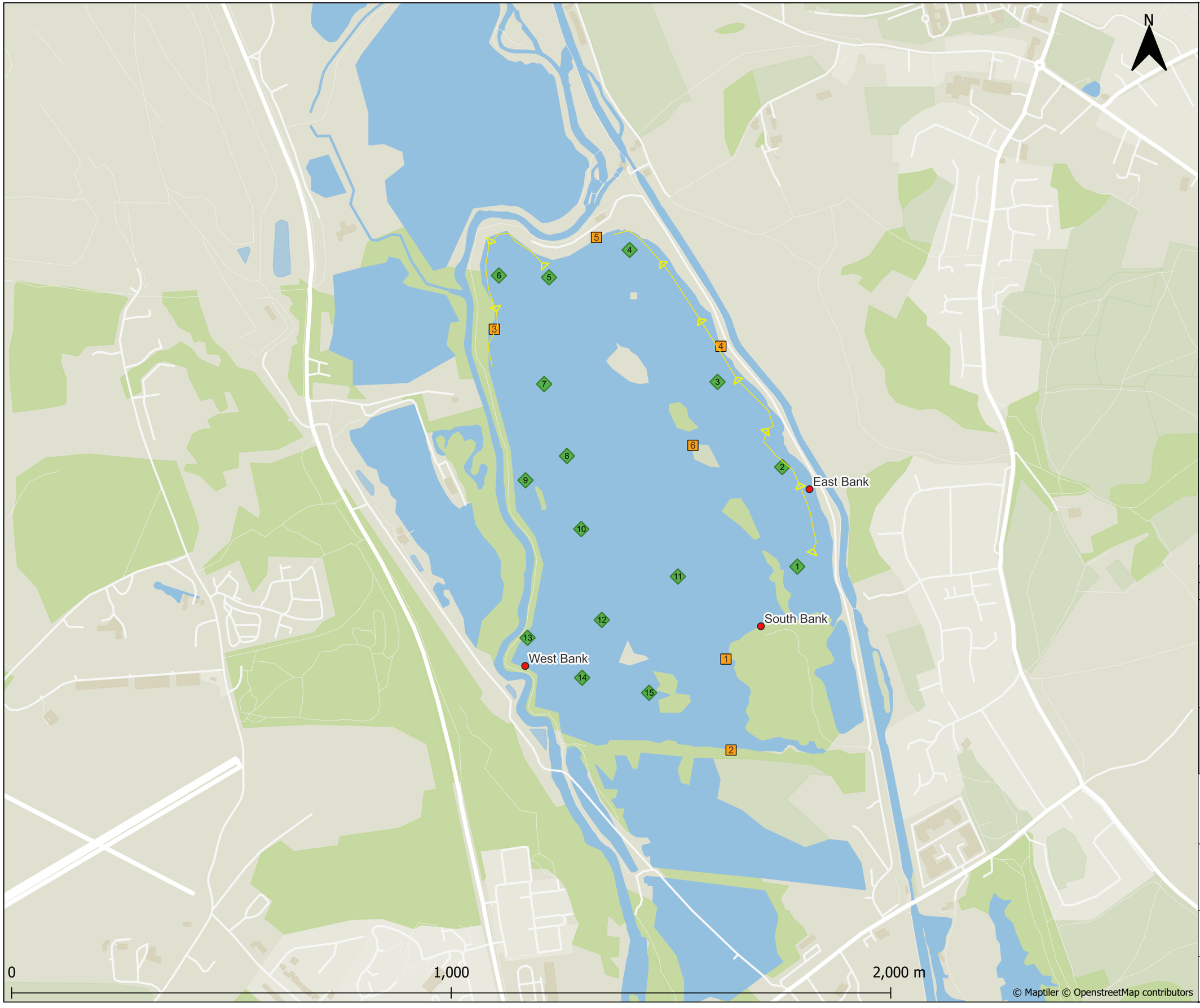

Legend

- Electrofishing Route
- Fyke Net Location
- Macroinvertebrate Sample Location
- Seine Net Location

General notes

All dimensions shown are in metres unless otherwise stated and levels in metres to Ordanance Datum

Ver.	Ver. Date	Status	Drawn	Check'd	Apprv'd
1	29/11/2022	DATA	DH	TE	TE

FiveRivers
Hangar 5A
Thruxton Airfield
Andover
Hampshire
SP11 8PN
Tel: 01722 783041
www.five-rivers.com
7871
ISO 14001: 2004

Client

mace

Project

2933 - Broadwater Lake - Fish Assessment

Title

Figure A-1. Broadwater Survey Map

Scale

1:12,634 @ A3

Appendix B. Catch Photos

Figure B-1. Common carp (only one caught).

Figure B-2. Perch (lower size range).

Figure B-3. Perch (middle size range).

Figure B-4. Perch (upper size range).

Figure B-5. Pike (lower size range).

Figure B-6. Pike (middle size range).

Figure B-7. Pike (upper size range).

Figure B-8. 3-Spined stickleback (all were of similar size range).

Figure B-9. Tench (lower size range).

Figure B-10. Tench (middle size range).

Figure B-11. Tench (upper size range).

Figure B-12. North American signal crayfish

Figure B-13. North American signal crayfish.

Appendix C. Site Photos

Figure C-1. South bank looking north over Broadwater.

Figure C-2. North bank looking south over Broadwater.

Figure C-3. Seine netting.

Figure C-4. Electric fishing.

Figure C-5. Fyke netting.

Figure C-6. Macro-invertebrate Site – east bank.

Figure C-7. Macro-invertebrate Site – west bank.

Figure C-8. Macro-invertebrate Site – south bank.

Appendix D. Fisheries Data

Table D-1. Water quality parameters recorded each morning before survey.

Date	Conductivity (SPC)	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH
10/10/2022	487.5	13.8	85.3	8.83	9.28
11/10/2022	466.3	14.5	83.3	8.47	9.22
12/10/2022	489.5	13.1	79.9	8.37	9.29

Table D-2. Electrofishing – Run 1 (TQ 0474389490 to TQ 0427590194). Time = 46 minutes 10/10/2022.

Fish No.	Species	Length (mm)	Estimated Weight (g)
1	PI	730	3,266.01
2	PI	673	2,525.16
3	PI	332	269.90
4	PE	98	12.18
5	PE	92	9.94
6	PE	76	5.36
7	TE	38	0.75
8	TE	127	29.61
9	CC	115	32.61

Table D-3. Electrofishing – Run 2 (TQ 0411590124 to TQ 0400489891). Time = 20 minutes 10/10/2022.

Fish No.	Species	Length (mm)	Estimated Weight (g)
1	TE	171	73.33
2	PE	85	7.70
3	PE	86	7.99
4	PE	103	14.30

Table D-4. Fyke Netting – Details.

Fyke Number	NGR	Water Depth (m)	Soak Time (HH:MM:SS)			Signal Crayfish Caught
			Day 1	Day 2	Total	
1	TQ 04707 89449	2.7	20:21:00	27:20:00	47:41:00	31
2	TQ 04668 89674	2.4	20:30:00	27:15:00	47:45:00	8
3	TQ 04517 89864	3.6	20:30:00	27:13:00	47:43:00	7
4	TQ 04311 90159	3.2	20:38:00	28:30:00	49:08:00	3
5	TQ 04129 90093	3.2	20:39:00	28:48:00	49:27:00	7
6	TQ 04015 90095	2.9	20:17:00	28:47:00	49:04:00	26
7	TQ 04123 89851	4.9	20:18:00	26:38:00	46:56:00	2
8	TQ 04178 89689	3.6	20:38:00	26:25:00	47:03:00	8
9	TQ 04085 89632	2.7	20:31:00	28:23:00	48:54:00	50
10	TQ 04214 89524	3.8	20:34:00	26:54:00	47:28:00	7
11	TQ 04436 89421	2.7	20:16:00	28:20:00	48:36:00	14
12	TQ 04265 89319	2.3	20:18:00	28:20:00	48:38:00	9

Fyke Number	NGR	Water Depth (m)	Soak Time (HH:MM:SS)			Signal Crayfish Caught
			Day 1	Day 2	Total	
13	TQ 04097 89275	2.6	20:16:00	26:36:00	46:52:00	17
14	TQ 04223 89187	3.1	20:14:00	26:27:00	46:41:00	11
15	TQ 04376 89156	2.4	20:18:00	26:33:00	46:51:00	10

Table D-5. Fyke Net – Catch Data.

