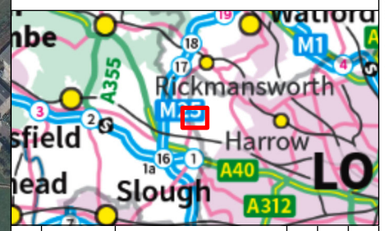
503600 503800 504000 504200 504400 504600 504800 505000 505200 505400 505600

190200 190000 189800 189600 189400 189200 189000 188800 188600

Legend:

- Site Boundary
- Waterbody 1
- Waterbody 2
- Waterbody 3
- Waterbody 4



Rev	Date	Description	Drn	Chk	App
00	18/05/2022	2483631	WF	RH	AA

Broadwater Lake

RSK biocensus EXPERTS IN ECOLOGY

TITLE: Figure 2:

Pond Locations

0 80 160 240

Metres

SCALE: 1:6,500 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 2483631- Broadwater Lake Ecological Mitigation\06 GIS\03 - APRX\2483631 - Broadwater Lake - Fig 2 - Pond Locations.aprx

References

ARG UK (2010), ARG UK Advice Note 5: *Great Crested Newt habitat Suitability Index*. Amphibian and Reptile Groups of the United Kingdom.

Biggs J., Ewald N., Valentini A., Gaboriaud C., Griffiths R.A., Foster J., Wilkinson J., Arnett A., Williams P. & Dunn F. (2014). *Analytical and methodological development for improved surveillance of the Great Crested Newt*. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

Oldham, R.S., Keeble, J., Swan, M.J.S. & Jeffcote, M. (2000), *Evaluating the suitability of habitat for the Great Crested Newt* (Triturus cristatus). Herpetological Journal, 10, 143-155.

Appendix 1: Legislation

Great Crested Newt

Triturus cristatus (Great Crested Newt) is listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), and receives full protection under Section 9. Great Crested Newts are also European Protected Species listed on The Conservation of Species and Habitats Regulations 2010 (as amended). This legislation makes it an offence to:

- deliberately capture, injure or kill a Great Crested Newt;
- deliberately disturb a Great Crested Newt (in such a way as to be likely to significantly affect, (i) the ability of a significant group of Great Crested Newt to survive, breed or rear/nurture their young; and (ii) the local distribution or abundance of the species concerned);
- deliberately take or destroys the eggs of such an animal;
- damage or destroy a breeding site or resting place of a Great Crested Newt; and
- possess, control, transport, sell, exchange a Great Crested Newt, or offer a Great Crested Newt for sale or exchange.

All resting and breeding places of Great Crested Newts receive legal protection even when Great Crested Newts are not present.

RSK biocensus
EXPERTS IN ECOLOGY
METHODOLOGY

Appendix 2: eDNA results

Client: Sophie Elliott,
RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-3517	Condition on Receipt: Good	Volume: Passed
Client Identifier: Waterbody 3, Broadwater lakes	Description: pond water samples in preservative	
Date of Receipt: 25/04/2022	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	27/04/2022
Degradation Control[§]	Within Limits	Real Time PCR	27/04/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	27/04/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2022	Date of issue:	27/04/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)

Greengage

Brighter strategies
for greener projects

Client: London Borough of Hillingdon

Project: Proposed Hillingdon Water Sports Facility, Broadwater Lake

Report: Breeding Bird Survey

QUALITY ASSURANCE

Issue/Revision:	Draft	Final
Date:	August 2022	August 2022
Comments:		
Prepared by:	Dr Jonty Denton / Mike Harris	Dr Jonty Denton / Mike Harris
Authorised by:	Stephanie Harper	Stephanie Harper
File Reference:	552023MJH09Aug22DV01_Breeding_Birds.docx	552023MJH09Aug22FV01_Breeding_Birds.docx

CONTENTS

Tables

Figures

1.0 EXECUTIVE SUMMARY

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon to undertake a breeding bird survey at a site known as Broadwater Lake in the London Borough of Hillingdon.

This report has been produced in support of a planning application which seeks to develop the Hillingdon Water Sports Facility (HWSF) on the site. At the time of the report, detailed proposals for the development had not been prepared.

The site is part of the wider Lower Colne Valley SSSI, a nationally designated site for nature conservation. The reason for the site's designation is primarily due to the breeding and wintering bird population it supports.

Of the approximately 48 birds recorded during the survey, at least 26 were confirmed breeding on site. The species recorded are a mixture of wetland and woodland bird species.

Any proposed development on site will need to be carefully designed so as not to impact the breeding bird population. Two key recommendations are:

- That Natural England is engaged and consulted as soon as possible and through the design process to discuss the proposals and to gain their thoughts on viability and design; and
- Wintering Bird Surveys should be undertaken to inform the design and considered alongside this breeding bird survey.

Further recommendations on how to minimise any future impact on breeding birds, assuming Natural England agree the scheme is viable, are provided.

Detailed proposals were not available at the time of report production and so compliance with legislation and policy will need to be considered once more detailed plans have been produced and after Natural England have been consulted.

2.0 INTRODUCTION

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon to undertake a breeding bird survey at a site known as Broadwater Lake in the London Borough of Hillingdon.

The survey aims were to survey and identify the breeding bird population present at site in order to inform future development proposals for the HWSF. At this stage, detailed designs for the proposals are not available. The results of this survey will be used to inform the design and, in time, identify appropriate mitigation, compensation and enhancement actions in light of the proposed development at site, ensuring legislative and planning policy compliance.

This document is a report of this survey and has been produced to support a planning submission for the site which seeks to develop the Hillingdon Water Sports Facility (HWSF) on the site.

2.1 SITE CONTEXT & STATUS

The assessment site covers an area of 8 hectares (ha) and is approximately centred on National Grid Reference TQ 0471 8921, OS Co-ordinates 504715 189215.

The site is located in South Harefield approximately 5km north of Uxbridge. The site lies within the Mid Colne Valley Site of Special Scientific Interest (SSSI). The habitats immediately surrounding the site primarily comprise Broadwater Lake to the north and west, woodland and the Grand Union Canal to the east, woodland, scrub and an active quarry to the south. Within the wider area, urban development in the form of South Harefield exists to the east with primarily further lakes, woodland and open grassland being present to the north, south and west.

2.2 PRELIMINARY ECOLOGICAL APPRAISAL

The Phase 1 Habitat Survey was carried out on 9th July 2021 by CGO Ecology Ltd.

Site-specific information was also sourced through Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) website[1] and a biological records search from Green Space Information for Greater London (GiGL) in relation to the presence of protected species, designated sites or areas of regional, national or international importance.

The key findings from the PEA were:

- The site lies within the Mid Colne Valley SSSI, which is designated primarily for the population of breeding and wintering birds it supports
- There were 9no. further statutory protected sites within 2km of the site
- 16no. non-statutory designated sites were identified within 2km of the site
- The GiGL search highlighted 9no. species of bat, and records of badger, water vole, hedgehog, over 100 bird species, GCN, grass snake, invertebrates, plants, and Invasive Non Native Species within 2km

- The PEA walkover recorded 122 plants, 11 birds, and at least 12 invertebrate species. The trees on site were numerous, and likely to hold bat roost potential. No Badger evidence was seen. Japanese knotweed and giant knotweed were present on site.
- Habitats recorded on site included:
    - Semi natural broadleaved woodland
    - Wet woodland
    - Standing water
    - Introduced shrub
    - Buildings and hardstanding
    - Amenity grassland
    - Localised areas of marshy grassland, ephemeral/short perennial and tall ruderal.
- Protected species potential identified on site include:
    - Breeding and wintering birds (a key reason for the SSSI designation)
    - Roosting, foraging and commuting bats
    - Otter and Water vole
    - Reptiles
    - Invertebrates
    - Hedgehog
    - Common toad
    - Fish

Recommendations for further survey and high-level mitigation measures were also recommended.

It is understood that a number of protected species surveys, in addition to the breeding bird survey, are being undertaken by others. At the time of this report production, the results of the other protected species surveys were not known.

3.0 METHODOLOGY

To provide a reasonable level of accuracy for determining the statuses of birds breeding on the site, monthly visits were undertaken between March- July 2022.

The site was walked at dawn on each visit for a minimum of 4 hours. Optics used were 10x42 Leica red spot binoculars and a Swarovski telescope. Surveys were conducted where possible in favourable weather conditions avoiding heavy rain and strong winds which could suppress bird activity especially vocalisations. Details of the prevailing weather conditions are summarized in Table 3.1.

Table 3.1 Survey Dates and conditions

date	Cloud cover	Rain	Wind	visibility
27/03/22	0%	No	Calm	Good
10/04/22	0%	No	Calm	Good
17/05/22	0%	No	Calm	Good
12/06/22	0%	No	Calm	Good
03/07/22	20%	No	Calm	Good

3.1 SURVEYOR COMPETENCIES

Dr Jonty Denton, who undertook the survey visits and contributed to this report, is a freelance Chartered Ecologist of over 30 years experience, with Natural England licenses for Bats, Dormice, Great Crested Newt, Natterjacks, Sand Lizard, Smooth Snake, and White-clawed Crayfish. His clients include Natural England, the National Trust, Crown Estates, County Trusts, Butterfly Conservation, the Ministry of Defence, Royal Parks, and many County and District Councils, as well as the Environment Agency and Thames Water. Jonty is a highly experienced ornithologist having carried out ornithological surveys (for breeding and wintering birds), including pioneering studies of impact on birds of construction of bridge crossings and specialist surveys of impacts of piling works on Brent Geese in Langstone harbour. Jonty has travelled widely across all the continents and has seen over 50% of the world's avifauna.

Mike Harris, who wrote this report, has a Bachelor's degree in Environmental Biology (BSc Hons), a Natural England Great Crested Newt Licence (2015-17819-CLS-CLS) and Dormouse Licence (2016-21291-CLS-CLS) and is a Chartered Environmentalist (CEnv) and Full member of CIEEM. Mike has over 18 years' experience in ecological surveying and has undertaken and managed numerous ecological surveys and assessments.

Dr Stephanie Harper, who reviewed and verified this report, has a bachelors degree in Environmental Biology (BSc Hons), a Natural England CL17 Bat Survey Level 1 Class Licence (2015-14723-CLS-CLS) and 15 years' experience in ecological surveying and consultancy.

This report was written by Dr Jonty Denton and Mike Harris and reviewed and verified by Stephanie Harper who confirms in writing (see the QA sheet at the front of this report) that the report is in line with the following:

- Represents sound industry practice;
- Reports and recommends correctly, truthfully and objectively;
- Is appropriate given the local site conditions and scope of works proposed; and
- Avoids invalid, biased and exaggerated statements.

3.2 CONSTRAINTS

The survey visits were undertaken during a suitable time of year and under suitable conditions. The site was fully accessible on all visits. No significant constraints were encountered.

4.0 RESULTS

4.1 SPECIES RESULTS PER SURVEY

The species of bird recorded per survey visit is provided in Table 4.1. The approximate location of each record is shown on Figure A.1 in Appendix A.

Table 4.1 Species list

Species	Status	27/03/22	10/04/22	17/05/22	12/06/22	03/07/22
Cormorant *Phalacrocorax carbo*		2	(30+)			1
Little Egret *Egretta garzetta*			(6)			1
Grey Heron *Ardea cinerea*		1	(6)	1		1
Great Crested Grebe *Podiceps cristata*		2	4	5	6	8+1
Little Grebe *Tachybaptus ruficollis*		5	4	4	6	6
Mute Swan *Cygnus olor*			1	6	3	5
Canada goose *Branta canadensis*		4	4	10	66	70
Greylag Goose *Answer anser*		6	2			
Egyptian goose *Alopochen aegyptiaca*		2	4	2	2	14
Mallard *Anas platyrhynchus*	A	4	6	2	8+1	11+1
Shoveler *Spatula clypeata*	A		6			
Gadwall *Mareca strepera*	A	4	2	2		2
Wigeon *Mareca penelope*	A	2				2
Tufted Duck *Aythya fuligula*		12	10	4	4+2	2+8
Red Crested Pochard *Netta rufina*						1
Pochard *Aythya ferina*	R	14		2+1	2+4	2+2

Species	Status	27/03/22	10/04/22	17/05/22	12/06/22	03/07/22
Moorhen *Gallinula chloropus*		2	5	3	6	6
Coot *Fulica atra*		10	11	8	8+7	10+9
Oystercatcher *Haematopus ostralegus*	A			1		
Kingfisher *Alcedo atthis*		1		2	1	1
Green Woodpecker *Picus viridis*		1	1			
Great Spotted Woodpecker *Dendrocopus major*			2	2	1	1
Red Kite *Milvus milvus*		1				
Common tern *Sterna hirundo*	A			6	1	3
Black-headed gull *Chroicocephalus ridibundus*	A	6		4	1	1
Lesser Black-backed gull *Larus fucus*				2	1	1
Herring Gull *Larus argentatus*	R	4				
Wood Pigeon *Columba palumbus*		2	4	5		2
Cuckoo *Cuculus canorus*	R				1h	1h
Wren *Troglodytes troglodytes*		8	9	8	10	10
Dunnock *Prunella modularis*	A	4		3	4+3	4+7
Robin *Erithacus rubecula*		9	8	8	7	5
Song Thrush *Turdus philomelos*	A	3	1	2	2	3
Blackbird *Turdus merula*		4	2	2	2	5
Long-tailed Tit *Aegithalos caudatus*		4	3	8	7	8
Great Tit *Parus major*		6	2	4	8	4+5
Blue Tit *Parus caeruleus*		8	7	5	7	7

Species	Status	27/03/22	10/04/22	17/05/22	12/06/22	03/07/22
Treecreeper *Certhia familiaris*		2	2	2+4	8	8
Goldcrest *Regulus regulus*					2	2
Chiffchaff *Phylloscopus collybita*		5	5	4	4	2+ 2
Blackcap *Sylvia atricapilla*		2	3	5	3	4+ 3
Garden Warbler *Sylvia borin*				4	1	2
Cetti's Warbler *Cettia cetti*		2	1	2	2	
Magpie *Pica pica*		1	1	1	1	1
Jackdaw *Corvus monedula*		4				
Carrion Crow *Corvus corone*		2	2		1	1
Jay *Garrulus glandarius*		2	2			
Rose-ringed parakeet *Psittacus krameri*		2	2	2	1	2

Species in Bold were attempted breeders.

Status refers to UK Conservation Status: A = Amber listed and R = Red listed

4.2 SUMMARY OF SIGHTINGS

The following is a summary of sightings during the survey visits.

Cormorant

- Overflyers on 27th March.
- Large nesting colony on island 300m to west

Grey Heron

- Overflyers on 27th March.
- Heronry on island 300m to west

Little Egret

- Six plus in heronry on island 300m to west.

Great Crested Grebe

- Two adults on 27th March and 10th April in east inlet. Four pairs in June but no sign of breeding.
- Four pairs but only one young chick being fed on 3rd July.