Fyke Number	Fish No.	Species	Length (mm)	Estimated Weight (g)	Date
1	1	PE	93	10.29	11/10/2022
2	2	PE	103	14.30	11/10/2022
2	3	PE	84	7.41	11/10/2022
2	4	PE	85	7.70	11/10/2022
2	5	PE	113	19.29	11/10/2022
2	6	PE	104	14.76	11/10/2022
2	7	PE	107	16.17	11/10/2022
2	8	PE	100	13.00	11/10/2022
2	9	PE	98	12.18	11/10/2022
2	10	PE	105	15.22	11/10/2022
2	11	PE	107	16.17	11/10/2022
2	12	PE	104	14.76	11/10/2022
2	13	TE	194	107.75	11/10/2022
3	14	PE	122	24.70	11/10/2022
3	15	PE	93	10.29	11/10/2022
3	16	PE	91	9.59	11/10/2022
3	17	PE	94	10.65	11/10/2022
3	18	PE	101	13.43	11/10/2022
3	19	PE	92	9.94	11/10/2022
3	20	PE	103	14.30	11/10/2022
4	21	PE	104	14.76	11/10/2022
4	22	PE	123	25.35	11/10/2022
5	23	PI	251	111.39	11/10/2022
6	24	PE	93	10.29	11/10/2022
6	25	PE	94	10.65	11/10/2022
7	26	PE	109	17.17	11/10/2022
7	27	PE	115	20.41	11/10/2022
7	28	PE	84	7.41	11/10/2022
7	29	PE	124	26.03	11/10/2022
7	30	PE	98	12.18	11/10/2022
7	31	PE	101	13.43	11/10/2022
7	32	PE	95	11.02	11/10/2022
7	33	PE	102	13.86	11/10/2022
7	34	PE	90	9.26	11/10/2022

Fyke Number	Fish No.	Species	Length (mm)	Estimated Weight (g)	Date
7	35	PE	92	9.94	11/10/2022
7	36	PE	95	11.02	11/10/2022
7	37	PE	114	19.84	11/10/2022
7	38	PE	112	18.74	11/10/2022
7	39	PE	211	144.60	11/10/2022
7	40	PE	98	12.18	11/10/2022
7	41	PE	96	11.40	11/10/2022
7	42	PE	122	24.70	11/10/2022
7	43	PE	100	13.00	11/10/2022
7	44	PE	96	11.40	11/10/2022
7	45	PE	100	13.00	11/10/2022
7	46	PE	117	21.58	11/10/2022
7	47	PE	94	10.65	11/10/2022
7	48	PE	89	8.93	11/10/2022
7	49	PE	103	14.30	11/10/2022
7	50	PE	98	12.18	11/10/2022
7	51	PE	105	15.22	11/10/2022
7	52	PE	118	22.18	11/10/2022
7	53	PE	179	85.06	11/10/2022
7	54	PE	122	24.70	11/10/2022
7	55	PE	100	13.00	11/10/2022
7	56	PE	102	13.86	11/10/2022
7	57	PE	98	12.18	11/10/2022
7	58	PE	99	12.59	11/10/2022
7	59	PE	91	9.59	11/10/2022
7	60	PE	97	11.79	11/10/2022
7	61	PE	114	19.84	11/10/2022
7	62	PE	118	22.18	11/10/2022
7	63	PE	81	6.59	11/10/2022
7	64	PE	92	9.94	11/10/2022
7	65	PE	95	11.02	11/10/2022
7	66	PE	93	10.29	11/10/2022
7	67	PE	114	19.84	11/10/2022
7	68	PE	100	13.00	11/10/2022
7	69	PE	107	16.17	11/10/2022
7	70	PE	153	51.27	11/10/2022
7	71	PE	85	7.70	11/10/2022
7	72	PE	111	18.21	11/10/2022
7	73	PE	98	12.18	11/10/2022
7	74	PE	96	11.40	11/10/2022
7	75	PE	96	11.40	11/10/2022
7	76	PE	93	10.29	11/10/2022
7	77	PE	102	13.86	11/10/2022

Fyke Number	Fish No.	Species	Length (mm)	Estimated Weight (g)	Date
7	78	PE	100	13.00	11/10/2022
7	79	PE	97	11.79	11/10/2022
7	80	PE	113	19.29	11/10/2022
7	81	PE	103	14.30	11/10/2022
7	82	PE	106	15.69	11/10/2022
7	83	PE	97	11.79	11/10/2022
7	84	PE	97	11.79	11/10/2022
7	85	PE	158	56.87	11/10/2022
7	86	PE	102	13.86	11/10/2022
7	87	PE	104	14.76	11/10/2022
13	88	PE	101	13.43	11/10/2022
14	89	PE	83	7.13	11/10/2022
14	90	PE	102	13.86	11/10/2022
14	91	PE	98	12.18	11/10/2022
14	92	PE	97	11.79	11/10/2022
14	93	PE	104	14.76	11/10/2022
14	94	PE	96	11.40	11/10/2022
2	95	PE	95	11.02	12/10/2022
3	96	PE	99	12.59	12/10/2022
3	97	PE	93	10.29	12/10/2022
4	98	PE	102	13.86	12/10/2022
4	99	PE	94	10.65	12/10/2022
4	100	PE	94	10.65	12/10/2022
4	101	PE	96	11.40	12/10/2022
4	102	PE	91	9.59	12/10/2022
4	103	PE	92	9.94	12/10/2022
4	104	PE	87	8.30	12/10/2022
4	105	PE	84	7.41	12/10/2022
4	106	PE	106	15.69	12/10/2022
4	107	PE	87	8.30	12/10/2022
4	108	PE	84	7.41	12/10/2022
5	109	TE	185	93.22	12/10/2022
6	110	PE	307	484.81	12/10/2022
6	111	PE	93	10.29	12/10/2022
6	112	PE	113	19.29	12/10/2022
6	113	PE	76	5.36	12/10/2022
6	114	PE	98	12.18	12/10/2022
6	115	PE	86	7.99	12/10/2022
6	116	PE	104	14.76	12/10/2022
6	117	PE	109	17.17	12/10/2022
6	118	PE	94	10.65	12/10/2022
6	119	PE	84	7.41	12/10/2022
6	120	PE	89	8.93	12/10/2022

Fyke Number	Fish No.	Species	Length (mm)	Estimated Weight (g)	Date
6	121	PE	99	12.59	12/10/2022
6	122	PE	88	8.61	12/10/2022
6	123	PE	104	14.76	12/10/2022
6	124	TE	194	107.75	12/10/2022
7	125	PE	171	73.40	12/10/2022
7	126	PE	104	14.76	12/10/2022
7	127	PE	103	14.30	12/10/2022
7	128	PE	102	13.86	12/10/2022
7	129	PE	111	18.21	12/10/2022
7	130	PE	114	19.84	12/10/2022
7	131	PE	108	16.67	12/10/2022
7	132	PE	100	13.00	12/10/2022
7	133	PE	96	11.40	12/10/2022
7	134	PE	107	16.17	12/10/2022
7	135	PE	108	16.67	12/10/2022
7	136	PE	163	62.89	12/10/2022
7	137	PE	94	10.65	12/10/2022
7	138	PE	116	20.99	12/10/2022
7	139	PE	117	21.58	12/10/2022
7	140	PE	117	21.58	12/10/2022
7	141	PE	116	20.99	12/10/2022
7	142	PE	102	13.86	12/10/2022
7	143	PE	103	14.30	12/10/2022
7	144	PE	124	26.03	12/10/2022
7	145	PE	102	13.86	12/10/2022
7	146	PE	103	14.30	12/10/2022
7	147	PE	113	19.29	12/10/2022
7	148	PE	104	14.76	12/10/2022
7	149	PE	97	11.79	12/10/2022
7	150	PE	106	15.69	12/10/2022
7	151	PE	103	14.30	12/10/2022
7	152	PE	98	12.18	12/10/2022
7	153	PE	85	7.70	12/10/2022
7	154	PE	94	10.65	12/10/2022
7	155	PE	102	13.86	12/10/2022
7	156	PE	114	19.84	12/10/2022
7	157	PE	101	13.43	12/10/2022
7	158	PE	98	12.18	12/10/2022
7	159	PE	100	13.00	12/10/2022
7	160	PE	115	20.41	12/10/2022
7	161	PE	110	17.68	12/10/2022
7	162	PE	96	11.40	12/10/2022
7	163	PE	102	13.86	12/10/2022

Fyke Number	Fish No.	Species	Length (mm)	Estimated Weight (g)	Date
7	164	PE	114	19.84	12/10/2022
7	165	PE	96	11.40	12/10/2022
7	166	PE	121	24.05	12/10/2022
7	167	PE	116	20.99	12/10/2022
7	168	PE	87	8.30	12/10/2022
7	169	PE	96	11.40	12/10/2022
7	170	PE	99	12.59	12/10/2022
7	171	PE	107	16.17	12/10/2022
7	172	PE	95	11.02	12/10/2022
7	173	PE	76	5.36	12/10/2022
7	174	PE	106	15.69	12/10/2022
7	175	PE	105	15.22	12/10/2022
7	176	PE	123	25.35	12/10/2022
7	177	PE	94	10.65	12/10/2022
7	178	PE	108	16.67	12/10/2022
7	179	PE	94	10.65	12/10/2022
7	180	PE	93	10.29	12/10/2022
7	181	PE	85	7.70	12/10/2022
7	182	PE	95	11.02	12/10/2022
7	183	PE	97	11.79	12/10/2022
7	184	PE	121	24.05	12/10/2022
7	185	PE	124	26.03	12/10/2022
7	186	PE	103	14.30	12/10/2022
7	187	PE	108	16.67	12/10/2022
7	188	PE	94	10.65	12/10/2022
8	189	PE	97	11.79	12/10/2022
10	190	PE	89	8.93	12/10/2022
14	191	PE	103	14.30	12/10/2022
14	192	PE	94	10.65	12/10/2022
14	193	PE	93	10.29	12/10/2022

Table D-6. Seine Netting – Details.