Little Grebe

- Two pairs on east lake and a singleton west of peninsula on 27th March.
- Two pairs again on closed pond in May and June.

Canada Goose

- A pair on island in east lake in April.

Greylag Goose

- Skein of 6 flew NE across site on 27th March.
- Two on 10th April in east inlet.

Egyptian Goose

- Resident no evidence of breeding on site.
- Pair in east inlet on 27th march and 10th April.
- On small island in east inlet on 12th June.

- Eight adults in east inlet in July

Mute Swan

- One swan into east inlet under bridge and 10th April. Adults but no sign of breeding.

Mallard

- Resident breeder, bred successfully.
- Two on 10th April in east inlet and four on western edge of peninsula
- Male on NW edge of site on 17th May. Duck with one small duckling west of site on 12th June
- Two groups of eclipse drakes on 12th June.
- Duck with one very young duckling to west of site on 3rd July.

Shoveler

- Pair on closed pond on 10th April, plus 6 west of peninsula.

Wigeon

- Two males west of site on 27th March. Pair west of site on 3rd July.

Gadwall

- Two pairs in east inlet on 27th March. One pair west of peninsula in April and again in May.

Tufted Duck

- Resident breeder, bred successfully.
- At least 20 roughly equal numbers of ducks and drakes on 27th March. Numerous on open water but not on closed pond.
- Only one pair close to area on 17th May.
- Duck with two duckling on closed pond on 12th June

Red-crested Pochard

- Pair west of site on 3rd June

Pochard

- Resident breeder, bred successfully.
- Seven drakes in inlet and 4 and a duck west of peninsula on 27th March. 6 west of peninsula on 10th April.

- Pair with one week old duckling in east inlet on 17th May.
- Duck with 4 small ducklings east of peninsula on 12th June.
- Pair with 2 ducklings on 3rd July off NW corner of main block

Moorhen

- Resident breeder, attempted breeder.
- Pair nesting in pool at south end of site. Also seen in east inlet on 10th April.

Coot

- Resident breeder, bred successfully.
- Nesting on island and inlets. Two pairs with chicks on closed pond on 12th June. Lots of strong juveniles in closed pond and inlet in July.

Oystercatcher

- One flew north just west of site in May.

Kingfisher

- Feeding in shallow water at edge of carr woodland area.
- Two chasing each other around in mid canopy in carr woodland section on 17th May.
- Female bird with fish on bill flew into carr wood on 12th June.

Green Woodpecker

- Heard offsite on 27th March, one calling on 10th April landed in dead trees in carr area.

Great Spotted Woodpecker

- Resident breeder.
- Two drumming and calling foraging and nest prospecting on 17th May.

Black-headed gull

- Frequent flocks on water east of island.

Lesser Black-backed gull

- Adult on first island off peninsula on 17th May.

Red Kite

- One roosting in trees on site on 27th March.

Wood Pigeon

- Resident, Bred successfully.
- Present at edge of site. Nesting in large willow in centre of site in July.

Cuckoo

- Heard off site to west on 12th June

Wren

- Resident, Breed successfully.
- Widespread across site and vocal

Dunnock

- Resident, Breed successfully.
- Widespread in areas with undergrowth. Fledglings seen on 12th June.

Chiffchaff

- Bred successfully.
- Three singing on site on 27th march. Dull individuals likely over-winterers.

Blackcap

- Summer visitor, Bred successfully.
- At least 2 singing on site. A male seen gathering nesting material just off site to SE on 10th April.

Garden Warbler

- Summer visitor, likely successful breeder.
- Four territories on 17th May.

Cetti's Warbler

- Resident breeder
- Vocal and foraging along south creek on 27th March.

- Only heard off site in quicksand area on 10th April. Vocal and mobile along south edge and off site to east by canal in May-June.

Reed Warbler

- Summer visitor
- One singing in quicksand area in May -July

Robin

- Resident breeder
- Widespread in peripheral hedgerows, woodland and shelter belts

Song Thrush

- Resident breeder
- Several across site on 27th March. Two singing from carr area on 12th June.
- Four singing across site on 3rd July.

Blackbird

- Resident breeder, bred successfully.
- Mainly around edge of site. Adults with food on eastern edge of site on fledglings on 12th June.

Long-tailed Tit

- Resident breeder, bred successfully.
- Several small flocks at west end in March.
- Post breeding flock on peninsula on 17th May.
- Two post breeding family groups on 12th June in mixed flock with great tit blue tit on east edge of site

Great Tit

- Resident breeder, bred successfully.
- Numerous on all visits with fledglings on 12th June in mixed flock with blue tit and Long-trailed tit on east edge of site

Blue Tit

- Resident breeder

- Several pairs prospecting in March-early April. fledglings on 12th June in mixed flock with great tit and Long-trailed tit on east edge of site

Goldcrest

- Resident likely attempted breeder.
- Two in conifers in garden on 12th June.

Treecreeper

- Resident breeder, bred successfully.
- Pair on tall trees in carr area in March and April. Pair with four fledglings on peninsula on 17th May. Family parties on peninsula and in quicksand area on 12th June.

Magpie

- One off site to east

Jackdaw

- Four present in March.

Carrion Crow

- Resident breeder.
- Occasional on tree tops around periphery. Possible nesting in carr wood on 10th April

Jay

- Pair on site on 27th March and on 10th April

Goldfinch

- Offsite only to east.

Rose-ringed parakeet

- Present and likely attempted breeder

5.0 DISCUSSION

The site is part of the wider Lower Colne Valley SSSI, a nationally designated site for nature conservation. The reason for the site's designation is primarily due to the breeding and wintering bird population it supports.

Of the approximately 48 birds recorded during the survey, at least 26 were confirmed breeding on site. The species recorded are a mixture of wetland and woodland bird species.

Any proposed development on site will need to be carefully designed so as not to impact the breeding bird population. Two key recommendations are:

- That Natural England is engaged and consulted as soon as possible and through the design process to discuss the proposals and to gain their thoughts on viability and design; and
- Wintering Bird Surveys should be undertaken to inform the design and considered alongside this breeding bird survey.

Should Natural England agree that the scheme is viable, where key habitat suitable for nesting birds is required to be cleared, the following is recommended:

- The loss of any habitat should be avoided and minimised where possible;
- If tree and scrub clearance is required, this should be undertaken outside of most sensitive time of year (March - August inclusive). Note though that clearance should also take in to consideration sensitive times of the year of over wintering birds (October - March), with the consideration informed by the results of a wintering bird survey;
- Compensatory habitat for breeding birds will need to be provided on at least a like-for like, or more, basis. This should also replicate the habitats being lost e.g. woodland, wet woodland, scrub etc. Ideally this should be created and be established prior to the loss of the existing habitat. This creation would ideally be elsewhere on site or within the immediate vicinity. As a last resort, the habitat creation could be offsite within the wider Borough, although this would need to be agreed with the LPA and Natural England;
- The footprint of the proposals should be as limited as possible, allowing for as much undisturbed space as possible to remain on site. This undisturbed space could be fenced off to restrict access;
- Bird boxes should be installed on any structures proposed and could be considered on trees within retained habitat.

6.0 SUMMARY AND CONCLUSIONS

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon to undertake a breeding bird survey at a site known as Broadwater Lake in the London Borough of Hillingdon.

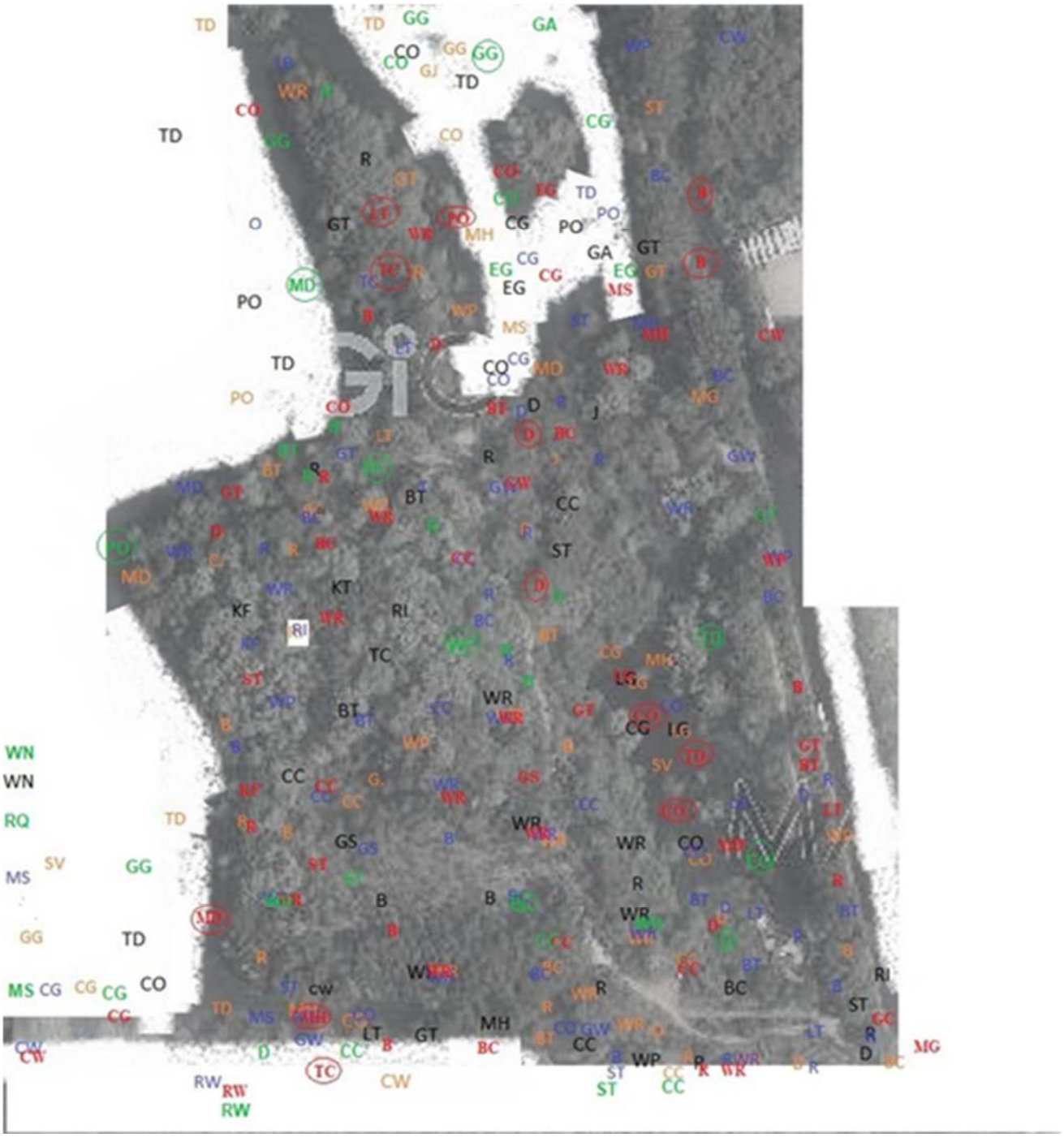
The site sits within the Mid Colne Valley SSSI, a nationally designated site that is primarily designated for the assemblage of breeding and wintering birds it supports. A total of five survey visits between March and July inclusive were undertaken. During the surveys approximately 48 species of bird were recorded, of which 26 were confirmed breeding on site.

High level recommendations have been made within the report, with the two key recommendations being that a wintering bird survey should be completed and that Natural England should be consulted and included in the design process.

Detailed proposals were not available at the time of report production and so compliance with legislation and policy will need to be considered once more detailed plans have been produced and after Natural England have been consulted.