Seine Number	Date	Time of Deployment	NGR	Signal Crayfish Caught
1	11/10/2022	12:52	TQ 0454989236	12
2	11/10/2022	13:30	TQ 0456589030	10
3	11/10/2022	14:10	TQ 0400789973	10
4	11/10/2022	14:50	TQ 0452389945	12
5	11/10/2022	15:50	TQ 0423590186	11
6	11/10/2022	16:20	TQ 0446489719	1

Table D-7. Seine Netting – Catch Data.

Seine Number	Fish No.	Species	Length (mm)	Estimated Weight (g)
1	1	SP3	32	0.80
1	2	SP3	34	0.90
1	3	SP3	34	0.90
1	4	SP3	36	1.00
1	5	SP3	29	0.66
1	6	SP3	26	0.53
1	7	SP3	38	1.12
1	8	SP3	29	0.66
1	9	SP3	35	0.95
1	10	SP3	30	0.70
2	11	SP3	35	0.95
2	12	SP3	34	0.90
2	13	SP3	20	0.32
2	14	SP3	33	0.85
2	15	SP3	34	0.90
2	16	SP3	36	1.00
2	17	SP3	37	1.06
2	18	TE	58	2.71
2	19	TE	40	0.87
3	20	SP3	31	0.75
3	21	PE	83	7.13
3	22	PE	65	3.24
4	23	SP3	36	1.00
4	24	SP3	32	0.80
4	25	SP3	37	1.06
4	26	SP3	34	0.90
4	27	PE	109	17.17
5	28	SP3	29	0.66
5	29	SP3	31	0.75
5	30	PE	110	17.68
6	31	SP3	34	0.90
6	32	SP3	35	0.95
6	33	SP3	41	1.29
6	34	SP3	36	1.00
6	35	SP3	33	0.85
6	36	SP3	28	0.61
6	37	SP3	34	0.90
6	38	SP3	35	0.95
6	39	PE	69	3.93

Appendix E. Macro-invertebrate Data

Macro-invertebrate Metrics

Community Conservation Index (CCI) & Conservation Score (CS)

The Community Conservation Index (Chadd and Extence, 2004), represents the national rarity and diversity of species within a site and gives a total conservation score to the whole community. Table E-1 shows a guide to specific scores of from the metric.

Table E-1. CCI values.

CCI Score	Conservation Value
<5	Low
5-<10	Moderate
10-<15	Fairly High
15-<20	High
>20	Very High

Conservation Score looks at individual species rareness and is graded from 0 to 10, with definitions of each score shown in Table E-2.

Table E-2. Conservation Score values.

Conservation Score	Classification
10	RDB1 (Endangered)
9	RDB2 (Vulnerable)
8	RDB3 (Rare)
7	Notable (no RDB status)
6	Regionally Notable
5	Local
4	Occasional
3	Frequent
2	Common
1	Very Common

Biological Monitoring Working Party (BMWP), NTAXA and ASPT

Biological Monitoring Working Party (BMWP) is used mainly to assess general water quality and macro-invertebrate tolerance to pollution especially organic waste. This metric uses family level taxa and is scored from 1 to 10. With 1 scoring species most tolerant to pollution and 1 least.

NTAXA (Number of TAXA is a metric is used to help determine the diversity of taxa at family level. It counts the total number of family present within a sample, with the higher the score the higher the diversity.

ASPT (Average Score Per Taxa) is calculated by diving BMWP by NTAXA to give an average score per taxon. This is used as a general indicator of water quality.

Macro-invertebrate Taxa List

Table E-3. Macro-invertebrate species list.

Family	Species	Abundance		
		South bank	West bank	East bank
Crangonyctidae	*Crangonyx pseudogracilis/floridanus agg.*	95	65	243
Gammaridae	*Dikerogammarus haemobaphes*	39	13	24
Sphaeriidae	*Euglesa henslowana*		14	
Sphaeriidae	*Euglesa sp.*		15	16
Sphaeriidae	*Euglesa subtruncata*			2
Sphaeriidae	*Sphaerium corneum*	3		13
N/A	Cladocera	1		
Dytiscidae	*Hyphydrus ovatus*	1		
Dytiscidae	*Laccophilus hyalinus*	4		
Haliplidae	*Haliplus confinis*			1
Haliplidae	*Haliplus flavicollis*		1	
Hygrobiidae	*Hygrobia hermanni*	1		
Ceratopogonidae	Ceratopogonidae	1	1	1
Chironomidae	Chironomidae		47	30
Chironomidae	Chironomini	84	85	55
Chironomidae	Tanypodinae	18	40	48
Baetidae	*Cloeon dipterum*		2	13
Ephemeridae	*Ephemera sp.*		38	
Ephemeridae	*Ephemera vulgata*	1	16	
Bithyniidae	*Bithynia tentaculata*	1		
Lymnaeidae	*Ampullaceana balthica*	1		
Lymnaeidae	*Radix auricularia*	3		5
Physidae	*Physella acuta/heterostropha*	162	48	168
Planorbidae	*Gyraulus albus*	80	30	221
Planorbidae	*Gyraulus crista*	1		1
Planorbidae	*Planorbis carinatus*	1		1
Tateidae	*Potamopyrgus antipodarum*	1	16	31
Valvatidae	*Valvata piscinalis*			1
Corixidae	*Corixa panzeri*	5		7
Corixidae	*Corixa sp.*			13
Corixidae	Corixidae	6		3
Corixidae	*Cymatia coleoptrata*	1		1
Corixidae	*Paracorixa concinna*	2		4
Corixidae	*Sigara falleni*	1		1
Corixidae	*Sigara sp.*	3		1
Notonectidae	*Notonecta viridis*	2		
Pleidae	*Plea minutissima*	3		
Erpobdellidae	*Erpobdella octoculata*	7		1

Family	Species	Abundance		
		South bank	West bank	East bank
Glossiphoniidae	*Alboglossiphonia heteroclita*	1		4
Glossiphoniidae	*Helobdella stagnalis*	27		5
Glossiphoniidae	*Theromyzon tessulatum*	2		2
Asellidae	*Asellus aquaticus*	120	2	392
Sialidae	*Sialis lutaria*	2	8	4
N/A	Ostracoda	40	14	103
Aeshnidae	*Anax parthenope*	1		
Aeshnidae	*Anax sp.*	1		
Coenagrionidae	Coenagrionidae	9	5	22
Coenagrionidae	*Enallagma cyathigerum*	35	2	50
Coenagrionidae	*Erythromma najas*	7		8
Coenagrionidae	*Ischnura elegans*	34		12
N/A	Oligochaeta	84	112	53
Ecnomidae	*Ecnomus tenellus*			1
Leptoceridae	*Athripsodes cinereus*	1		3
Leptoceridae	*Leptocerus lusitanicus*		1	
Leptoceridae	*Molanna angustata*		1	
Leptoceridae	*Mystacides longicornis*	4	3	3
Dugesiidae	*Girardia tigrina*	12	5	84
Dugesiidae	*Schmidtea lugubris/polychroa*	5	2	7

Appendix F. Legislation & Designations

The UK Biodiversity Action Plan

Published in 1994, after the 1992 international Rio de Janeiro "Earth Summit" which called for the development and enforcement of national strategies and action plans to protect threatened species and habitats. This is through identification, conservation and protection of existing biological diversity and enhancing it where possible.

Salmon & Freshwater Fisheries Act

An Act which regulates fisheries in England and Wales. The legislation covers polluting effluents, barriers to fish migration, illegal fishing techniques and times of year for legal fishing.

The Bern Convention & Habitats Directive

The Bern Convention on the Conservation of European Wildlife and Natural Habitats 1979 was a binding international legal instrument aimed to conserve wild flora and fauna and their natural habitats. This was done through increasing co-operation between contracting parties and to regulate the exploitation of migratory species. The Habitats Directive was adopted from this in 1992 and is a means by which European Union meets its obligations to the Bern Convention. The main aims are to promote the maintenance and protection of biodiversity by requiring member states to take measures to maintain or restore natural habitats and protect wild species listed of European importance.

International Union for Conservation of Nature's (IUCN) Red List

Is the most comprehensive and up to date information source on the global conservation status of plants and animals. The system classifies species according to their extinction risk based on criteria including; population size, rate of decline and population fragmentation. The classification system ranges from Extinct to species of Least Concern and is an easy way to communicate how threatened a species to policy makers and the public.