APPENDIX A SURVEY RESULTS AND BTO SPECIES CODES

Figure A.1 Distribution of Sightings



Black Codes = 27/03/2022

Orange Codes = 10/04/2022

Blue Codes = 17/05/2022

Red Codes = 12/06/2022

Green Codes = 03/07/2022

BTO SPECIES CODES

AC	Arctic Skua	GA	Godwit	LE	Long-eared Owl	SM	Sand Martin
AE	Arctic Tern	GX	Gannet	LT	Long-tailed Tit	SS	Sanderling
AV	Avocet	GW	Garden Warbler	MG	Magpie	TE	Sandwich Tern
BO	Barn Owl	GY	Garganey	MA	Mallard	YI	Savi's Warbler
BY	Barnacle Goose	GC	Goldcrest	MN	Mandarin Duck	SQ	Scarlet Rosefinch
BA	Bar-tailed Godwit	EA	Golden Eagle	MX	Manx Shearwater	SP	Scaup
BR	Bearded Tit	OL	Golden Oriole	MR	Marsh Harrier	CY	Scottish Crossbill
BS	Berwick's Swan	GF	Golden Pheasant	MT	Marsh Tit	SW	Sedge Warbler
BI	Bittern	GP	Golden Plover	MW	Marsh Warbler	NS	Serin
BK	Black Grouse	GN	Goldeneye	MP	Meadow Pipit	SA	Shag
TY	Black Guillemot	GO	Goldfinch	MU	Mediterranean Gull	SU	Shelduck
BX	Black Redstart	GD	Goosander	ML	Merlin	SX	Shorelark
BJ	Black Tern	GI	Goshawk	M.	Mistle Thrush	SE	Short-eared Owl
B.	Blackbird	GH	Grasshopper Warbler	MO	Montagu's Harrier	SV	Shoveler
BC	Blackcap	GB	Great Black-backed Gull	MH	Moorhen	SK	Siskin
BH	Black-headed Gull	GG	Great Crested Grebe	MS	Mute Swan	S.	Skylark
BN	Black-necked Grebe	ND	Great Northern Diver	N.	Nightingale	SZ	Slavonian Grebe
BW	Black-tailed Godwit	NX	Great Skua	NJ	Nightjar	SN	Snipe
BV	Black-throated Diver	GS	Great Spotted Woodpecker	NH	Nuthatch	SB	Snow Bunting
BT	Blue Tit	GT	Great Tit	OP	Osprey	ST	Song Thrush
BU	Bluethroat	GE	Green Sandpiper	OC	Oystercatcher	SH	Sparrowhawk
BL	Brambling	G.	Green Woodpecker	PX	Pealowl/Peacock	AK	Spotted Crake
BG	Brent Goose	GR	Greenfinch	PE	Peregrine	SF	Spotted Flycatcher
BF	Bullfinch	GK	Greenshank	PH	Pheasant	DR	Spotted Redshank
BZ	Buzzard	H.	Grey Heron	PF	Pied Flycatcher	SG	Starling
CG	Canada Goose	P.	Grey Partridge	PW	Pied Wagtail	SD	Stock Dove
CP	Capercaillie	GV	Grey Plover	PG	Pink-footed Goose	SC	Stonechat
C.	Carrion Crow	GL	Grey Wagtail	PT	Pintail	TN	Stone-curlew
CW	Cetti's Warbler	GJ	Greylag Goose	PO	Pochard	TM	Storm Petrel
CH	Chaffinch	GU	Guillemot	PM	Ptarmigan	SL	Swallow
CC	Chiffchaff	FW	Guineafowl (Helmeted)	PU	Puffin	SI	Swift
CF	Chough	HF	Hawfinch	PS	Purple Sandpiper	TO	Tawny Owl
CL	Cirl Bunting	HH	Hen Harrier	Q.	Quail	T.	Teal
CT	Coal Tit	HG	Herring Gull	RN	Raven	TK	Temminck's Stint
CD	Collared Dove	HY	Hobby	RA	Razorbill	TP	Tree Pipit
CM	Common Gull	HZ	Honey Buzzard	RG	Red Grouse	TS	Tree Sparrow
CS	Common Sandpiper	HC	Hooded Crow	KT	Red Kite	TC	Treecreeper
CX	Common Scoter	HP	Hoopoe	ED	Red-backed Shrike	TU	Tufted Duck
CN	Common Tern	HM	House Martin	RM	Red-breasted Merganser	TT	Turnstone
CO	Coot	HS	House Sparrow	RQ	Red-crested Pochard	TD	Turtle Dove
CA	Cormorant	JD	Jackdaw	FV	Red-footed Falcon	TW	Twite
CB	Corn Bunting	J.	Jay	RL	Red-legged Partridge	WA	Water Rail
CE	Corncrake	K.	Kestrel	NK	Red-necked Phalarope	W.	Wheatear
CI	Crested Tit	KF	Kingfisher	LR	Redpoll (Lesser)	WM	Whimbrel
CR	Crossbill (Common)	KI	Kittiwake	RK	Redshank	WC	Whinchat
CK	Cuckoo	KN	Knot	RT	Redstart	WG	White-fronted Goose
CU	Curlew	LM	Lady Amherst's Pheasant	RH	Red-throated Diver	WH	Whitethroat
DW	Dartford Warbler	LA	Lapland Bunting	RE	Redwing	WS	Whooper Swan
DI	Dipper	L.	Lapwing	RB	Reed Bunting	WN	Wigeon
DO	Dotterel	TL	Leach's Petrel	RW	Reed Warbler	WT	Willow Tit
DN	Dunlin	LB	Lesser Black-backed Gull	RZ	Ring Ouzel	WW	Willow Warbler
D.	Dunnock	LS	Lesser Spotted Woodpecker	RP	Ringed Plover	CD	Wood Sandpiper
EG	Egyptian Goose	LW	Lesser Whitethroat	RI	Ring-necked Parakeet	WO	Wood Warbler
E.	Eider	LI	Linnet	R.	Robin	WK	Woodcock
FP	Feral Pigeon	ET	Little Egret	DV	Rock Dove (not feral)	WL	Woodlark
ZL	Feral/hybrid goose	LG	Little Grebe	RC	Rock Pipit	WP	Woodpigeon
ZF	Feral/hybrid mallard type	LU	Little Gull	RO	Rook	WR	Wren
FF	Fieldfare	LO	Little Owl	RS	Roseate Tern	WY	Wryneck
FC	Firecrest	LP	Little Ringed Plover	RY	Ruddy Duck	YW	Yellow Wagtail
F.	Fulmar	AF	Little Tern	RU	Ruff	Y.	Yellowhammer

APPENDIX B LEGISLATION

B.1 BIRDS

All wild birds are protected under Wildlife and Countryside Act 1981[2], as amended, from damage or destruction of their nest whilst in use or construction, some birds listed on Schedule 1 receive additional protection from disturbance during nesting.

In addition some birds are classified according to their conservation status: this includes their position on the amber/red list of Birds of Conservation Concern (BoCC).

REFERENCES

[1] *MAGIC (2019); Interactive Map. (Partnership project involving six government organisations: Defra (Department for Environment, Food and Rural Affairs); English Heritage; Natural England; Environment Agency; Forestry Commission; Department for Communities and Local Government). Available at: www.magic.gov.uk.*
[2] *HM Government, (1981); Part I and Part II of Wildlife and Countryside Act (as amended). HMSO*

APPENDIX C RELEVANT LEGISLATION AND POLICY

C.1 LEGISLATION

Current key legislation relating to ecology includes The Environment Act[6] Wildlife and Countryside Act 1981 (as amended)[7]; The Conservation of Habitats and Species Regulations 2019 ('Habitats & Species Regulations')[8], The Countryside and Rights of Way Act 2000 (CRoW Act)[9], and The Natural Environment and Rural Communities Act, 2006[10].

The Environment Act, 2021

The Environment Act, 2021 will mandate the requirement for new development in England to deliver a minimum 10% biodiversity net gain (BNG), as measured by the agreed metric (the current relevant version being the Natural England metric 3.1), secured through planning condition as standard (as per schedule 14 of the Act). Approach to the delivery of BNG must follow the mitigation hierarchy, with avoidance of impact and on-site compensation/gains prioritised, ahead of the use of offsite biodiversity unit offsets, or the purchase of biodiversity credits.

The Act introduces the condition that no development may begin unless a biodiversity net gain plan has been submitted and approved by the local planning authority (LPA).

The Act also amends requirements of the NERC Act, 2006, adding the need to not just conserve, but enhance biodiversity through planning projects. Furthermore, it introduces the need for the LPA to have regard to relevant local nature recovery strategies and relevant species/protected site conservation strategies, when making their decision.

Under the Act, the enhancements must be maintained for at least 30 years.

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

The Conservation of Habitats & Species Regulations replace The Conservation (Natural Habitats, etc.) Regulations 1994 (as amended)[11], and transpose Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora ('EU Habitats Directive')[12], and Council Directive 79/409/EEC on the Conservation of Wild Birds ('Birds Directive')[13] into UK law (in conjunction with the Wildlife and Countryside Act).

Regulation 43 and 47 respectively of the Conservation of Habitats & Species Regulations makes it an offence (subject to exceptions) to deliberately capture, kill, disturb, or trade in the animals listed in Schedule 2 (European protected species of animals), or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5 (European protected species of plant). Development that would contravene the protection afforded to European protected species requires a derogation (in the form of a licence) from the provisions of the Habitats Directive.

Regulation 63 (1) states: 'A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which —

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects); and

(b) is not directly connected with or necessary to the management of that site;

must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.'

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats[14] (the 'Bern Convention') and the Birds Directive and EU Habitats Directive are implemented in Great Britain.

The Countryside and Rights of Way Act 2000

The Wildlife and Countryside Act has been updated by the CRoW Act. The CRoW Act amends the law relating to nature conservation and protection of wildlife. In relation to threatened species it strengthens the legal protection and adds the word 'reckless' to the offences of damaging, disturbing, or obstructing access to any structure or place a protected species uses for shelter or protection, and disturbing any protected species whilst it is occupying a structure or place it uses for shelter or protection.

The Natural Environment and Rural Communities Act 2006

The Natural Environment and Rural Communities Act 2006 states that every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity. Biodiversity Action Plans provide a framework for prioritising conservation actions for biodiversity.

Section 41 of the Natural Environment and Rural Communities Act requires the Secretary of State to publish a list of species of flora and fauna and habitats considered to be of principal importance for the purpose of conserving biodiversity. The list, a result of the most comprehensive analysis ever undertaken in the UK, currently contains 1,149 species, including for example, hedgehog (Erinaceus europaeus), and 65 habitats that were listed as priorities for conservation action under the now defunct UK Biodiversity Action Plan[15] (UK BAP). Despite the devolution of the UK BAP and succession of the UK Post-2010 Biodiversity Framework[16] (and Biodiversity 2020 strategy[17] in England), as a response to the Convention on Biological Diversity's (CBD's) Strategic Plan for Biodiversity 2011-2020[18] and EU Biodiversity Strategy (EUBS)[19], this list (now referred to as the list of Species and Habitats of Principal Importance in England) will be used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 41 of the Natural Environment and Rural Communities Act 2006 'to have regard' to the conservation of biodiversity in England, when carrying out their normal functions.

Biodiversity Action Plans

Non-statutory Biodiversity Action Plans (BAPs) have been prepared on a local and regional scale throughout the UK over the past 15 years. Such plans provide a mechanism for implementing the government's broad strategy for conserving and enhancing the most endangered ('priority') habitats and species in the UK for the next 20 years. As described above the UK BAP was succeeded in England by Biodiversity 2020 although the list of priority habitats and species remains valid as the list of Species of Principal Importance for Nature Conservation.

Regional and local BAPs are still valid however and continue to be updated and produced.

Detail on the relevant BAPs for this site are provided in the main text of this report.

Legislation Relating to Nesting Birds

Nesting birds, with certain exceptions, are protected from intentional killing, destruction of nests and destruction/taking of eggs under the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act. Any clearance of dense vegetation should therefore be undertaken outside of the nesting bird season, taken to run conservatively from March to August (inclusive), unless an ecologist confirms the absence of active nests prior to clearance.

Legislation Relating to Bats

All UK bats and their roosts are protected by law. Since the first legislation was introduced in 1981, which gave strong legal protection to all bat species and their roosts in England, Scotland and Wales, additional legislation and amendments have been implemented throughout the UK.

Six of the 18 British species of bat have Biodiversity Action Plans (BAPs) assigned to them, which highlights the importance of specific habitats to species, details of the threats they face and proposes measures to aid in the reduction of population declines.

Although habitats that are important for bats are not legally protected, care should be taken when dealing with the modification or development of an area if aspects of it are deemed important to bats such as flight corridors and foraging areas.

The Wildlife & Countryside Act 1981 (WCA) was the first legislation to provide protection for all bats and their roosts in England, Scotland and Wales (earlier legislation gave protection to horseshoe bats only.)

All eighteen British bat species are listed in Schedule 5 of the Wildlife and Countryside Act, 1981 and under Annexe IV of the Habitats Directive, 1992 as a European protected species. They are therefore fully protected under Section 9 of the 1981 Act and under Regulation 43 of the Conservation of Habitats and Species Regulations 2017, which transposes the Habitats Directive into UK law. Consequently, it is an offence to:

- Deliberately capture, injure or kill a bat;
- Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats;

- Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time);
- Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat; and
- Intentionally or recklessly obstruct access to a bat roost.

This legislation applies to all bat life stages.

The implications of the above in relation to the proposals are that where it is necessary during construction to remove trees, buildings or structures in which bats roost, it must first be determined that work is compulsory and if so, appropriate licenses must be obtained from Natural England.

Legislation Relating to Reptiles

All species of reptile native to the UK are protected to some degree under national and/or international legislation, which provides mechanisms to protect the species, their habitats and sites occupied by the species.

Sand lizards and smooth snakes are European protected species and are afforded full protection under Section 9 of the Wildlife and Countryside Act 1981 and Regulation 43 of the Conservation of Habitats and Species Regulations 2017. However, these species are rare and highly localised. Their occurrence is not considered as relevant in this instance, as the ranges and specialist habitats of these species do not occur at this site.

The remaining widespread species of native reptiles (adder, grass snake, slow worm and viviparous lizard) are protected under part of Section 9(1) and all of Section 9(5) of the Wildlife and Countryside Act 1981. They are protected against intentional killing and injury and against sale, transporting for sale etc. The habitat of these species is not protected. However, in terms of development, disturbing or destroying reptile habitat during the course of development activities while reptiles are present is likely to lead to an offence under the Wildlife and Countryside Act 1981. It is therefore important to identify the presence of these species within a potential development site. If any of these species are confirmed, all reasonable measures must then be taken to ensure the species are removed to avoid the threat of injury or death associated with development activities.

Each species of native reptile has specific habitat requirements but general shared features include a structurally diverse habitat that provides for shelter, basking, foraging and hibernating.

All reptiles are BAP species and as such are also of material consideration in the planning process due to the NPPF.

Legislation Relating to Badgers

Badgers and their setts are protected under the Protection of Badgers Act 1992[20], an Act which consolidated and strengthened previous legislation, including the Badgers (Further Protection) Act 1991, the Badgers Act 1991 and the Badgers Act 1973. In England and Wales, it is an offence to:

· Wilfully kill, injure or take a badger;

· Attempt to kill, injure or take a badger;

· Cruelly ill-treat a badger;

· Dig for a badger;

· Intentionally or recklessly damage or destroy a badger sett, or obstruct access to it;

· Cause a dog to enter a badger sett; or

· Disturb a badger when it is occupying a sett.

A licence may be obtained from the appropriate authority (Natural England or Natural Resources Wales) to carry out any activities prohibited by the Act, subject to the conditions of the licence being adhered to.

Legislation Relating to Water Voles

Water Voles are protected by the Wildlife & Countryside Act (1981) (as amended). It is an offence to intentionally kill, injure or capture a water vole or be in possession of a live or dead water vole or any part of one or intentionally damage, destroy or obstruct access or disturb any water vole shelter or disturb while occupying such shelter. Works to water vole habitat may require a licence from Natural England.

Legislation Relating to Otter

Otter is protected by both the Wildlife and Countryside Act (1981) (listed on Schedule 5) and the Conservation of Habitats and Species Regulations 2019 which make it an offence to capture, kill disturb or injure an otter, damage or destroy a breeding or resting place, obstruct access to their resting or sheltering places and possess, sell, control or transport live or dead or parts of an otter. Activities which involve the disturbance of otter or the destruction of its places of shelter require a license from Natural England.

C.2 PLANNING POLICY

National

National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2021[21] sets out the Government's planning policies for England, including how plans and decisions are expected to apply a presumption in favour of sustainable development. Chapter 15 of the NPPF focuses on conservation and enhancement of the natural environment, stating plans should 'identify and pursue opportunities for securing measurable net gains for biodiversity'.

It goes on to state: 'if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'.

The NPPF states that development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other

developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest

Alongside this, it acknowledges that planning should be refused where irreplaceable habitats such as ancient woodland are lost.

Regional

The London Plan[22]

Policy G1 Green infrastructure

6. London's network of green and open spaces, and green features in the built environment such as green roofs and street trees, should be protected, planned, designed and managed as integrated features of green infrastructure.
7. Boroughs should prepare green infrastructure strategies that integrate objectives relating to open space provision, biodiversity conservation, flood management, health and wellbeing, sport and recreation.
8. Development Plans and Opportunity Area Planning Frameworks should:
    1. identify key green infrastructure assets, their function and their potential function
    2. identify opportunities for addressing environmental and social challenges through strategic green infrastructure interventions.
9. Development proposals should incorporate appropriate elements of green infrastructure that are integrated into London's wider green infrastructure network.

Policy G5 Urban greening

1. Major development proposals should contribute to the greening of London by including urban greening as a fundamental element of site and building design, and by incorporating measures such as high-quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage.
2. Boroughs should develop an Urban Greening Factor (UGF) to identify the appropriate amount of urban greening required in new developments. The UGF should be based on the factors set out in Table 8.2, but tailored to local circumstances. In the interim, the Mayor recommends a target score of 0.4 for developments that are predominately residential, and a target score of 0.3 for predominately commercial development. (excluding B2 and B8 uses).
3. Existing green cover retained on site should count towards developments meeting the interim target scores set out in (B) based on the factors set out in Table 8.2.

Policy G6 Biodiversity and access to nature

1. Sites of Importance for Nature Conservation (SINCs) should be protected.
2. Boroughs, in developing Development Plans, should:
    a. use up-to-date information about the natural environment and the relevant procedures to identify SINCs and ecological corridors to identify coherent ecological networks
    b. identify areas of deficiency in access to nature (i.e. areas that are more than 1km walking distance from an accessible Metropolitan or Borough SINC) and seek opportunities to address them
    c. support the protection and conservation of priority species and habitats that sit outside the SINC network, and promote opportunities for enhancing them using Biodiversity Action Plans
    d. seek opportunities to create other habitats, or features such as artificial nest sites, that are of particular relevance and benefit in an urban context
    e. ensure designated sites of European or national nature conservation importance are clearly identified and impacts assessed in accordance with legislative requirements.
3. Where harm to a SINC is unavoidable, and where the benefits of the development proposal clearly outweigh the impacts on biodiversity, the following mitigation hierarchy should be applied to minimise development impacts:
    a. avoid damaging the significant ecological features of the site
    b. minimise the overall spatial impact and mitigate it by improving the quality or management of the rest of the site
    c. deliver off-site compensation of better biodiversity value.
4. Development proposals should manage impacts on biodiversity and aim to secure net biodiversity gain. This should be informed by the best available ecological information and addressed from the start of the development process.
5. Proposals which reduce deficiencies in access to nature should be considered positively.

Policy G7 Trees and woodlands

1. London's urban forest and woodlands should be protected and maintained, and new trees and woodlands should be planted in appropriate locations in order to increase the extent of London's urban forest – the area of London under the canopy of trees.
2. In their Development Plans, boroughs should:
    a. Protect 'veteran' trees and ancient woodland where these are not already part of a protected site
    b. Identify opportunities for tree planting in strategic locations

3. Development proposals should ensure that, wherever possible, existing trees of quality are retained [Category A and B]. If planning permission is granted that necessitates the removal of trees, there should be adequate replacement based on the existing value of the benefits of the trees removed, determined by, for example, i-tree or CAVAT or another appropriate valuation system. The planting of additional trees should generally be included in new developments – particularly large-canopied species which provide a wider range of benefits because of the larger surface area of their canopy.

London Environment Strategy 2018[23]

The Mayor's Environment Strategy was published in May 2018. This document sets out the strategic vision for the environment throughout London. Although not primarily a planning guidance document, it does set strategic objectives, policies and proposals that are of relevance to the delivery of new development in a planning context, including:

Objective 5.1 Make more than half of London green by 2050

Policy 5.1.1 Protect, enhance and increase green areas in the city, to provide green infrastructure services and benefits that London needs now.

This policy states:

"New development proposals should avoid reducing the overall amount of green cover and, where possible, seek to enhance the wider green infrastructure network to increase the benefits this provides. […] New developments should aim to avoid fragmentation of existing green space, reduce storm water run-off rates by using sustainable drainage, and include new tree planting, wildlife-friendly landscaping, or features such as green roofs to mitigate any unavoidable loss".

This supports the 'environmental net gain' approach promoted by government in the 25 Year Environment Plan.

Proposal 5.1.1.d The London Plan includes policies to green streets and buildings, including increasing the extent of green roofs, green walls and sustainable drainage.

Objective 5.2 conserving and enhancement wildlife and natural habitats

Policy 5.2.1 Protect a core network of nature conservation sites and ensure a net gain in biodiversity

This policy requires new development to include new wildlife habitat, nesting and roosting sites, and ecologically appropriate landscaping will provide more resources for wildlife and help to strengthen ecological corridors. It states:

"Opportunities should be sought to create or restore priority habitats (previously known as UK Biodiversity Action Plan habitats) that have been identified as conservation priorities in London [and] all land managers and landowners should take BAP priority species into account".

Local Policy

The Hillingdon Local Plan sets out the strategic policies guiding development in the Borough. A Strategic Objective of particular note is:

'S08: Protect and enhance biodiversity to support the necessary changes to adapt to climate change. Where possible, encourage the development of wildlife corridors.'

It also sets out policy under Policy EM7 for the Borough;

Hillingdon's biodiversity and geological conservation will be preserved and enhanced with particular attention given to:

- 2. The protection and enhancement of all Sites of Importance for Nature Conservation. Sites with Metropolitan and Borough Grade 1 importance will be protected from any adverse impacts and loss. Borough Grade 2 and Sites of Local Importance will be protected from loss with harmful impacts mitigated through appropriate compensation.
- 3. The protection and enhancement of populations of protected species as well as priority species and habitats identified within the UK, London and the Hillingdon Biodiversity Action Plans.
- 4. Appropriate contributions from developers to help enhance Sites of Importance for Nature Conservation in close proximity to development and to deliver/ assist in the delivery of actions within the Biodiversity Action Plan.
- 5. The provision of biodiversity improvements from all development, where feasible.
- 6. The provision of green roofs and living walls which contribute to biodiversity and help tackle climate change.
- 7. The use of sustainable drainage systems that promote ecological connectivity and natural habitats.

Invertebrate Scoping Study, Colne Valley SSSI, Unit 3

Report by Jon Mellings BSc for Ecology by Design Ltd, 6th May, 2022

Contents

Summary

- An invertebrate scoping study was undertaken in response to a planned development within the footprint of unit 3 of the Mid Colne Valley SSSI at Uxbridge, Greater London.
- The survey area comprised c9.5 hectares of habitat comprising, wet and dry woodland, grassland, standing water and swamp areas on the site of a historic gravel quarry. The northern and western margins of the site form the margins of a large gravel pit lake.
- A datasearch undertaken by GiGL within a 2.5km radius of the survey area indicated that a number of statutory and non-statutory sites designated for their nature conservation interest occur within the wider landscape. Several sites support representative wet woodland, wetland and grassland habitat comparable to that recorded within the survey area.
- Invertebrate species data provided within the GiGL datasearch, whilst not exhaustive, included a high proportion of records of Decaying wood associated species. Additional records of s41 and Annex II Desmoulin Whorl Snail *Vertigo moulinsiana*, occur within 0.1km of the survey area, indicate potential value of the site's wetland and riparian marginal habitat.
- Although the habitat within the site as a whole was considered to be unexceptional; from the field survey, in combination with datasearch information, the following habitats were identified as having potential to support invertebrate assemblages of conservation significance:
    - Resource of mature native wet and dry woodland trees and standing and fallen wood-decay habitat with features of potential value to arboreal, wet woodland and decaying wood assermblages.
    - Wetland habitat comprising riparian and lacustrine habitat of potential for supporting aquatic and other wetland associated invertebrate assemblages including potentially, Desmoulin's Whorl Snail.
- Further detailed invertebrate surveys focussing on decaying wood, wet woodland, arboreal are recommended. In addition, surveys of wetland habitat, including in particular in relation to lacustine marginal vegetation stands and wetland associated sedges occurring at the site's southern boundary.
- Survey work should include species-specific survey to establish presence/absence of Desmoulin's Whorl Snail.

Introduction

The following report details the findings of a scoping study evaluating the invertebrate conservation potential of habitat occupying approximately 9.5 hectares of land, at the site of a proposed change of use to a recreational lake, within Unit 3 of the Mid Colne Valley SSSI nr. Uxbridge, West London. The SSSI is designated primarily for its breeding woodland and wetland birds, as well as, its wintering wildfowl populations. The site also supports one of the last remaining examples of unimproved chalk grasslands in Greater London and supports a range of other habitats including wetland and woodland.

The area survey for the purpose of this study comprised primarily of broadleaved wet and dry woodland with areas of standing water/carr habitat and a lacustrine habitat occupying the margin of a former gravel pit lake. The central area of the site supported some semi-improved grassland habitat at the track edges some colonising areas of hardstanding; immediately to the east of the central path, there were also significant areas colonised by dense non-native *Buddleja davidii* scrub.

The survey was a scoping exercise, rather than a detailed survey. Therefore, the evaluation this report is based on the potential quality of habitat recorded during the survey, alongside designated site information and associated invertebrate records. Areas and habitat with potential to support species and assemblages of conservation value, are listed and recommendations for further survey are included.

Aims and objectives

Aim

The main aim of the surveys was to scope the potential conservation value of invertebrate habitat within the site of a proposed recreational lake development occupying part of Unit 3 of the Mid Colne Valley SSSI.

Objectives

1. To undertake a brief desk study based on previously recorded invertebrate species of conservation value and a review of statutory and non-statutory nature conservation sites within and adjacent to the survey area;
2. To conduct a baseline invertebrate habitat scoping survey;
3. To produce a report including findings, an evaluation of key habitat and species assemblages and an appraisal of the potential conservation value of the site for invertebrates;
4. Provide brief recommendations in terms of further survey requirements and potential development constraints.

Method

Desk study

Existing information including sites subject to statutory and non-statutory designation, as well as invertebrates historically recorded and within a two kilometre radius of the site was consulted for the purpose of this study. An independent desk study and datasearch conducted for the purpose of the current project by GiGL/eCountability (Ritchie, 2022) was consulted.

Field survey

Habitat Scoping

Scoping fieldwork was conducted between 9.30 and 15.30 on the 22nd April, 2022. The weather was dry but coolish for the duration of the site visit.

The entire site was walked and brief habitat descriptions were made using target notes. Habitat features with potential to support invertebrate assemblages/species of conservation value were recorded, mapped and geo-referenced. Target notes recorded during the survey are included in Appendix 1, Table 1 and a map of the survey area, with ascribed field numbers is included in Appendix 2, Figure 1.

Particular emphasis was placed on habitat features with potential to support significant species assemblages, including those defined within the Pantheon analytical resource, as well as species listed in section 41 of the Natural Environment and Rural Communities Act (2006) and other species of note which have been recorded within, or close to the survey area. A photographic record of representative habitats was made during the survey and is included in Appendix 3.

The primary aim of the survey was to scope the habitat rather than to record species. However, some incidental species records were made during the survey and are included in Appendix 1. Table 2. The scoping study followed a habitat-based approach and with due consideration to standard invertebrate survey approaches outlined in NERR005 (Drake *et al*, 2007).

Limitations

- The report is a scoping study only. Therefore, any invertebrate species records are incidental only and the report must not be considered as being of sufficient resolution to be used in lieu of a detailed invertebrate survey.
- Habitat conditions recorded during the survey must be seen as a snapshot in time.
- The desk study is based on limited records. Invertebrate records are often based entirely on incidental records made incidentally by amateur naturalists and there can, therefore, be considerable discrepency bewteen locations in terms of recording effort.
- Due to the relatively low temperatures experienced for the most part of the fieldwork element of the project, relatively few incidental invertebrates were seen during the survey.

Results/discussion

Desk study

The following information was souced from an independent desk study and datasearch conducted for the purpose of the current project by GiGL/eCountability (Ritchie, 2022).

Sites subject to statutory and non-statutory nature conservation designations

Sites subject to statutory designation within a 2.5km radius of the Mid Colne Valley SSSI survey area, are listed within the following table:

Site name	Designation(s)	Approximate distance from redline area	Habitat (from citation)	Key species (from citation)
Mid-Colne Valley	SSSI (includes Unit 3 which forms part of the survey area, as well as other Units comprising the SSSI)	Unit 3 comprises part of the survey area;	132 ha site representing a cross-section of the River Colne flood-plain and the adjoining valley slopes which rise abruptly to the east and west and lie on Upper Chalk, with Pebbly Clay capping the higher western slopes. An extensive series of flooded pits occupy much of the floodplain resulting from the gradual and continuing extraction of underlying river gravels. The northerly pit, Broadwater, is one of the largest expanses of open water in the	Site designated primarily for the diversity of breeding woodland and wetland birds and for the numbers of wintering wildfowl. On the eastern valley slope is one of the last remaining examples of unimproved chalk grassland in Greater London.

Site name	Designation(s)	Approximate distance from redline area	Habitat (from citation)	Key species (from citation)
			Colne Valley and is unusual with its scattering of small wooded islands. Around the pits on the dividing causeways are remnants of the original grasslands and valley alderwoods. These grade into various types of beech and hornbeam woodland and mixed scrub on the western slopes.	
Harefield Pit	SSSI	c0.55km (northeast)	Mainly designated for Geological interest, but with remnant calcareous flora in the Reading Beds.	No reference to invertebrates in citation, but site with invertebrate potential
Northmoor Hill Wood	LNR	c0.65km (west)	Ancient woodland	No reference to invertebrates in citation, but site with invertebrate potential
Ruislip Woods	NNR, LNR, SSSI	c1.5km (east)	Extensive, 305 ha ancient, semi-natural woodland site, including some of the largest, unbroken blocks in Greater London. Site also occurs in mosaic with other semi-natural habitats including acid grass-heath mosaic and areas of wetland.	SSSI citation refers to important insect fauna including 'Lepidoptera and Diptera'. Recorded species include rot hole specialist wood soldierfly species *Xylomyia maculata* (classed Nationally Rare with a threat status of 'Vulnerable' under post-2001 IUCN guidelines; also moths including Light Orange Underwing *Archiearis notha;* Lead-coloured Drab *Orthosia populeti* and Great Oak Beauty *Hypomecis roboraria*.
Old Park Wood	SSSI	c1.7km (north)	A 16.7 ha ancient woodland SSSI, supporting some of the most floristically rich ancient woodlands in Greater London. Contains contains a complex transition through widely differing woodland types.	Wet woodland present on site. No mention of invertebrate value on site, but likely to support a significant fauna.
Denham Country Park	LNR	c2.2km south	19.82 ha. Site supports meadows, rivers and woodlands	Potential to support wetland, woodland and grassland invertebrate assemblages, but no details in datasearch documents
Denham Quarry Park	LNR	c2.5km south	22.22 ha. Meadowland and flooded quarry land	Potential to support wetland, woodland and grassland invertebrate assemblages, but no details in datasearch documents. Citation refers to dragonflies and damselflies, but is not specific.
Frays Valley	LNR	c2.5km south	71.84 ha. The whole of the LNR contains a wide diversity of habitats. The flooded gravel pits provide valuable habitat for wildfowl, and Fray's Farm Meadows represent some of the last remaining examples of wet alluvial grassland in Greater London and are important for a variety of plant	Desmoulin's Whorl Snail *Vertigo moulinsiana*, a UK protected species occurs in Denham Lock Woods.

Site name	Designation(s)	Approximate distance from redline area	Habitat (from citation)	Key species (from citation)
			species. A number of ancient woodland herbs that are extremely uncommon in Greater London and the protected Desmoulin's Whorl Snail *Vertigo moulinsiana* is present in Denham Lock Woods.	

Sites subject to non-statutory nature conservation designations

16 SNCIs were recorded within a 2.5km radius of the survey area. No proposed SNCIs or RIGS or LIGS within the search area.