Wildlife and countryside Act 1981

The primary legislation in Great Britain for the protection of flora, fauna and the countryside. This includes the UK's domestic implementation of the EU Birds Directive (Directive 2009/147/EC on the Conservation of Wild Birds). The Act protects native species, controls the release of INNS and enhances the protection of Sites of Special Scientific Interest (SSSI).

Water Framework Directive

This was established to protect inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater to achieve Good Ecological Status. Ecological Status has five class which are High, Good, Moderate, Poor and Bad. These designations are based on specific criteria including biological, physico-chemical and hydromorphological parameters. The overall classification is based on the lowest class of all the different assessments.

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Greengage

Brighter strategies
for greener projects

Client: London Borough of Hillingdon

Project: HWSFAC

Report: 2023 Ecology Survey Report

QUALITY ASSURANCE

Issue/Revision:	Draft	Final
Date:	June 2023	October 2023
Comments:		
Prepared by:	Molly Dailide	Molly Dailide & Stephanie Harper
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1.0 EXECUTIVE SUMMARY

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon (LBH) to undertake further ecological survey work at a site known as Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon.

The survey work was undertaken to inform an ecological impact assessment for a proposed development at the site, which seeks to develop the HWSFAC on the peninsula, with eventual demolition of the current Broadwater Lake Sailing Club facilities at the north end.

Surveys were undertaken on land and by boat in April, May, June, July and August 2023. The following surveys were undertaken:

- Otter (Lutra lutra) - to search for holts (May and August);
- Water vole (Arvicola amphibius) - to establish presence or absence (May and August);
- Vegetation on islands - characterise to inform a Biodiversity Net Gain assessment and inform future management proposals (May);
- Invasive non-native plant surveys - establish presence and coverage, if / where present (May and August);
- Aquatic and emergent vegetation (presence, coverage and species) (May and August); and
- UKHab survey of grassland in a field north of Moorhall Road in July.

The survey results are summarised as follows:

- Use of the site by otter is assumed, based on previous anecdotal evidence recorded during other surveys of the site, however, no likely potential otter holts or further evidence of otter activity was found during the 2023 surveys;
- The habitat onsite was sub-optimal for water vole and no signs of their presence were found; no signs were noted in the surrounds. Therefore, water voles are concluded to be likely absent from the Site;
- Habitat surveys of the islands were conducted from a boat on the water so as not to disturb breeding birds. Based on the boat based survey, the habitats on the islands were considered to be dominated by wet woodland (Islands 6, 8 and 10 - 16) or tall forbs/ruderal (Island 1 - 5 and 7);
- One island (Island 6) was dominated by Schedule 9 invasive species giant knotweed (Fallopia sachalinensis). Japanese knotweed (Fallopia japonica) was present in one location and was under active management. Buddleia was still present across the site although the majority had been cleared from hardstanding areas;
- Very small patches of typical emergent vegetation were present all around the lake edge and at the edge of islands, but no extensive emergent beds were present;
- Aquatic vegetation (benthic macrophytes) presence was limited to a small range of aquatic plants in a few locations. The majority of the lake had limited to no macrophyte growth, likely to be due to

the depth and substrate condition. Below 3m, no macrophytes grew. Algae was present in many locations across the lake; and

- The field in the south of the Site was assessed as 'other neutral grassland' (previously this would have been classified as 'roughland' a London-specific habitat type).

High level mitigation and enhancement is included in this report with further detailed provided in the accompanying Ecological Impact Assessment and Draft Mitigation and Ecological Management Plan (MEMP) Volume 1 and 2.

2.0 INTRODUCTION

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon (LBH) to conduct additional habitat surveys along with otter and water vole at the Site known as Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon.

The survey aims were as follows:

- Classify habitats present on the islands within Broadwater Lake and within a field to the south of the Site identified as a potential site for biodiversity enhancement;
- Map locations of lake aquatic macrophytes and emergent vegetation (See Figure A1 - A4 in Appendix A;
- Identify and map any invasive non-native plant species;
- Assess the habitat suitability for water vole within the lake, peninsula and adjacent suitable habitats (River Colne banks and canal edge); and
- Identify any signs of otter including holts.

This document is a report of this survey work and has been produced to inform a planning submission for the site which seeks to develop the HWSFAC on the peninsula, with eventual demolition of the current Broadwater Lake Sailing Club facilities at the north end.

The surveys aimed to inform appropriate mitigation, compensation and enhancement actions in light of the proposed development at site, ensuring legislative and planning policy compliance.

2.1 SITE CONTEXT & STATUS

The assessment area ('the Site') covers an area of approximately 79.95 hectares (ha) and is approximately centred on National Grid Reference TQ 04396 89593, OS Co-ordinates 504396 , 189593.

The Site is located in South Harefield approximately 5km north of Uxbridge. The Site forms part of the Mid-Colne Valley Site of Special Scientific Interest (SSSI) and Site of Importance for Nature Conservation (SINC) and lies within the Colne Valley, an area of lakes and rural habitat.

The Site comprises an access road from Moorhall Road, the lake itself with an associated lagoon (south-east corner of the lake), a peninsula at the south-east corner, an existing sailing club (Broadwater Sailing Club) at the north end of the lake, parts of the margins of the lake, and islands set within the lake. Projecting north from the peninsula there is an island or isthmus which supports woodland.

Habitats present at the Site are areas of standing open water, broadleaved woodland, wet woodland, scattered trees, invasive non-native buddleia scrub, dense scrub, modified grassland, gravel hardstanding, concrete, and buildings. The dominant habitat across the Site was standing open water in the form of Broadwater Lake (approximately 60 ha).

The habitats immediately surrounding the Site primarily comprise the River Colne to the west and north, a large residence with gardens to the north, the Grand Union Canal to the east, and woodland,

scrub and a mineral processing site to the south along with residential bungalows on Boyer's Pit Road. Within the wider area, urban development in the form of South Harefield exists to the east, with further lakes, woodland and open grassland being present to the north, south and west.

2.2 PREVIOUS SURVEY WORK

A Preliminary Ecological Appraisal was carried out on the site in 2021 which recommended several protected species surveys.

Further surveys for otter and water vole were undertaken and reported in 2022. No evidence of otter or water vole was recorded during the surveys in May 2022. These surveys were constrained to the areas around the peninsula and did not cover the entire Site.

In August 2022 an otter spraint was identified on the banks of the Grand Union Canal running parallel to the Site. A potential otter spraint next to signal crayfish (Pacifastacus leniusculus) remains was also identified on the northern bank of the lake. Further crayfish remains were found on the banks of the lake, however, due to the presence of a wide variety of bird species, the remains could not be confidently attributed to otter. No otter holts were discovered during the surveys. While the spraint and crayfish remains could not be identified definitively as signs of otter presence, it was considered highly likely that otter visit and utilise the site for feeding due to the presence of suitable habitat and an otter spraint close by along the Grand Union Canal.

No evidence of water vole was identified during the surveys and the lake was considered to offer very marginal suitability due to the lack of suitable bankside habitat for burrows, foraging opportunities and cover. It was considered the part of the wider lake that enters the peninsula in the east may be suitable but was covered by dense buddleia at the time of the survey.

The field to the south of the Site was identified as a potential site for enhancement or offsetting during winter 2022. This was originally assessed in December 2022 which is outside the optimal survey season for grassland.

3.0 METHODOLOGY

3.1 SITE VISITS

Following clearance of dense buddleia in February 2023, a survey within previously inaccessible areas of the peninsula was completed in April 2023. This was carried out to determine the presence of any otter holts along with an assessment of the suitability of the habitat for water vole. The survey was undertaken by foot following standard guidance for each species (further details provided below).

A survey of the lake by boat was undertaken over two days in May 2023 and one day in August 2023. The boat survey allowed close access to the waterside aspect of habitats which were not able to be viewed from the landside. The surveys were undertaken from a motorised boat, driven slowly by a helmsman around the lake edge and island perimeters. Two surveyors were onboard searching for signs (as above) along the edges. Where access was limited due to overhanging vegetation, binoculars were used.

A survey of the grassland field was undertaken in July - previously the field had been subject to a basic habitat assessment during the initial PEA site visit. This was outside the optimal survey season.

3.2 HABITAT SURVEYS

Vegetation on islands

The survey was undertaken in May to inform a Biodiversity Net Gain assessment and inform future management proposals. Habitats were identified and classified using the UKHab methodology. Due to the presence of nesting birds on the islands, the UKHab survey was undertaken from the boat and at sufficient distance to ensure there was no disturbance to nesting birds.

The islands and their associated number are shown in Figure A5 in Appendix A.

Invasive Non-Native Species - plants

A boat survey and site walkover were undertaken in August to record the presence and determine the coverage of any INNS. The land survey was the main survey although from the boat, binoculars were used to search areas of vegetation not easily visible from land. Species searched for included Japanese knotweed, giant knotweed, Himalayan balsam and giant hogweed.

Aquatic macrophytes

To locate areas where macrophytes were present within the lake, four transects were taken across the lake. These were located centrally within the lake from north to south and in an 'X' shape crossing the lake from each corner. An additional transect was surveyed along the northern edge of the lake. A bathyscope was used at approximately 100m intervals to look into the water and a grapnel deployed to collect samples of plant material from the bed for identification. The location and information regarding any visible macrophyte cover was noted at each interval. An assessment of presence, coverage and

species was made from the information. The surveys were undertaken in May (the start of the main growing season) and August (when full macrophyte growth would have been achieved and the most likely month to discover the full coverage / extent and species composition).

Emergent vegetation

Emergent vegetation was mapped from the boat in May 2023 and characterised using binoculars, or a closer approach was made if breeding birds were unlikely to be present. Emergent vegetation is fairly visible and occurs on shallow sediments close to land such as the lake shore and islands.

Grassland

A UKHab survey was undertaken of the Moorhall Road field during July to inform a Biodiversity Net Gain assessment and inform future management proposals. The field was walked and the plant species identified throughout and ground conditions assessed. A 'w' transect was undertaken with sampling points at each point of the W. The number of species were counted within a $1m^2$ area at each point. This was to better allow the grassland type to be established, as the number of species is an important criterion in grassland classification.

3.3 SPECIES SURVEYS

Otter (*Lutra lutra*)

Signs of otter and their holts were searched for during the survey. This included any slides showing where otters enter the water routinely, and suitable holt (den) sites such as hollows beneath tree roots or within earth banks beneath rocks or rubble. Spraint, footprints or food remains were also searched for. The extent of the survey was limited to Broadwater Lake.

Water Vole (*Arvicola terrestris*)

Water vole potential was assessed during the land-based and water-based surveys. The potential is identified by the presence of holes (burrows) and runs along the banks of rivers and lakes as well as ditches. Along with the assessment of suitability of the habitat for water vole, signs including burrows, latrines, footprints or piles of food were also searched for.

Areas of the site covered by the surveys included the shoreline of the lake and the banks of the adjacent River Colne wherever this was accessible. The canal towpath was also walked where this lies in parallel with the site, to assess areas visible from the pathway.

3.4 WEATHER

Weather during all the survey visits was conducive for surveying being dry with temperatures of 11-24^{0}C.

3.5 COMPETENCIES

Molly Dailide, who undertook the April and May surveys, has a degree in Ecology and Conservation (Hons), an MSc in Biodiversity Conservation and is a Full member of CIEEM with over 9 years' experience in ecological survey and assessment. Molly holds a Natural England Great Crested Newt Licence and a FISC level 4 in botanical identification.

Laura Cooper-Smith, who assisted with the May boat survey, has a BSc degree in Zoology (Hons) and is a Qualifying member of CIEEM. Laura has three years of experience in ecological survey and assessment and has particular proficiency in River Condition Assessment.

Stephanie Harper and Matthew Cameron undertook the June, July and August surveys. Stephanie has 16 years' experience as an ecological consultant with field survey training and significant experience in surveying for otter, water vole, badgers and reptiles. She holds a Natural England Level 1 class licence for bats. Matthew is an assistant ecologist with two years' experience in general ecology and 10+ years' experience as a keen birdwatcher, working as a professional ornithologist since 2023.

This report was written by Molly Dailide 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.

3.6 CONSTRAINTS

Parts of the peninsula, namely the wet woodland and lake edges, comprised dense vegetation and wet ground (standing water overlying sinking sand / silt), limiting access in these areas. In addition, these areas were largely on flat ground making them unsuitable for water vole burrows.

Parts of the lake shoreline including the peninsula and some island edges were inaccessible due to the presence of dense, overhanging willow along much of the shoreline. To overcome this limitation, the shoreline was fully viewed using binoculars and therefore the presence of any holts or water burrows are likely to have been identified in these areas.

Due to the density of vegetation in some areas, precautionary mitigation measures are recommended to minimise any low risk of harm.

The lake islands could not be directly accessed to minimise disturbance to any nesting birds. Therefore, habitat classification was undertaken from the boat. While individual plant species may have been missed, the majority of the island habitats were visible from the boat given their small size and therefore the habitat classification is considered accurate on this basis.

4.0 RESULTS

4.1 HABITAT SURVEYS

Lake - emergent vegetation

The shallow lake banks were formed of earth and gravel. The majority of the lake edge was dominated by overhanging willow (Salix spp). Pockets of emergent, marginal vegetation were occasionally present. These typically comprised dominant common reed (Phragmites australis), branched bur-reed (Sparganium erectum), bulrush (Typha sp.) or yellow flag iris (Iris pseudacorus). Other species included gypsywort (Lycopus europaeus), watermint (Mentha aquatica) and willowherb species (Epilobium sp.).

The broad location of emergence vegetation recorded is shown in Figure A1 - A4 in Appendix A.

Lake - aquatic macrophytes

During the survey in May 2023, no macrophyte cover was observed. In areas of shallow water, the floor of the lake was visible with some vegetation beginning to the develop although not yet identifiable.

During the August survey, limited macrophytes were observed to be present with patchy distribution. Species recorded were lesser pondweed (Potamogeton pusillus), hornwort (Ceratophyllum demersum), and the invasive non-native Canadian pondweed (Elodea canadensis) along with algae (it was beyond the scope of the survey to identify the algal species).

At depths of 3m or more, the lakebed was bare (four transect points); in one location gravels were present on the lakebed which were also bare of growth. Algae was predominantly present within shallow areas of the lake used by waders / dabblers for feeding. Overall, there were very few species and growth was very limited in extent.

Islands

The islands were not accessible to identify all the species present due to the nesting bird season; instead an assessment of the broad habitat type habitat was made from the boatside with species identified where possible.

The islands and their associated number are shown in Figure A5 in Appendix A.

w1d - Wet woodland

Islands 6, 8 and 10- 16 were well wooded with mature trees; the species present appeared to be dominated by willow with native broadleaved shrubs and trees occupying the landmass. The islands are assumed to be natural ground remaining from quarrying activities and as such will likely have soils present, allowing more natural plant assemblages to grow. As such, although occupying a small area, a woodland habitat type has been ascribed. Examination of historic aerial photography shows that these islands have been continuously wooded for over 20 years.

Many of the smaller islands were completely submerged and dominated by low-lying willow. Due to the dominance of willow spp on all wooded islands, the woodlands are considered wet woodland, a Habitat of Principal Importance (HPI) under the NERC Act 2006[1].

One of the islands was dominated by giant knotweed, an invasive, non-native species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

Tall forbs/Ruderals

Islands 1, 2, 2a, 4, 5 and 7 have been cleared of woodland in the past ten years and are reportedly cleared annually by members of the sailing club in order to a) enhance the provision of the lake for roosting waterfowl and b) remove barriers to the wind, in order to create a less turbulent air flow for sailing.

The main habitat observed from the boat appeared to be tall forb/ruderal vegetation with visible species including white dead nettle (Lamium album), hemlock (Conium maculatum), willowherb species, dock (Rumex sp.), spear thistle (Cirsium vulgare), red campion (Silene dioica), and daisy species. Patches of bramble (Rubus fruticosus) were also present on some of the islands. These islands are likely under grazing pressure from waterfowl, regularly well-trodden, and organically enriched from bird guano.

Invasive non-native species

Buddleia was present across the Site although only in significant densities at the peninsula where clearance had not been completed.

Giant knotweed was identified occupying part of island 6 and in two locations near the entrance to the peninsula.

Japanese knotweed is present in a very stunted dwarf form at the peninsula shoreline in one location; it is under treatment to remove it from the Site.

Limited presence of submerged macrophytes (Elodea canadensis) were recorded within the lake during the August boat survey.

No other invasive non-natives were found on the Site.

In the surrounding area, floating pennywort was observed on the River Colne.

Field north of Moorhall Road

The field to the southernmost extent of the Site on Moorhall Road was classified as 'other neutral grassland' in moderate condition. 90% of the field had a 'roughland' character (a habitat term specific to Greater London which is essentially a damp grassland).

There were a mixture of grasses and rushes including perennial ryegrass (Lolium perenne) meadow foxtail (Alopecurus pratensis), quaking grass (Briza media) red fescue (Festuca rubra), reed sweet-grass (Glyceria maxima), soft brome (Bromus hordaceous), black bent (Agrostis gigantea), jointed rush (Juncus articulatus) and soft rush (Juncus effusus). Herbs included prostrate knotweed (Polygonum

aviculare), tormentil (Potentilla erecta), red bartsia (Odontites vernus), creeping buttercup (Ranunculus repens), celery-leaved buttercup (R. sceleratus), selfheal (Prunella vulgaris), white clover (Trifolium repens), tufted vetch (Vicia cracca), broadleaf plantain (Plantago major). Large patches of tall ruderals were scattered through the field, with curled dock (Rumex crispus), thistles (Circium arvense and C. vulgare), lesser burdock (Arctium minus) with occasional teasel (Dipsacus fullonium); there were some dense tufts of gypsywort (Lycopus europaeus); osier (Salix viminalis) and white willow (Salix alba) and common alder (Alnus glutinosa) occurred occasionally, nettle (Urtica dioica) was also present.