Site name	Designation(s)	Approximate distance from redline area	Habitat (from citation)	Key species (from citation)
London's Canals	SNCI	Uncertain	A composite SNCI comprising canals within the London area. Amenity grassland, Bare ground, Canal, Planted shrubbery, Ruderal, Scattered trees, Scrub, Secondary woodland, Semi-improved neutral grassland, Tall herbs, Vegetated wall/tombstones, Wet marginal vegetation, Wet woodland/carr	Not specified other than generic reference to dragonflies and damselflies. Habitat likely to support diverse aquatic invertebrate fauna
Ruislip Woods and Poor's Field	SNCI (also NNR, LNR, SSSI)	c1.5km (east)	See also under statutory sites (above)	There is also an important invertebrate fauna including several nationally rare and scarce species (see under statutory sites (above)
Old Park Wood	SNCI	c1.5km (north)	See also under Old Park Wood SSSI. A sizeable woodland, mostly ancient, with a good variety of woodland stand-types due to variations in geology and topography. The site supports a particularly rich flora, including nationally scarce species	Wet woodland present on site. No mention of invertebrate value on site, but likely to support a significant fauna
Mid Colne Valley	SNCI (also SSSI)	Partly overlaps with survey area	See also under statutory sites (above). This section of the Colne Valley includes a diverse range of high quality habitats. Several waterways include the Frays River, from which 53 species of aquatic and wetland plants have been recorded. The unimproved wet pastures of Frays Farm Meadows (a Site of Special Scientific Interest and Local Nature Reserve managed by the London Wildlife Trust and Hillingdon Natural History Society) support a very rich flora	Citation mentions Desmoulin's Whorl Snail *Vertigo moulinsiana*, a UK protected species; also Balsam Carpet Moth *Xanthorhoe biriviata* and Glow-worm *Lampyris noctiluca*. Likely to support a range of wet woodland and wetland species

Site name	Designation(s)	Approximate distance from redline area	Habitat (from citation)	Key species (from citation)
Coppermill Down	SNCI	c1km (north)	This site comprises the only natural chalk grassland in London north of the Thames. It supports a diverse flora, with typical downland species such as Upright Brome *Bromopsis erecta*, Dwarf Thistle *Cirsium acaule*, Salad Burnet *Sanguisorba minor*, Fairy Flax *Linum catharticum* and Cowslip *Primula veris*	The site has an important invertebrate fauna. Part of the Mid Colne Valley Site of Special Scientific Interest.
Harefield Chalk Pit	SNCI	c0.25km (northeast)	See also under statutory sites (above). One of four old chalk pits in the east Colne Valley, Harefield Pit comprises a strip of dense woodland on steeply undulating raised ground to the south, and a wooded seasonally damp basin to the north. Part of the southern wood is a Site of Special Scientific Interest	No reference to invertebrates in citation, but site with invertebrate potential
Harefield Churchyard and Wood	SNCI	c0.5km (northeast)	Ancient woodland, Bare ground, Marsh/swamp, Pond/lake, Secondary woodland	No reference to invertebrates in citation, but site with invertebrate potential
Shepherd's Hill Woods and Fields	SNCI	c2.4km (east)	Ancient woodland, Bare ground, Bracken, Coniferous woodland, Hedge, Improved agricultural grassland, Pond/lake, Running water, Scrub, Secondary woodland, Semi- improved neutral grassland, Tall herbs, Unimproved neutral grassland	No reference to invertebrates in citation, but site with invertebrate potential
Dew's Dell	SNCI	c1.2km (southeast)	Bare ground, Pond/lake, Ruderal, Secondary woodland, Semi-improved neutral grassland, Tall herbs, Unimproved neutral grassland, Wet grassland	No reference to invertebrates in citation, but site with invertebrate potential
Newyears Green	SNCI	c2km (southeast)	A woodland believed to have been planted in the late 19th century, surrounded by fields and hedges. Hedge, Scrub, Secondary woodland, Semi-improved neutral grassland, Tall herbs, Wet ditches	No reference to invertebrates in citation, but site with invertebrate potential
Medipark Site	SNCI	c1.5km (northeast)	An interesting mosaic of habitats has developed within the former grounds of a demolished hospital building, including species-rich neutral to chalk grassland, scrub and some marginal secondary woodland. This site adjoins the eastern edge of Old Park Wood	Reference to Marbled White and Common Blue Butterflies. Roesel's Bush-cricket also mentioned as being Nationally Scarce; however, the species has long been downgraded from this status and is widespread and common throughout the southern half of the UK

Site name	Designation(s)	Approximate distance from redline area	Habitat (from citation)	Key species (from citation)
The Dairy Farm, Harefield	SNCI	c1km (northeast)	Hedge, Semi-improved neutral grassland, Unimproved neutral grassland, Wet ditches, Wet grassland	No reference to invertebrates in citation, but site with invertebrate potential
Knightscote Farm Ponds	SNCI	c1.3km (northeast)	Two ponds separated by an area of woodland, one used for fishing. Bracken, marsh/swamp, pond/lake, ruderal, wet woodland/carr	No reference to invertebrates in citation, but site with invertebrate potential
Harefield Green Pond	SNCI	c1.2km (northeast)	A small pond on the edge of the historic village green of Harefield. Marsh/swamp, pond/lake, scattered trees	Citation mentions that the pond is likely to support aquatic invertebrate populations
Breakspear House Wood	SNCI	c1.2km (east)	A small ancient woodland with a footpath running through it. This small woodland is dominated by Ash *Fraxinus excelsior,* with frequent Pedunculate Oak *Quercus robur* and Sycamore *Acer pseudoplatanus.* Stands of Beech *Fagus sylvatica*, with occasional Hornbeam *Carpinus betulus* and Horse Chestnut *Aesculus hippocastanum* make up the rest of the canopy.	Speckled Wood - a common species of butterfly, is mentioned on the citation; however, the age of the wood suggest it may support an interesting invertebrate fauna
Harefield Hospital Ponds and the Old Orchard	SNCI	c1.3km (northeast)	The two ponds in the grounds of Harefield Hospital are examples of mid- and late-successional habitats; the eastern pond being full of water with a well-developed marginal flora and the western one of mainly willow scrub, mud and leaf litter with a small area of water. An old orchard of over-mature Apple *Malus domestica* and plum *Prunus domestica* trees is part of the council-owned Mount Pleasant Farm. These old fruit trees are likely to be valuable for inverebrates.	The orchard and mature oaks may support important invertebrate assemblages

Historic records of invertebrate species of recognised conservation status

Species of conservation status recorded within a 2.5 kilometre radius of the survey area provided within the Gigl dataset are included within the below table:

English Name	Scientific Name	Earliest Year	Latest Year	Total Records	Status	SAT affinities	Habitat-level affinities
Hairy Dragonfly	*Brachytron pratense*	2018	2019	3	Locally Important	N/a	Acid & sedge peats
A long-legged fly	*Hercostomus plagiatus*	1987	1987	1	Formerly NS	N/a	Acid & sedge peats
Purple Emperor	*Apatura iris*	2015	2018	2	NT; protection	N/a	Arboreal
White Admiral	*Limenitis camilla*	1989	2017	8	S41 Vu	N/a	Arboreal
Kent Bent-wing	*Phyllocnistis xenia*	2014	2014	1	RL-VU	N/a	Arboreal
A scraptiid beetle	*Anaspis costai*	2010	2010	2	NS	Bark & sapwood	Decaying wood

English Name	Scientific Name	Earliest Year	Latest Year	Total Records	Status	SAT affinities	Habitat-level affinities
						decay	
Dark-shouldered Sap Hoverfly	*Brachyopa pilosa*	2009	2009	1	NS	Bark & sapwood decay	Decaying wood
A sap beetle	*Epuraea longula*	2009	2009	1	NS	Bark & sapwood decay	Decaying wood
A tumbling flower beetle	*Mordellistena neuwaldeggiana*	2010	2010	2	NS	Bark & sapwood decay	Decaying wood
A minute tree-fungus beetle	*Cis festivus*	2010	2010	1	NS	Fungal fruiting bodies	Decaying wood
A rove beetle	*Gyrophaena munsteri*	2009	2009	1	RDBK	Fungal fruiting bodies	Decaying wood
Brown Tree Ant	*Lasius brunneus*	2009	2010	2	Formerly NS	Heartwood decay	Decaying wood
Stag Beetle	*Lucanus cervus*	1998	2018	8	S41; protection	Heartwood decay	Decaying wood
A tumbling flower beetle	*Mordellistena humeralis*	2010	2010	3	NS	N/a	Decaying wood
Common Club-tail	*Gomphus vulgatissimus*	1968	1968	1	NT	Slow flowing rivers	Running water
Red-girdled Mining Bee	*Andrena labiata*	2011	2011	1	Formerly NS	Rich flower resource	Short sward & bare ground
Silver-washed Fritillary	*Argynnis paphia*	2017	2017	1	Low Priority	Scrub edge	Tall sward & scrub
A flea beetle	*Apteropeda globosa*	2009	2009	1	NS	N/a	Tall sward & scrub
Green Hairstreak	*Callophrys rubi*	2011	2011	2	Low Priority	N/a	Tall sward & scrub
Jersey Tiger	*Euplagia quadripunctaria*	2015	2015	1	HDir2	N/a	Tall sward & scrub
Essex Skipper	*Thymelicus lineola*	1991	2013	2	Low Priority	N/a	Tall sward & scrub
Cinnabar	*Tyria jacobaeae*	2012	2013	2	S41 research only	N/a	Tall sward & scrub
A pollen beetle	*Meligethes atramentarius*	2009	2009	1	NS	N/a	N/a
A tumbling flower beetle	*Mordellistena variegata*	2010	2010	2	NS	N/a	N/a

Conservation status of historically recorded species

A total of 24 invertebrate species, all insects, were listed in the GiGL data search spreadsheet, all having been recorded within a 2.5km radius of the survey area. Of these, three species are afforded a threat status of 'Vulnerable' and two as 'Near Threatened' based on post-2001 IUCN criteria; one species is listed in the RDBK 'unknown' category based on pre-1994 criteria; nine species are currently classed as nationally scarce (or still listed in one of the former Notable A or B categories); one species, the Hairy Dragonfly *Brachytron pratense,* is listed as 'Locally Important' within the Greater London region, whilst three species; Silver-washed Fritillary *Argynnis paphia,* Green Hairstreak *Callophrys rubi* and Essex Skipper *Thymelicus lineola*, have no official status and are listed as 'Low Priority'.

Two of the species including Stag Beetle *Lucanus cervus,* White Admiral *Limenitis camilla* are listed as 'Priority Species' under section 41 of the NERC Act, 2006, whilst a third, the Cinnabar Moth *Tyria jacobaeae* is listed under the section 41 as 'Research only', a status afforded to a number of still widespread and common British moth species, for which a decline has been recorded in recent decades.

A further three species, still listed in the GiGL dataset as Nationally Scarce, have been subject to status revisions and are now considered to be too widely recorded for the NS category. These include *Hercostomus plagiatus* - a species

of long-legged fly; the Red-girdled Mining Bee *Andrena labiata* and the Brown Tree Ant *Lasius brunneus*, a species which has been recorded in numerous sites in the southern UK.

Stag Beetle is also protected under Appendix 1,2 and 3 of the Bern Convention and is listed on Annex 2 of the EU Habitats Directive (Non-priority species) and Purple Emperor *Apatura iris* is also protected for collection and sale under Section 5 of the UK Wildlife and Countryside Act (1981), as amended.

Pantheon affinities of historically recorded species

For the purpose of this review, species records have been analysed using the Pantheon analytical resource https://pantheon.brc.ac.uk/ in order to establish habitat affinities of recorded species. The habitat affinities are represented within the 'Habitat-level' and 'Specific Assemblage Type' (SAT) columns of the table.

Whilst the analysis involved too few species to be robust and should not be viewed as a meaningful analysis under Pantheon/ISIS (Invertebrate Species-habitat Information System) criteria, a useful guage of habitat affinities of species recorded within close-proximity of the survey area can be gained.

Of the 24 species; 9 are attributed to the 'Decaying wood' habitat-level classification and more precisely under one or other of the three SATs nested withinn this assemblage, namely: A212 'Bark and sapwood decay', A213 'Fungal fruiting bodies' and A211 'Heartwood decay'. A further three species were listed at habitat-level under A1 'Arboreal' assemblage.

Of the remaining assemblages; six species were attributed to the F2 'Tall sward and scrub' assemblage and three species to two wetland assemblages; W3 'Acid and sedge peats' and W1 'Running water'.

The most frequently recorded species of these include Stag Beetle and White Admiral; both of which have been recorded on eight occasions. In the UK, Stag Beetle was listed as Nationally Scarce, with the threat status of 'Least Concern' in a status review by Lane and Mann (2016). Stag Beetle is a saproxylic insect, the larvae developing in rotting wood. Stag Beetles take between three and seven years to develop, often in the below ground sections of rotting trees, stumps or larger wooden posts. White Admiral is associated primarily with ancient woodlands, where it frequents sunny rides. The larval foodplant of this butterfly is Honeysuckle *Lonicera periclymenum*. There are post-2000 records for White Admiral from within less than 1km of the survey area and Stag Beetle has been recorded from within 1.5km from Denham Green.

2022 Scoping study survey

Survey Area

The area covered by the survey is outlined in Appendix 2, Figure 1 and a table of habitat specific target notes corresponding to numbers on the map is included in Appendix 1, Table 1.

The survey area comprised approximately 9.5 hectares of land, this occupying the footprint of Unit 3 of the Mid Colne Valley SSSI. This area is contiguous with Unit 4 of the SSSI, which lies immediately south of the survey area, whilst Unit 2 lies a few hundred metres to the west.

General Habitat

The habitat within the main survey area comprised mainly of semi-natural broadleaved woodland, the bulk of this habitat occupying the area immediately to the west of a central path, which more or less divided the site along a central north/south axis. The habitat within this area occupied approximately 4.4 hectares, with a further 0.8 hectare peninsula, also supporting semi-natural broadleaved woodland connected to the main area by a wooden bridge.

The habitat to the east of the central track comprised, for the most part, of habitat of somewhat lower potential conservation value, with extensive areas of dense stands of non-native *Buddleja davidii*, which gave rise to a heavy shaded ground layer. However, a rather inaccessible open water area with emergent native broadleaves characteristic of wet woodland and carr habitat, occurred beyond this, occupying the eastern boundary of the survey area. Also, more mature native broadleaves also occurred as standards within the Buddleia dominated area.

The central track itself was characterised fairly herb-rich, short grazed grassland, which whilst being confined to scallops on either side of the central path, collectively comprosed a reasonable area. Evidence of former human activity was evident throughout the site, with areas of partially vegetated hard standing, as well as concrete constructions and topographical evidence of former quarry activity.

Whilst much of the site was level, there was topographical variation within the eastern part of the site, notably including a steep escarpment between the dense scrub woodland to the east of the main track and the standing water and carr habitat at the sites's easternmost boundary.