The remaining 10% in the south-west corner of the field was more marshy / damp in character with amphibious bistort (Persicaria amphibia), great willowherb (Epilobium hirsutum), American willowherb (E. ciliatum), broadleaf dock (Rumex obtusifolius), smooth sow thistle (Sonchus oleraceus), prickly sow thistle (Sonchus asper), redshank (Persicaria maculosa), gypsywort, fat hen (Chenopodium album). Bramble scrub (Rubus fruticosus), lesser burdock and field bindweed (Calystegia sepium) occurred along the boundary hedgerow (elder (Sambuca nigra), ash (Fraxinus vulgaris) and alder); small stands of bulrushes (Typha latifolia) occurred along the south-west fence line with HS2, marking spots where the ground stayed wet through the summer.

4.2 PROTECTED SPECIES SURVEYS

A full description of the lake and peninsula, where the surveys were undertaken, and associated habitats can be found within the 2023 PEA (Report ref: 552023sh21Feb23FV01_PEA).

Otter

No evidence of otter such as feeding remains or spraints was identified during the 2023 surveys. The density of parts of the wet woodland limited full access, however much of the area could still be surveyed. Rubble piles within the survey area had potential to be utilised as holts for otter, however no other signs indicated use by this species such as spraints or tracks. The area is regularly disturbed, reducing its suitability for use as holts further. It is considered that holts are likely absent from the Site.

Water Vole

The habitat within the peninsula previously covered by buddleia was considered unsuitable for water vole. The topography was generally flat, including within the wet woodland, with small ponds holding shallow water a few centimetres deep. Some marginal vegetation such as water mint (Mentha aquatica) was present, but the waterbodies lacked the depth and vegetation to provide cover for this species. The flat topography also meant the area lacked suitable habitat for burrowing.

During the lake surveys from the boat, very little suitable habitat for water vole was identified. Only very small pockets of emergent vegetation were visible and therefore cover and a suitable range of food plants that are necessary for water vole were absent from the lake edge. The bankside substrate, a mix of earth and gravel, also limited suitability for burrow creation due to the preponderance of gravel. No

signs of water vole including feeding remains, burrows and latrines were identified during the survey. Water voles are considered to be likely absent from the site.

5.0 DISCUSSION

5.1 HABITAT SURVEYS

Lake - emergent vegetation

Emergent vegetation in the lake was limited to occasional pockets. This is likely to be due in part to the impoverished substrate that is present. Emergent vegetation is an important habitat for a whole range of faunal species including nesting, roosting and foraging birds, as well as an important habitat for invertebrates and fish, particularly juvenile fish. Therefore, the lack of significant areas of emergent vegetation are likely to restrict the ecological condition of the lake; food webs that would typically rely on such plants will be very impoverished or absent, resulting in much lower biodiversity.

Emergent vegetation, due to its limited occurrence on site, is not considered to be an important ecological receptor at the site in its current form.

Significant enhancements to the lake, embedded within the Proposed Development, such as making the lake less homogenous, creating new floating reedbeds and coir rolls etc will ensure that a significant greater proportion of emergent vegetation will be present and will be able to establish. The aim of this is that the increase in this habitat will provide new and important refuges for a swathe of species including invertebrates and juvenile fish in particular.

Lake - aquatic macrophytes

The macrophyte cover was considered very low to negligible during the survey in May 2023 and low in August 2023. The development of macrophytes appeared to be limited by the depth of the water and the hard substrate which was encountered during the sampling and reported from other surveys undertaken previously.

Macrophytes are not considered to be an important ecological receptor at the Site. The lack of significant growth of macrophytes will significantly restrict the ecological condition of the lake; food webs that would typically rely on such plants will be very impoverished or absent, resulting in much lower biodiversity.

Significant enhancements to the lake, embedded within the Proposed Development, such as making the lake less homogenous, creating new floating reedbeds and coir rolls etc will ensure that a significant greater proportion of aquatic macrophytes will be present and will be able to establish. The aim of this is that the increase in this habitat will provide new and important refuges for a swathe of species including invertebrates and juvenile fish in particular.

Islands

The majority of the islands will be retained as part of the Proposed Development with future management measure implemented to ensure their value for biodiversity is maximised.

All islands with wet woodland habitat, a Habitat of Principle Importance, will be retained as part of the Proposed Development.

Two islands, Island 2a (tall ruderal/forbs) and Island 3, will be lost to facilitate the Proposed Development. However, as part of the Proposed Development, new islands are being created and this habitat creation, which is embedded in the design, will more than adequately compensate for the small loss of 2a and 3.

Invasive non-native species

The Schedule 9 invasive giant knotweed was identified on an island. It is an offence to allow the spread of a Schedule 9 species into the wild. As such, it is recommended a specialist contractor is sought to devise a remediation strategy for the safe removal of the giant knotweed within the site.

Field north of Moorhall Road

In earlier design discussions the field north of Moorhall Road was considered as a possible enhancement area for BNG. However, this is no longer proposed and the Proposed Development does not include any works within or to this field. Instead, it is recommended that the field is left as is, albeit with any existing management being continued in the short term, and dialogue be opened with appropriate stakeholders to discuss the best use/management of this habitat moving forward in the context of the wider Mid Colne Valley Nature Reserve. The grassland is currently likely to support foraging geese and the value for this should be maintained.

5.2 PROTECTED SPECIES SURVEYS

Otter

No evidence of otter was identified during the surveys in 2023, however use of the site by foraging otter cannot be ruled out given the identification of a nearby otter spraint along the canal, which is offsite, in previous surveys.

Mitigation and enhancement measures for otter are outlined within the PEA (Report ref: 552023sh21Feb23FV01_PEA) and developed further within the Draft Mitigation and Ecological Management Plan (MEMP) Volume 1 and 2, which has been written to accompany the Environmental Statement for the proposed development. The measures include creation of wildflower meadow, with mounds and hedgerows to provide sheltered terrestrial habitat for couches and feeding. Secluded beaches for foraging otter will be retained. Wider enhancements to the lake will serve to increase the fish population which in turn will improve the foraging resource for otter.

Water vole

No evidence of water vole was identified during the surveys. Habitats within the peninsula were not considered suitable for water vole. No suitable habitat around the lake edges was identified. Therefore,

this species is considered likely absent within the site and no further surveys or specific mitigation measures are required.

6.0 SUMMARY AND CONCLUSIONS

Greengage Environmental Ltd was commissioned by LBH to undertake an updated survey for otter and water vole on the site's peninsula and lake, in addition to a UKHab classification survey of the lake's islands, and identification of macrophyte cover within the site's lake.

The occurrence of aquatic macrophytes and emergent vegetation was found to be minimal and neither of these are considered to be an important ecological receptor at the Site. Enhancements designed into the Proposed Development will significantly improve the occurrence of these habitats and therefore increase the biodiversity value of the site for a swathe of species including invertebrates and fish.

Habitats within the islands included ruderal vegetation and wet woodland HPI. The islands supporting wet woodland will be retained as part of the Proposed Development and suitable long term management to maximise their biodiversity value will be implemented (see MEMP Volume 1 and 2). The majority of the island with tall ruderal/forbs will also be retained and protected during the Proposed Development. Two islands are to be removed; however, these are being more than adequately compensated for through the creation of new islands within the Site.

Giant knotweed, a Schedule 9 invasive, non-native species was identified on one the islands. A specialist contractor should be sought to develop a remediation strategy for the removal of this species to avoid any unintended spread into the wild.

Macrophyte cover within the lake was negligible to low during the survey in May 2023.

No signs of water vole were identified during the surveys and this species is considered likely absent from the site. In addition, no signs of otter were identified however foraging otter cannot be ruled out. Mitigation and enhancement measures for otter are included within the EcIA and MEMP Volume 1 and 2 for the Site.