The western wooded area included flattish areas, with frequent inundated depressions, including some largish areas of standing water, within the wetter woodland areas.

Semi-natural broadleaved woodland

The woodland occurring to the west of the central track, on the easternmost site boundary and on the narrow northern peninsula of the site, was generally structurally diverse with distinct canopy, understorey, shrub and ground layers. Much of the habitat was wet woodland supporting stands of mature trees typical of such habitat, including Crack Willow *Salix fragilis*, Alder *Alnus glutinosa* and Downy Birch *Betula pubescens*. These occurring in differing levels of relative abundance throughout the site and occasionally other canopy species including Lombardy Poplar *Populus nigra italicum*.

Drier wooded habitat occurred in mosaic with the wetter woodland, with such habitat typically occupying the more elevated banks and raised areas of the site. A fairly significant stand of Silver Birch *Betula pendula* occurred within the western area, with mature trees (Appendix 1, Table 1, TN16; Appendix 3, Photograph 1), as well as young growth colonising an area of partially vegetated bare ground at TN11 (Photograph 2).

Understorey trees typically included Goat/Grey Willow *Salix caprea/cinerea*, the more mature examples of these penetrating the canopy (Photograph ; with saplings and young trees of other species occurring alongside, as well as a range of smaller tree species including Hawthorn *Crataegus monogyna*, Elder Elder *Sambucus nigra,* Hazel *Corylus avellana* and Blackthorn *Prunus spinosa,* occurring more typically on drier, raised banks and plateaux, in mosaic with the lower lying wet woodland habitat. Shrub layer woody species included Bramble *Rubus fruticosus* agg. Common Dog Rose *Rosa canina*, Wild Redcurrant *Ribes rubrum*, Wild Raspberry *Rubus idaea*, Old Man's Beard *Clematis vitalba* and occasional Bittersweet *Solanum dulcamara*. Buddleia *Buddleja davidii* occurred locally in the scrub layer throughout the site, but was most abundant in the dense stand immediately to the east of the central track (See TNs 5 and 6).

The woodland groundflora was most diverse in the western section of the site, particularly around TNs 20 and 16, where species including Bugle *Ajuga reptans*, Common Dog Violet *Viola riviniana,* Primrose *Primula vulgaris*, Wood Dock *Rumex sanguineus*, Enchanter's Nightshade *Circaea lutetiana* and Ground Ivy *Glechoma hederacea*, were present, alongside locally abundant Pendulous Sedge *Carex pendula.* However, Common Nettle *Urtica dioica,* Cleavers *Galium aparine*, Garlic Mustard *Alliaria petiolata* and Wood Avens *Geum urbanum* with Ivy *Hedera helix* and Ground Ivy, were the most frequently occurring groundlayer species (Photograph 3) .

Other species less frequently recorded locally within the woodland groundflora included Carnation Sedge *Carex panicea*, Tutsan *Hypericum andosaemum*, native Bluebell *Hyacinthoides non-scripta*, forget-me-nots *Myosotis* sp., Cow Parsley *Anthriscus sylvestris*, Nipplewort *Lapsana communis* and Lords and Ladies *Arum maculatum* and in the wetter areas and lakeside margins; Water Mint *Mentha aquatica,* Yellow Flag *Iris pseudacorus,* Gipsywort *Lycopus europaeus* and Hemp Agrimony *Eupatoria cannabinum*. Bryophytes were abundant in many parts of the woodland ground layer.

Structurally, the woodland area to the west of the site and on the peninsula was fairly open, with some light reaching the groundlayer (Photographs . Herbs such as Ground Ivy, Bugle and Primrose provided foraging habitat for nectaring insects, including bumblebees *Bombus* spp. and various diptera. There was a significant amount of fallen and some standing wood decay habitat (TNs 18, 21 Photograph 4); frequently trees including Crack Willow had fallen into water and there was a strong resource of saturated wood decay habitat within the areas of partially shaded

standing water within the wet woodland (Photograph 5). The variation in groundlevel provided opportunities for aquatic and hygrophilous invertebrates as well as those associated with drier, woodland floor habitats.

Wetland

Open water habitat within the wet woodland areas occurred both to the east of the site immediately west and south of TN1 (Photograph 6) and more extensively, throughout the wooded area to the west of the main track dividing the site. The open water areas were frequently fairly extensive and were frequently populated with inundated wet woodland trees including Crack Willow, Grey Willow and Alder (TNs 1 and 14; Photograph 7). These often being mature. Fallen wood decay habitat was also a feature of such habitat and the habitat at TN14, in particular, supported some standing wood decay habitat of good potential value for saproxylic invertebrates. Much of the open water was rather anoxic and lacked aquatic vegetation, besides localised marginal stands of species such as Yellow Flag, Gipsywort, Water Mint and Pendulous Sedge.

There was some more interesting habitat along the southernmost site boundary, within an area marked as being dangerous due to 'quick sand' (around TN13). Here, a flattish wet sand/silt substrate with numerous tussocks of Pendulous Sedge and occasional Gipsywort, was present (Photograph 8). The habitat here, whilst being somewhat overshaded, was structurally diverse and had potential to support wetland margin, tussock associated invertebrates.

The western and northern perimeter of the main survey area and the margins of the narrow, northern peninsula constituted the shoreline of the larger, ex-gravel-pit lake. The habitat was frequently shaded by overhanging willows and Alder from the wet woodlands. The lake margins were generally over silt and gravel substrate and shelved shallowly from the margin. However, relatively little aquatic vegetation was visible at the time of survey, with much of the shoreline being entirely devoid emergent, floating-leaved or submerged aquatic vegetation. Exceptions to this rule were observed around TNs 17 and 19. The former of these was the best developed at the time of survey, comprising a stand of emergent vegetation with macrophytes including Lesser Pond Sedge *Carex acutiformis*, Water Mint*,* Bittersweet and Yellow Flag. Terrestrial wet woodland habitat in area of good relative quality (Appendix 3, Photograph 9).

Lacustrine marginal habitat can support hygrophilous invertebrate assemblages, including species associated with wetland edge habitats and seasonally wetted areas. These edge habitats, together with the wet mud habitats at the margins of the various waterbodies within the site's wet woodlands, were relatively extensive and have potential to support some interesting invertebrate fauna. In addition, whilst there was relatively little well vegetated open water aquatic habitat, there may be some potential for the site to support aquatic invertebrate assemblages of some conservation value, especially if considered alongside the hygrophilous species, which jointly comprise habitat-level 'Marshland', 'Peatland' and 'Lake' invertebrate assemblages in Pantheon. There were some tussocky habitats with potential to support 'moss and tussock fen' specific assemblage types, and 'open water on disturbed mineral sediments' and/or 'litter-rich fluctuating marsh' assemblages, may also be represented.

Grassland and other open habitat

The grassland habitat within the survey area was confined to scalloped edges along the central path of the main survey area. The habitat was more or less flat throughout and whilst much of the grassland was characterised by graminoid and herb vegetation representative of drier habitat, there was evidence of localised drainage impedence and wetting, giving rise to vegetation characteristic of damper habitats in some parts. Although some of the grassland comprised a well established sward (e.g. TN 8; Photograph 10); there were also areas of partially vegetated habitat over hardstanding and very thin soils (e.g. TNs 7 and 11; Photographs 11 & 2).

The sward was generally short throughout, with evidence of grazing by rabbit/deer and there was significant bare ground within the open areas, some with evident hard standing, some with sandy soil substrate. A diverse groundflora was recorded within the combined open ground areas on either side of the central path with graminoids including Yorkshire Fog *Holcus lanatus*, Creeping Bent *Agrostis stolonifera*, Common Bent *A. capillaris,* Red Fescue *Festuca rubra*, Smooth-stalked Meadow Grass *Poa pratensis*, Cock's-foot *Dactylis glomerata* and in damper areas, Hard Rush *Juncus inflexus* and herbs including Germander Speedwell *Veronica chamaedrys*, Perforate St John's-wort *Hypericum perforatum*, Selfheal *Prunella vulgaris*, Dandelion *Taraxacum officinale* agg., Yarrow *Achillea millefolium*, Creeping Cinquefoil *Potentilla reptans*, Common Mouse-ear *Cerastium fontanum*, Common Cat's-ear *Hypochaeris radicata*, Common Bird's-foot Trefoil *Lotus corniculatus,* Bulbous Buttercup *Ranunculus bulbosus*, Ground Ivy

Glechoma hederacea, Ribwort Plantain *Plantago lanceolata*, Greater Plantain *P.major*, Dove's-foot Crane's-bill *Geranium molle*, Common Ragwort *Senecio jacobaea,* Hoary Ragwort *S. erucifolius* and locally, a stonecrop *Sedum* sp. and Goat's Rue *Galega officinalis*, Common Stork's-bill *Erodium cicutarium* was locally abundant in sandier areas of vegetated hard standing, with species such as Teasel *Dipsacus fullonum*, Wavy Bittercress *Cardamine flexuosa* occurring in damper areas.

Lichens including *Cladonia* sp. and bryophytes were also abundant, particularly over areas of hard standing. The margins with scrub woodland to the east of the track were generally Buddleia dominated, but with some seedling *Betula* sp. and *Rubus fruticosus* agg. Bare gravel/sand patches present throughout sward. The western side of the path supported more representative native woody species.

A more defined patch of wetter grassland habitat with a good edge succession through Bramble scrub to the wet woodland margin occurred towards the south of the central track, near the site entrance (TN12; Photograph 12) Here, the habitat comprised Yorkshire Fog and Creeping Bent with locally abundant Hard Rush with sedges *Carex* spp. and herbs including Cuckoo-flower *Cardamine pratense*, Greater Bird's-foot Trefoil *Lotus pedunculatus* and Water Mint *Mentha aquatica*, indicating localised wetting, alongside species associated with drier habitats including Ground Ivy, Common Bird's-foot Trefoil, Ribwort Plantain, Greater Plantain, Selfheal, Creeping Cinquefoil and Yarrow.

Collectively the open ground and wet and dry grassland habitats adjacent to the central track provided some potentially valuable habitat for short sward and bare ground invertebrate assemblages, as well as aculeate Hymenoptera and diptera associated with rich-flower resource habitat. In addition the herb rich borders, in close proximity to wood decay habitat, provided potential habitat for beetles developing as larvae within wood decay habitat, many of which require tall herb vegetation as adults.

Incidental invertebrates[1]

In total 22 invertebrate species were recorded incidentally during the scoping study, these are listed in Appendix 1, Table 2. The majority of species recorded were common and widespread and included generalist species of bee, beetle and fly. The weather during the survey was dry and windless; however, the temperature was below average for the time of year and there was, consequently, invertebrate activity was low.

Several species of common bumblebee *Bombus* spp. were recorded, including the Forest Bumblebee Bombus sylvestris, a cuckoo of other bumblebee species such as *B. pratorum*. This species is associated with woodland habitats. Dark-edged Beefly *Bombylius major,* was also recorded within the central grassland area. This species is a brood parasite in the nests of *Andrena* and other genera of mining bees.

Evaluation

Habitat within the survey area comprised predominately wet and dry broadleaved woodland and scrub, with areas of standing water, swamp, wet and dry grassland and lacustrine edge habitat, following much of th site's perimeter. Much of the woodland and scrub habitat to the east of the central track supported habitat of limited invertebrate potential, due to the predominance of non-native *Buddleja davidii* scrub.

The enclosed waterbody adjacent to the extreme, eastern site boundary, held somewhat greater potential for species associated with the wet woodland canopy and standing water, but was heavily shaded, therefore, invertebrate potential was somewhat diminished.

[1] Invertebrate species recorded incidentally during a scoping study such as this typically comprise mainly of more visually distinctive species, which are commonly spotted and easily recorded during what is, fundamentally, a habitat based exercise. Such records frequently include butterflies, some bumblebees and other readily identified taxa. Therefore, incidental records cannot in any way be considered as a substitute for more detailed invertebrate surveys.

The best potential invertebrate habitat occupied the western part of the site and of particular importance, the juxtaposition of mature wet woodland, partially shaded open water, scrub and damp, semi-improved grassland, occupying the southern site boundary, immediately west of the central track/grassland area. Here, the groundlayer was generally sheltered and well-lit, providing structural diversity potentially favourable to wet woodland, swamp and bare-mud associated invertebrates.

There was a significant resource of wood decay habitat, here, as throughout much of the site's woodland; however, fallen and standing wood decay habitat, with potential mainly for bark and sapwood decay assemblages, often occurred under detrimentally dense shade, especially to the north and east of the site.

Standing water within the site was often heavily shaded also and also supportef little in the way of swamp/aquatic macrophyte vegetation. It was, therefore, rather lacking the structural diversity beneficial to aquatic invertebrate assemblages. However, such habitat, including saturated logs and silt edge habitats, can be important for the larvae and adults of certain two-winged fly (Diptera) and beetle (Coleoptera) families.

The open water of the lacustrine margin, was frequently lacking significant aquatic vegetation; however, some small patches of marginal emergent and submerged aquatic vegetation, where it occurred, could support some aquatic invertebrate diversity, reflecting that of habitats within the wider landscape.

The grassland and partially vegetated bare ground areas could be of potential value to short sward and bare ground and tall sward and scrub invertebrates; however, the habitat was unexceptional, except in structural terms, where in combination with Bramble *Rubus fruticosus* agg. scrub, wetland and woodland edge could provide habitat for species requiring different habitat elements at different times of their lifecycle; e.g. wood decay beetles, flies and aculeate Hymenoptera.

A number of both statutory sites and non-statutory SNCIs occur within a 2.5km radius of the site, several of these being much closer. Some sites are large and support habitat similar to, or complementary to the site, with a number of wet and dry broadleaved woodlands, several of which are considered to be ancient woodland. Wetland habitats, including both open water and swamp habitats, as well as unimproved and herb-rich semi-improved grasslands, are also well represented within both statutory and non-statutory sites.

Although the citations rarely mention invertebrates, or invertebrate assemblages specifically, several are known to support significant assemblages. Data provided by GiGL contained relatively few records of invertebrates of higher conservation status; however, this is often the case with local record centre data, even in areas of high diversity. From records analysed using Pantheon, Decaying wood species of higher conservation status, were particularly well represented within the output. Nine species were attributed to this group, with an additional three species being attributed to another tree-associated assemblage, Arboreal.

Whilst not constituting proof, these findings indicate the likelihood of decaying wood assemblages being well represented, this potential being reinforced by the abundance of ancient and secondary wet and dry woodland and wood pasture proxy habitat occurring in the immediate and wider landscape.

Somewhat surprisingly, wetland species of recognised conservation status were not particularly well represented in the Pantheon output. Owing to the extensive wetland resource within the datasearch area, a greater number of species of conservation status would be expected to have resulted from the search. However, certain species did not appear in the datasearch; notably Desmoulin's Whorl Snail *Vertigo moulinsiana*, which is listed within citations both for Frays Valley LNR and Mid Colne Valley SNCI (but not in the SSSI citation). Desmoulin's Whorl Snail is currently classed as Nationally Scarce in the UK, as well as being listed on section 41 of the NERC Act (2006) as a 'priority species'. Importantly the species is listed as a non-priority species in Annex 2 of the European Habitats Directive. The species has, however, been recorded more frequently in recent years, possibly due to greater search effort.