APPENDIX A FIGURES

Figure A.1 Emergent Vegetation (Plan 1)

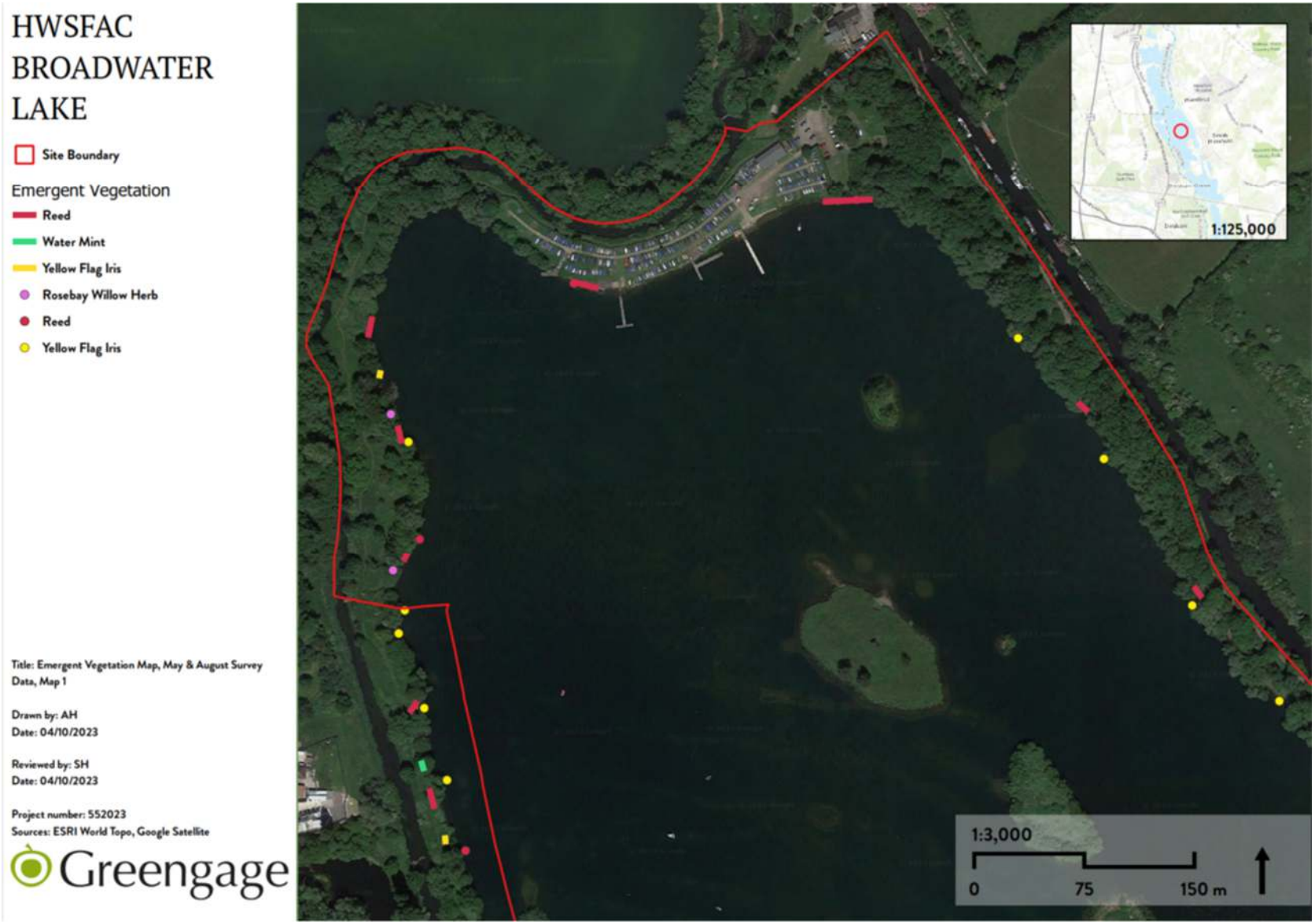

Figure A.2 Emergent Vegetation (Plan 2)

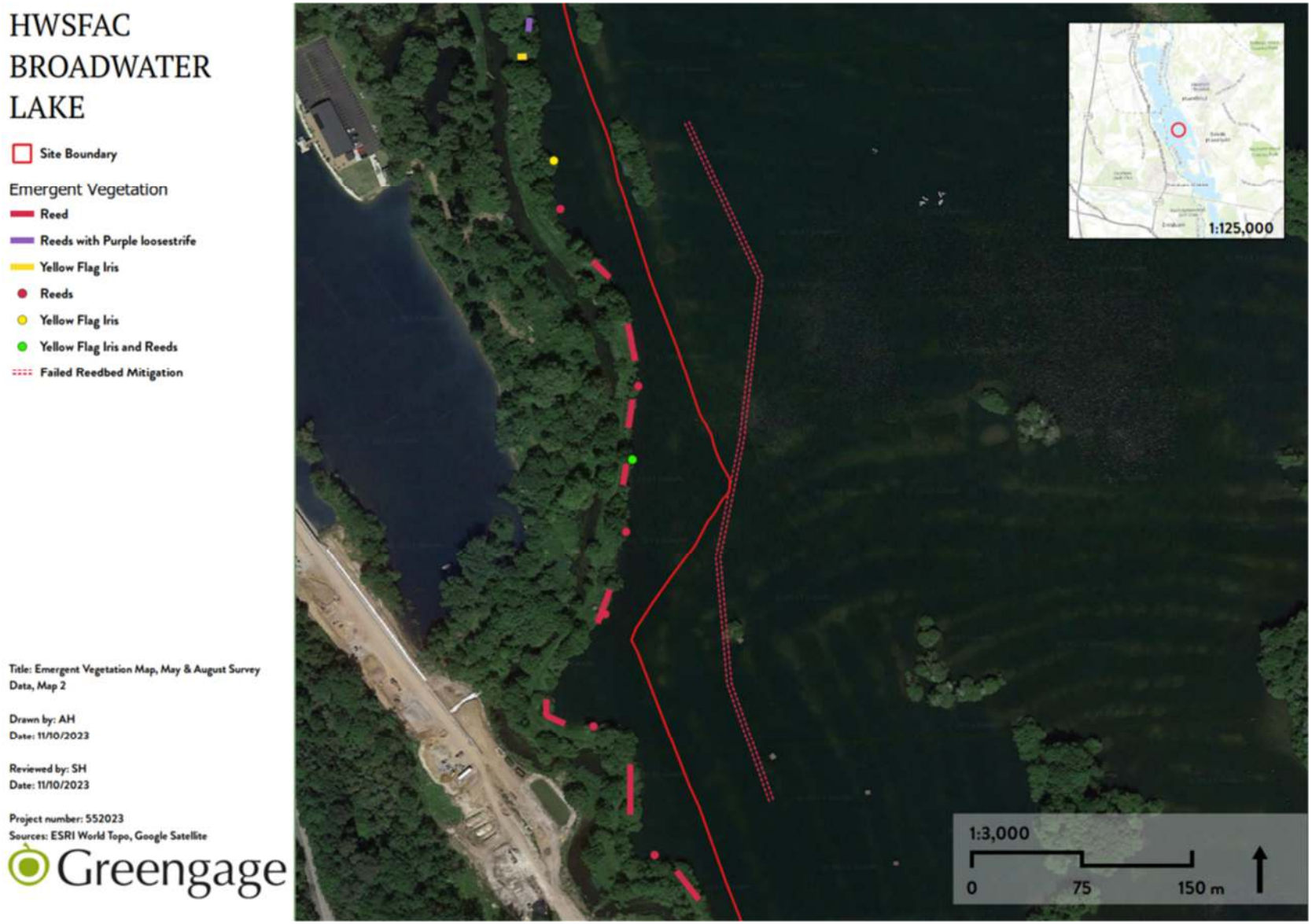

Figure A.3 Emergent Vegetation (Plan 3)