According to the NBN Gateway species dictionary, Desmoulin's Whorl Snail has been recorded, from several locations in the series of wetlands between Uxbridge, in the south and Rickmansworth in the north and there is a record from within 100 metres of the northern extremity of the survey area.

Conclusions

On face-value, the overall value of the site did not appear to be exceptional, there were habitat elements of potential value for supporting decaying wood, wet woodland and arboreal assemblages. Desmoulin's Whorl Snail has been historically recorded within close proximity of the survey area and Despite the lack of an abundance of typical emergent vegetation on site with which this species is usually associated, Desmoulin's Whorl Snail has been historically recorded within close proximity of the survey area.

It is recommended that further survey focussing particularly on the Wood decay, wet woodland and arboreal assemblages should be undertaken. In addition, a study to establish presence/absence of Desmoulin's Whorl Snail on site, should also be undertaken.

Confirmation of important features

From the findings of the 2022 scoping study, habitat resources with potential to support invertebrate assemblages of conservation significance were recorded as follows.

- Resource of mature native wet and dry woodland trees and standing and fallen wood-decay habitat with features of potential value to arboreal, wet woodland and wood-decay assermblages.
- Wetland habitat comprising riparian and lacustrine habitat of potential for supporting aquatic and other wetland associated invertebrate assemblages including potentially, Desmoulin's Whorl Snail.

Recommendations

Further survey

- Based on findings of the scoping study it is recommended that detailed invertebrate surveys are undertaken within the survey area to adequately inform the planning process in relation to this project.
- Surveys should focus on:
    - Wood-decay and arboreal invertebrate assemblages associated with mature native trees and associated wood-decay resources within the survey area;
    - Aquatic and hygrophilous invertebrate assemblages associated with the site's better wetland habitat, with a particular focus on Desmoulin's Whorl Snail.

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Appendices

Appendix 1 – Tables

Table 1 – 2022 Habitat target notes

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
1	22/04/2022	Eastern site boundary	TQ04836 89249	Lane edge hedgebank & open water/carr habitat	Hedgebank on eastern site boundary, adjacent access track. Hedgebank followed enterity of margin of woodland boundary and supported broadleaved canopy trees including mature *Salix fragilis* and occasional *Betula pendula/ pubescens* and *Populus nigra italica*, with an understorey of *S. caprea/cinerea, Crataegus monogyna, Corylus avellana, Sambucus nigra and Buddleja davidii,* with occasional *Clematis vitalba.* Scrub included *Rubus fruticosus agg.* and occasional *Ribes rubrum.* Ground layer with *Alliaria petiolata, Urtica dioica, Galium aparine, Anthriscus sylvestris, Hedera helix, Arum maculatum, Geum urbanum* and *Lapsana communis.* Inundated habitat immediately west of the hedgebank supported stagnant standing water, with little evident aquatic vegetation and mature *Salix* spp. emerging from waterbody, creating shade. Waterbody silted with leaf debris, but with some saturated branches and logs. Scattered marginal vegetation on damp banks with *Iris pseudacorus* and *Lycopus europaeus*.	Limited potential for saproxylics and aquatic invertebrates.	Marshland, Peatland, wet woodland, arboreal, wood decay	Fairly good

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
2	22/04/2022	Northern peninsula	TQ04688 89350	Broadleaved woodland	Wooded peninsula with central raised area, supporting drier woodland and margins with wetter woodland habitat. Some bark and sapwood decay habitat. Dominant canopy trees included mature, multi-stemmed *Salix fragilis, Alnus glutinosa* and *Betula pendula/pubescens*; with *Salix cinerea/caprea* in the understorey and *Crataegus monogyna, Prunus spinosa, Sambucus nigra* and *Ilex aquifolium*; a scrub layer with *Rubus fruticosus* agg., *R. idaeus, Ribes rubrum* and *Rosa canina*. Also *Clematis vitalba* and *Hedera helix.* Ground layer partially shaded with *Urtica dioica, Galium aparine* and *Anthriscus sylvestris* with patches of shade tolerant herbs including *Glechoma hederacea, Lapsana communis, Alliaria petiolata, Stachys sylvatica* and *Arum maculatum* with *Carex pendula* in wetter areas. Also a range of other herbs including *Ranunculus repens, Hypericum perforatum, Prunella vulgaris, Rumex sanguineum, Potentilla reptans, Heracleum sphondylium* and *Arctium minus*. The groundlayer locally open with species including G*alega officinalis.*	Some bark and sapwood decay and arboreal potential	Arboreal, Bark & sapwood decay	Fairly good
3	22/04/2022	Northern peninsula	TQ04639 89461	Marginal habitat	Marginal habitat with Mature *Salix fragilis* and *S. cinerea/caprea* and occasional *Alnus glutinosa* overstanding marginal lacustrine habitat. Groundflora with marginal *Mentha aquatica, Eupatoria cannabinum, Iris pseudacorus, Oenanthe crocata* and *Lycopus europaeus* with areas of bare silt. Marginal open water gently shelving, with silt and gravel substrate; slightly overshaded. No obvious emergent, floating or submerged aquatic vegetation at time of survey. Some aquatic and wet woodland invertebrate potential, also some potential for bark and sapwood decay invertebrates.	Aquatic and hygrophilus invertebrates, some bark and sapwood decay and arboreal habitat	Marshland, Peatland, wet woodland, arboreal, wood decay	Fairly good
4	22/04/2022	Northern peninsula	TQ04694 89341	Channel between main survey area and northern peninsula	Aquatic habitat around bridge to northern peninsula with narrow channel between woodland areas. Shallowly shelving gravel substrate to about 0.5 metres mid-channel. Little or no in-channel aquatic vegetation at time of survey.	Limited potential for aquatic invertebrates due to lack of vegetation structure.	Lake, Marshland, Peatland	Moderate

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
5	22/04/2022	Habitat east of central path	TQ04747 89348	Gravel bank and gravel lacustrine habitat	Man-made gravel bank at edge of lake/northern extremity of the wooded habitat east of central track in the main survey area. Partically vegetated with herbs including Geum urbanum, Potentilla reptans, Myosotis spp., surrounded by dense Buddleja davidii, Rubus fruticosus agg. and Salix cinerea/caprea scrub, merging into dense damp woodland, with heavily shaded ground layer. Some limited interest for marginal/shingle associated invertebrates, but relatively low potential.	Limited potential for shingle associated invertebrates, but surrounding scrub woodland of limited potential.	Lake, Shingle	Moderate
6	22/04/2022	Habitat east of central path	TQ04761 89339	Drier broadleaved woodland	Main, raised wooded area to the east of the central path. Varied topography, evidently resulting from historic landforming/quarrying activity. Plateau supporting woodland culminating in a steep escarpment descending to enclosed waterbody and carr woodland to the east. Scrub woodland on plateau, fairly dense, with shaded groundlayer with leaf-litter, but little ground vegetation. Broadleaves including Corylus avellana, Crataegus monogyna, Betula pendula (some fairly mature) and Salix spp. with dense Buddleja davidii in scrub/understorey. Steep sand and gravel escarpment with Holcus lanatus and Hedera helix, Galium aparine and Rubus fruticosus agg. Relatively low invertebrate potential.	Little invertebrate potential apart for shaded ground layer and arboreal assemblages.	Shaded ground layer, arboreal	Moderate
7	22/04/2022	Central path & adjacent clearings	TQ04715 89325	Path edge grassy scallop	Short, rabbit-grazed semi improved grassland scallop supporting a fairly diverse flora with graminoids including Holcus lanatus, Agrostis stolonifera, Festuca rubra, Poa pratensis, Dactylis glomerata and in damper areas, Juncus inflexus and herbs including Veronica chamaedrys, Hypericum perforatum, Prunella vulgaris, Taraxacum officinale agg., Achillea millefolium, Potentilla reptans, Cerastium fontanum, Hypochaeris radicata, Ranunculus sardous?, Glechoma hederacea, Plantago lanceolata, P.major, Senecio jacobaea and locally, Sedum sp. and Galega officinalis, occupying areas of vegetated hard standing. lichens including Cladonia sp. and bryophytes. Margins with scrub woodland generally with Buddleja davidii dominant, but with some seedling Betula sp.	Good potential for short sward and bare ground associated invertebrates.	Short sward & bare ground	Good

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
					and Rubus fruticosus agg. Bare gravel/sand patches present throughout sward.			
8	22/04/2022	Central path & adjacent clearings	TQ04718 89284	Path edge grassy scallop	Fairly herb-rich scallop, with similar composition to TN7, but slightly taller sward, with additional species including Geranium molle, Cardamine flexuosa and Muscari sp. Ground nesting Andrena scotica recorded.	Good potential for short sward and bare ground associated invertebrates.	Short sward & bare ground	Good
9	22/04/2022	Central path & adjacent clearings	TQ04749 89234	Open, sparsely vegetated clearing	Flat area of sparsely vegetated bare ground immediately to the east of central track. Area around 30m x 20m on granular/sandy/gravel substrate, with concrete blocks, indicating man-made origin, also, localised sandy banks. Habitat with partial cover of bryophyte, lichens including Cladonia sp. and liverworts and herbs including Erodium cicutarium, Dipsacus fullonum, Hypericum spp., Sedum sp., with patches of graminoids including Agrostis capillaris and Festuca rubra.	Some potential for short sward and bare ground associated invertebrates.	Short sward & bare ground	Good
10	22/04/2022	Habitat east of central path	TQ04757 89279	Mature Salix spp. near substation	Localised aggregation of mature Salix caprea amidst +/- continuous low Buddleja davidii dominated scrub/woodland. Trees multi-stemmed, with some potential for supporting bark and sapwood assemblages, but fairly shaded at groundlevel. Remaining scrub/woodland habitat east of main path dense and entangled, with some fallen wood decay habitat (Salix fragilis), often inaccessible and densely planted.	Some bark and sapwood decay and arboreal habitat, but invertebrate potential not considered to be high	Bark & sapwood decay, Arboreal	Moderate

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
11	22/04/2022	Habitat west of central path	TQ04743 89116	Clearing in Birch stand	Largish, sparsely vegetated clearing, west of main path, with bare ground and sandy/gravel substrate. Flattish with some raised banks of deposited rocks and sandy substrate. Habitat with some affinity to OMH and partially developed over hard standing. Grades into fairly extensive, dryish Betula pendula woodland on western side of bank. Groundlayer with extensive broken bryophyte patches, bareground and scattered herbs including Erodium cicutarium, Plantago lanceolata, Cirsium arvense, Ranunculus bulbosus/sardous, Hypericum perforatum, Geranium molle, Cirsium vulgare, Potentilla reptans, Bellis perennis, Senecio erucifolius, Veronica chamaedrys, Lotus corniculatus, Prunella vulgaris and Arctium minus. Some encroaching Betula pendula and Alnus glutinosa seedlings.	Some potential for short sward and bare ground and tall sward and scrub associated invertebrates.	Short sward & bare ground; scrub edge	Good
12	22/04/2022	Central path & adjacent clearings	TQ04793 89054	Juncus dominated damp grassland	Dampish, semi-improved grassland track edge scallop, with good scrub edge succession to woodland. Grassland with Holcus lanatus, Agrostis stolonifera and locally abundant Juncus inflexus with Carex sp. and herbs including Cardamine pratense, Lotus pedunculatus and Mentha aquatica, indicating localised wetting, alongside species associated with drier habitats including Glechoma hederacea, Lotus corniculatus, Plantago lanceolata, P. major, Prunella vulgaris, Potentilla reptans and Achillea millefolium; grading at woodland edge, through Rubus fruticosus agg. scrub, then Betula and Salix cinerea/caprea and S. fragilis, with some standing and fallen wood decay habitat.	Good potential for wetland edge and tall sward and scrub invertebrates. Also edge with woodland with potential wood decay habitat.	Marshland, Peatland, Tall sward & scrub, wood decay, arboreal	Very good
13	22/04/2022	Habitat west of central path	TQ04766 89021	Wet woodland & swamp	Structurally interesting swampy wet woodland, on southern margin of survey area. Habitat with mature Salix fragilis, S. cinerea/caprea and occasional Populus nigra italicum, over soft, saturated mud substrate. Groundlayer with dappled shade and Carex pendula tussocks alongside macrophytes including Lycopus europaeus and Mentha aquatica. Good potential for hygrophilus invertebrates such as	Good potential for hygrophilus invertebrates such as coleoptera and diptera. Possible pitfall trap area.	Marshland, Peatland, wet woodland, arboreal	Very good

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
14	22/04/2022	Habitat west of central path	TQ04793 89054	Standing water & wet woodland	Potentially interesting wet woodland opposite side of path to TN13 close to southern extremity of site. Mixed age stand of Alnus glutinosa, with Salix fragilis and S. cinerea/caprea. Both saturated and standing wood decay habitat. Trees in and around inundated area of standing water, rather stagnant with little aquatic vegetation other than some marginal Iris pseudacorus.	Bark and sapwood decay and arboreal habitat, with some potential for characteristic wet woodland species.	Marshland, Peatland, wet woodland, arboreal	Good
15	22/04/2022	Habitat west of central path	TQ04716 89087	Partially dried out waterbody in wet woodland	Linear wetland strip (c10-15m wide), in wet woodland. Recessed below general ground level of woodland floor. Habitat partially inundated at time of survey, with dried out areas supporting stands of tall herb vegetation including Urtica dioica, Alliaria petiolata. Surrounding woodland with Betula pendula/pubescens and leggy Salix caprea; secondary woodland, with some light reaching woodland floor, but habitat unexceptional in terms of invertebrate potential.	Wetland and ground layer of rather limited invertebrate potential; some arboreal potential	Marshland, Peatland, Arboreal	Moderate
16	22/04/2022	Habitat west of central path	TQ04679 89084	Birch woodland	Relatively dry Betula pendula woodland contiguous to Betula successional habitat described in TN11. Fairly open with relatively mature birch together with Alnus glutinosa and Salix spp. Groundlayer with dappled shade. Patches of Carex panicea, Primula vulgaris, Hypericum andosaemum, Prunella vulgaris, Geum urbanum, Carex pendula, Myosotis sp. and some Hyacinthoides non-scripta. Bryophytes abundant in ground layer. Varied topography and some wood decay habitat.	Some bark and sapwood decay habitat, but unexceptional invertebrate habitat	Bark & sapwood decay, Arboreal	Fairly good
17	22/04/2022	Habitat west of central path	TQ04597 89072	Lacustrine edge habitat	Stand of lacustrine marginal and emergent vegetation at edge of wet woodland stand. With macrophytes including Carex acutiformis, Mentha aquatica, Solanum dulcamara and Iris pseudacorus. Adjacent wet woodland with Alnus glutinosa, Betula pendula/pubescens and Salix caprea/cinerea. Terrestrial wet woodland habitat in area of good relative quality.	Potential aquatic and wet woodland invertebrate sample site	Marshland, Peatland, wet woodland, arboreal	Very good

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
18	22/04/2022	Habitat west of central path	TQ04662 89139	Wet woodland interior	Main woodland interior with Betula pendula/pubescens, Alnus glutinosa and Salix spp. Habitat quite structurally diverse, with both areas of dense canopy, over shaded ground layer and quite open areas. Many trees not fully mature, but some localised wood decay habitat, with potential for vane trap sampling.	Potential for vane trap location iadjacent to wood decay habitat.	Wet woodland, arboreal, Bark & sapwood decay	Good
19	22/04/2022	Habitat west of central path	TQ04635 89322	Lacustrine edge habitat	Lacustrine marginal habitat with gradually sloping, gravel substrate. Stands of developing marginal and emergent vegetation including Sparganium erectum, Iris pseudacorus. Fairly open area cleared of trees, possibly for fishing. Adjacent wet woodland mature.	Potential aquatic sample site	Marshland, Peatland, Lake	Good
20	22/04/2022	Habitat west of central path	TQ04613 89288	Wet woodland interior	Northern wet woodland section fairly mature with Alnus glutinosa, Salix fragilis and occasional Betula pendula/pubescens. Fairly open ground layer with mainly Urtica dioica and Galium aparine, but also more representative woodland groundflora species including Ajuga reptans, Viola riviniana, Primula vulgaris, Rumex sanguineus, Circaea lutetiana and Glechoma hederacea, with extensive, albeit localised patches of Carex pendula, with Iris pseudacorus in damper hollows. Some wood decay habitat.	Wet woodland most representative in this area and with potential for invertebrate survey, vane traps etc.	Wet woodland, arboreal, Bark & sapwood decay	Good
21	22/04/2022	Habitat west of central path	TQ04594 89258	Wet woodland fallen wood decay habitat	Inundated depressions in northern wet woodland section. Habitat with sparsely vegetated open water, with leaf-litter and fallen Salix fragilis; this tree being dominant in the canopy in this area, with Alnus glutinosa and Betula pendula/pubescens occurring to a lesser extent. Water margins with some Mentha aquatica alongside co-dominant Urtica dioica and Galium aparine. Woodland groundflora generally most diverse closest to path.	Some bark and sapwood decay and arboreal habitat, with some potential for characteristic wet woodland species.	Marshland, Peatland, wet woodland, arboreal, wood decay	Good
22	22/04/2022	Boyer's Pit Lane	TQ04905 88985	Mature Crack Willow pollards	Line of mature/veteran, pollarded Salix fragilis on eastern side of access track (parallel to canal). Trees have been subject to limb removal, but have potential to support saproxylic invertebrates.	Bark and sapwood and heart rot potential, but adjacent habitat	Bark & sapwood decay, heart rot	Fairly good

Target note	Date	Main survey area	Grid reference	Feature	Description	Potential invertebrate assemblages	Potential invertebrate assemblages	Potential invertebrate conservation value
						degraded.		

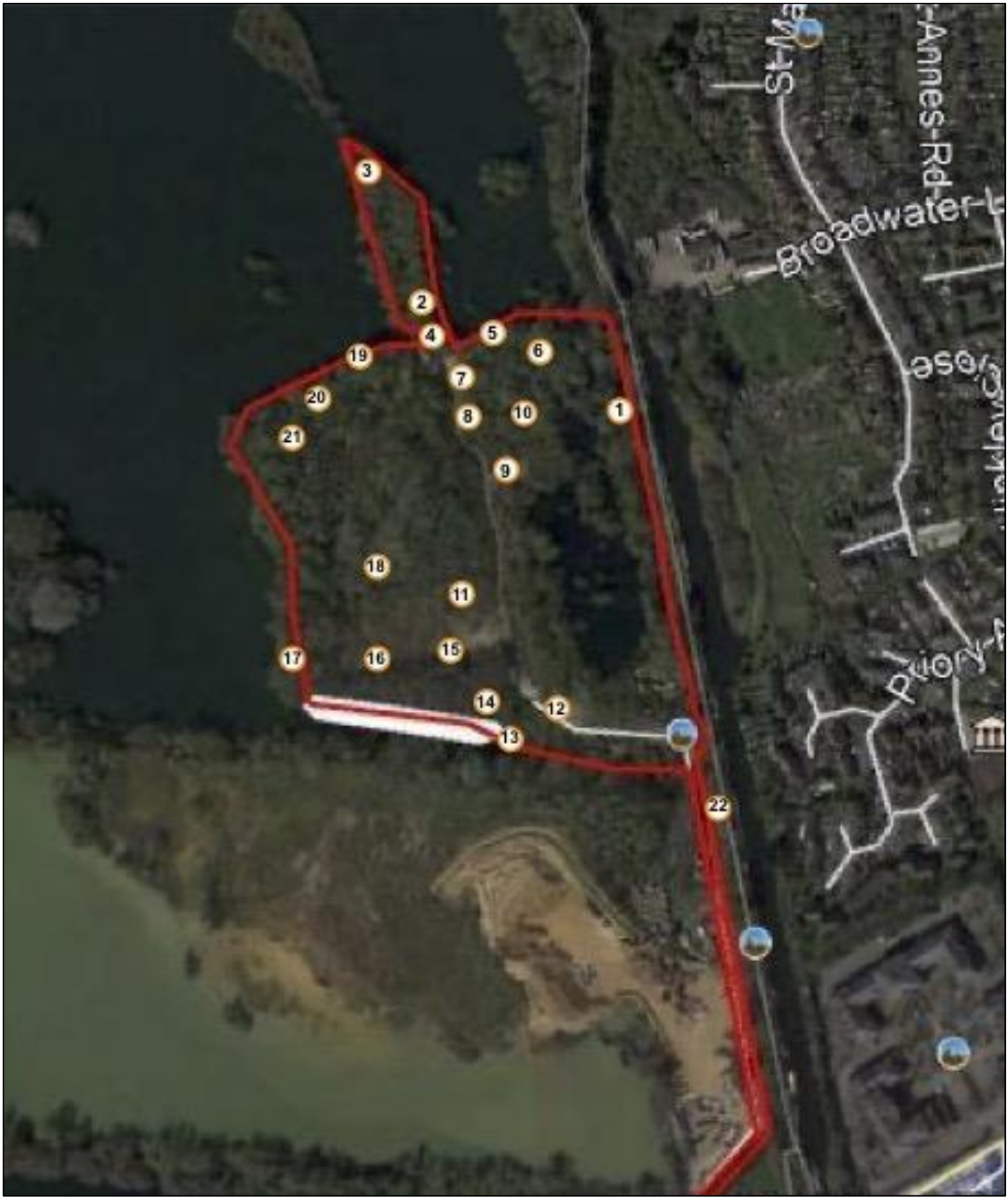
Table 2 – Invertebrate species recorded incidentally during the Mid Colne Valley SSSI invertebrate scoping survey 22/04/2022

Common name	Scientific name	Family	Order/higher taxon	UK status	IUCN status	Recorded site	Recorded habitat
A gnaphosid spider	*Zelotes sp.*	Gnaphosidae	Araneae	Unknown	Unknown	Central path grassland	Under bark & refugia
A ground beetle	*Amara aenea*	Carabidae	Coleoptera	Widespread	LC	Central path grassland	In grassland
A ground beetle	*Nebria brevicollis/salina*	Carabidae	Coleoptera	Unknown	Unknown	Central path grassland	On track
A ground beetle	*Pterostichus madidus*	Carabidae	Coleoptera	Widespread	LC	Central path grassland	Under bark & refugia
Dark-edged Bee-fly	*Bombylius major*	Bombylidae	Diptera	Widespread	LC	Central path grassland	On groundflora
A hoverfly	*Episyrphus balteatus*	Syrphidae	Diptera	Widespread	LC	Central path grassland	On groundflora
A hoverfly	*Heliophilus pendulus*	Syrphidae	Diptera	Widespread	LC	Central path grassland	On groundflora
Chocolate Mining Bee	*Andrena scotica*	Andrenidae	Hymenoptera	Widespread	LC	Central path grassland	On groundflora
Hairy-footed Flower Bee	*Anthophora plumipes*	Apidae	Hymenoptera	Widespread	LC	West of path; wet woodland	On Glechoma hederacea flowers

Common name	Scientific name	Family	Order/higher taxon	UK status	IUCN status	Recorded site	Recorded habitat
Large Red-tailed Bumblebee	*Bombus lapidarius*	Apidae	Hymenoptera	Widespread	LC	West of path; wet woodland	On woodland groundflora
Common Carder Bee	*Bombus pascuorum*	Apidae	Hymenoptera	Widespread	LC	Northern peninsula; Central path grassland	On Glechoma hederacea flowers
Forest Cuckoo Bee	*Bombus sylvestris*	Apidae	Hymenoptera	Widespread	LC	West of path; wet woodland	On Glechoma hederacea flowers
Buff-tailed Bumblebee	*Bombus terrestris*	Apidae	Hymenoptera	Widespread	LC	Central path grassland	On groundflora
Buff-tailed Bumblebee	*Bombus terrestris*	Apidae	Hymenoptera	Widespread	LC	Central path grassland	On groundflora
Black Ant	*Lasius niger*	Formicidae	Hymenoptera	Widespread	LC	Throughout	Under bark & refugia
A myrmicine ant	*Myrmica sp.*	Formicidae	Hymenoptera	Unknown	Unknown	Throughout	Under bark & refugia
Common Pill Woodlouse	*Armadillidium vulgare*	Armadillidiidae	Isopoda	Widespread	LC	Throughout	Under bark & refugia
Common Shiny Woodlouse	*Oniscus asellus*	Oniscidae	Isopoda	Widespread	LC	Throughout	Under bark & refugia
Common Striped Woodlouse	*Philoscia muscorum*	Philosciidae	Isopoda	Widespread	LC	Throughout	Under bark & refugia
Common Rough Woodlouse	*Porcellio scaber*	Porcellionidae	Isopoda	Widespread	LC	Throughout	Under bark & refugia
Peacock Butterfly	*Aglais io*	Nymphalidae	Lepidoptera	Widespread	LC	Central path grassland	On groundflora
Speckled Wood	*Pararge aegeria*	Nymphalidae	Lepidoptera	Widespread	LC	Central path grassland	On woodland margin

Appendix 2 - Figures

Figure 1 - 2022 Invertebrate scoping survey area with Target Note locations.



Appendix 3 - Photographs

Photograph 1 – Established Birch woodland (west of track)

Photograph 2 – Bare ground habitat & encoraching Birch

Photograph 3– Woodland groundflora (west of track)

Photograph 4 – Standing wood decay habitat (west of track)

Photograph 5 – Fallen Crack Willow (west of track)

Photograph 6 – Standing water & carr habitat (eastern perimeter)

Photograph 7 – Open water and wet woodland (south boundary)

Photograph 8 – Pendulous Sedge & wet sand (south boundary)

Photograph 9 – Marginal macrophyte vegetation (west boundary)

Photograph 10 – SI grassland scallop (central track)

Photograph 11 – Colonised bare ground (central track)

Photograph 12 – Wet grassland with Juncus (central track)

BROADWATER LAKE, UXBRIDGE

Terrestrial Invertebrate Survey Report

Dr Ross Piper FRES

SEPTEMBER 2022

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1 Executive summary

To support an outline planning application for a proposed marina development of former sand and gravel workings, a number of ecological surveys have been commissioned, including a terrestrial invertebrate survey.

The site (centred on TQ 04735 89123) is located near Harefield, Uxbridge. The site itself comprises the concrete access roads of the former aggregate workings, large amounts of *Buddleja* scrub and *Salix* woodland, wet woodland (much of which is inaccessible due to quicksand), bare ground and lake margin, scrubby, flower rich margins.

The terrestrial invertebrate fauna of the sites was sampled on five occasions between June and September 2022. The site was surveyed using standardised sampling protocols and involving sweep-netting, suction sampling, beating, pan trapping, direct searching and moth trapping. Survey conditions, especially later in the year, were not ideal because of the extremely hot and dry conditions.

447 terrestrial invertebrate species were recorded, of which 10 have some level of national conservation status. These were as follows: *Agelastica alni, Donacia thalassina, Omalium rugatum, Neopachygaster meromelas, Tipula livida, T. helvola, Ceraleptus lividus*, *Parascotia fuliginaria*, *Bohemannia quadrimaculella* and *Scrobipalpa obsoletella*. *Agelastica alni* has undergone a significant range expansion in recent years and a revision of its conservation status is warranted. Thirty-nine further moth species are classed as ‘Local’.

The site has some habitats that have moderate value for terrestrial invertebrates, particularly the tall, flower-rich sward and scrub edge in Area 1. The large areas of *Buddleja* scrub are of very limited value. The areas of wet woodland and the abundant deadwood resources therein could not be adequately surveyed because of the large swathes of quicksand. Only a relatively small proportion of the species that inhabit a site will be recorded during a survey of this type.

Specific measures will be needed to mitigate for the consequences of the construction process and the eventual use of the site. Pollution will need to be controlled during and after construction and measures taken to minimise disturbance of any retained/created habitats, as well as limiting nutrient and pesticide inputs.

There is a great deal of scope to create habitat for terrestrial invertebrates in the development that will serve to improve habitat connectivity through the wider landscape. Sympathetic habitat creation could increase the value of the site for terrestrial invertebrates. Retaining a network of existing habitat throughout the site and linking these with created habitats and surrounding habitats could provide a

connected, landscape scale mosaic of resources that will become more valuable to terrestrial invertebrates as they evolve.

2 Introduction

2.1 Overview

Ecology by Design, on behalf of the London Borough of Hillingdon (LBH), was commissioned to conduct a terrestrial invertebrate survey of land adjacent to Broadwater Lake, Moorhall Road, Harefield, Uxbridge, UB9 6PE (centred on TQ 04735 89123). LBH proposes to develop the Hillingdon Water Sports Facility (HWSF) on the 8ha site. The Local Planning Authority is Hillingdon Council. The site is a former sand and gravel pit.

2.2 Site location and setting

The site, centred on TQ 04735 89123, is approximately 8ha in size and comprises a former sand and gravel works. The site is bounded to the North and the West by Broadwater Lake and there is small lake within the boundary of the site. Further to the North and South are more lakes – flooded sand and gravel workings. To the East there is Harefield, agricultural land and the edge of Greater London. Further to the west is agricultural land, woodlands, the M25, Gerard's Cross and Chalfont St Peter.

Since cessation of sand and gravel processing on the site, it appears to have been subject to little management, apart from the cutting and maintenance of pathways by an angling club. There are no rights of way on the site, although some locals do walk their dogs there.

Figure 1: Plans of the site (outlined in blue)