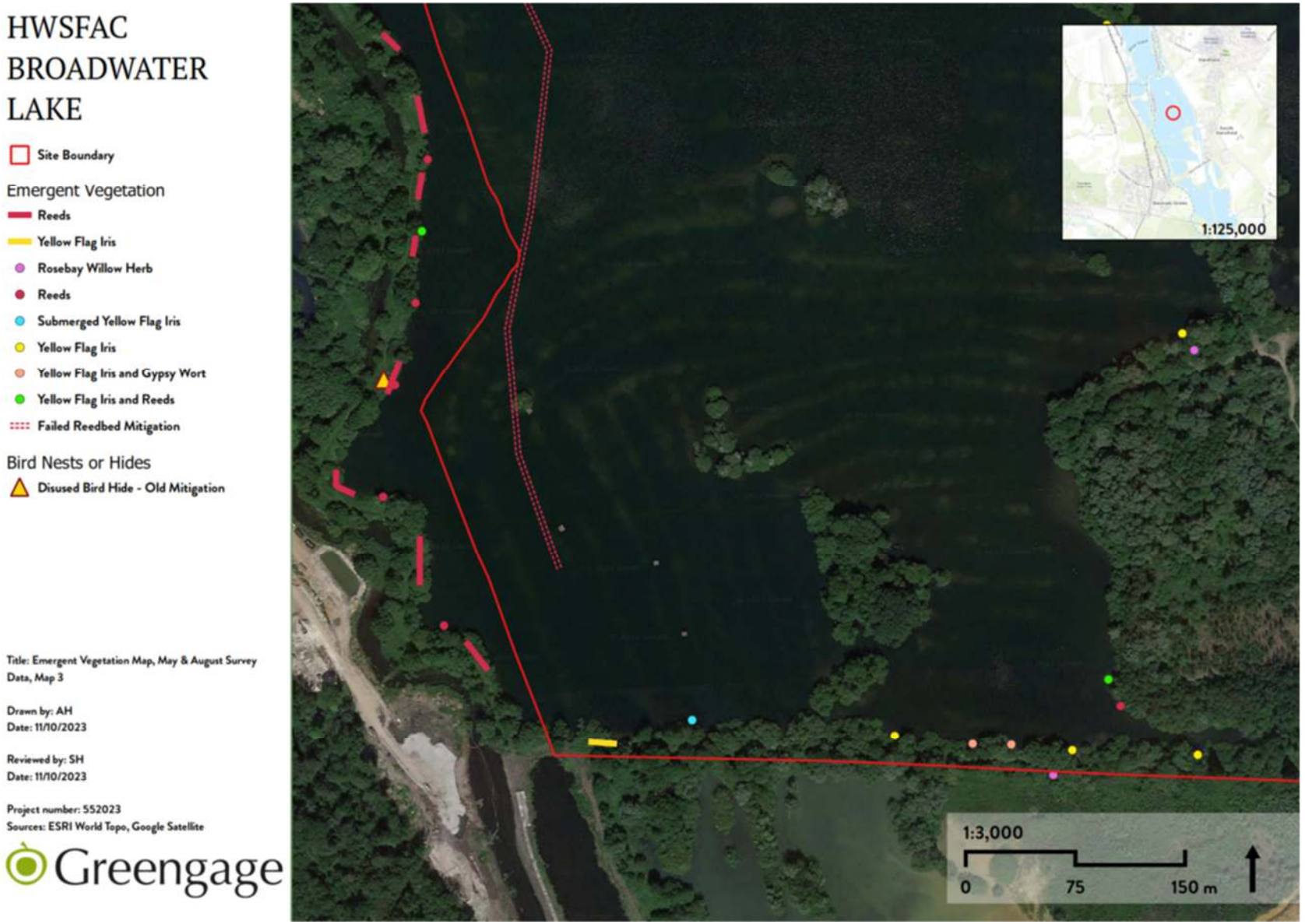

Figure A.4 Emergent Vegetation (Plan 4)

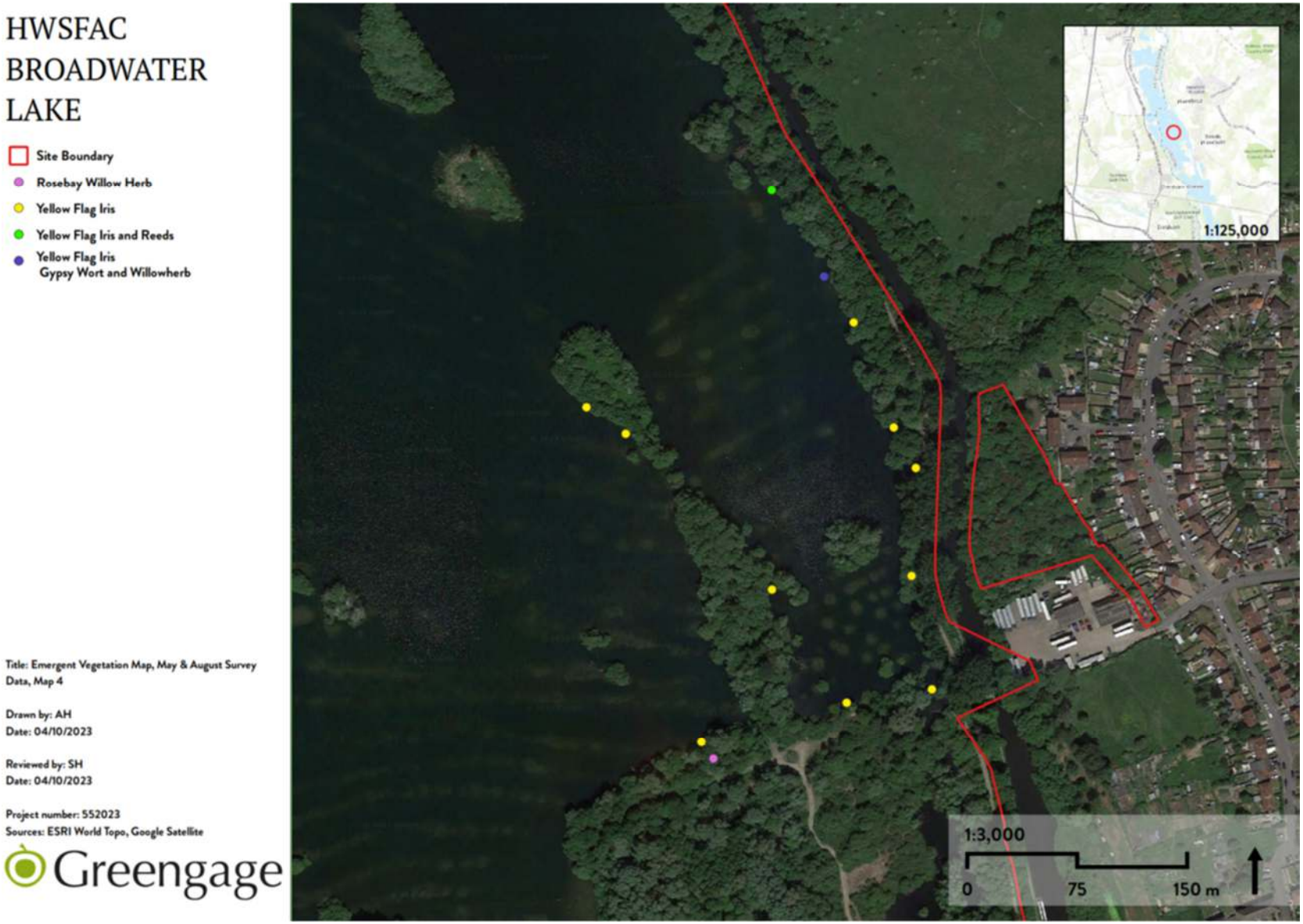

Figure A.5 Island Location and Number (letters indicate existing tern rafts)

APPENDIX B LEGISLATION AND PLANNING POLICY

B.1 LEGISLATION

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.

B.2 PLANNING POLICY

Guidance on nature conservation within planning is issued by the Government within the National Planning Policy Framework. The National Planning Policy Framework (NPPF) 2018[2] 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.

The NPPF has replaced, among other planning guidance documents, Planning Policy Statement 9: Biological and Geological Conservation[3]. However, the accompaniment to PPS9, government circular 06/05: Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System[4], remains valid. The prevention of harm to biodiversity through prudent planning decisions is the key principle in the NPPF when considering planning and the natural environment; set out in section 15.

Within the NPPF the Government's vision for conserving and enhancing biological diversity in England within the planning system is set out. The Government's objectives for planning from an ecological perspective are, among others, to recognise the wider benefits of ecosystem services, minimise the impacts on biodiversity and provide net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, which will include the establishment of coherent ecological networks that are more resilient to current and future pressures.

Of particular note to ecological impact assessment is paragraph 174 of the Habitats and biodiversity section which states, to protect and enhance biodiversity and geodiversity, plans should:

"a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and

"b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity".

And, when determining planning applications, local planning authorities should refuse planning permission 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".

As a result of the NPPF any species or habitats of principal importance found on the application site, in addition to statutorily protected species, are of material consideration in the planning process.

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.

B.3 PLANNING POLICY

National

National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2021[5] 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[6]

Policy G1 Green infrastructure

1. 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.
2. Boroughs should prepare green infrastructure strategies that integrate objectives relating to open space provision, biodiversity conservation, flood management, health and wellbeing, sport and recreation.
3. 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.
4. Development proposals should incorporate appropriate elements of green infrastructure that are integrated into London's wider green infrastructure network.

Policy G5 Urban greening

5. 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.

6. 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).
7. 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

8. Sites of Importance for Nature Conservation (SINCs) should be protected.
9. 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.
10. 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.
11. 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.
12. Proposals which reduce deficiencies in access to nature should be considered positively.

Policy G7 Trees and woodlands

13. 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.
14. 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
15. 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[7]

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.

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[1] *HM Government, (2006); Natural Environment and Rural Communities Act 2006. HMSO*
[2] *GOV.UK. (2018). National Planning Policy Framework. [online] Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2.*
[3] *DCLG (Former ODPM), (2005); Planning Policy Statement 9: Biodiversity and Geological Conservation. HMSO*
[4] *ODPM, (2005); Circular 06/2005; Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System. TSO*
[5] *GOV.UK. (2021). National Planning Policy Framework. [online] Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2*
[6] *Greater London Authority (2021) The London Plan: The Spatial Development Strategy for Greater London (GLA)*
[7] *Greater London Authority (2018). London Environment Strategy 2018. London: Greater London Authority.*

INVERTEBRATE SURVEY
OF
BROADWATER LAKE,

MIDDLESEX

AUGUST 2023

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SUMMARY

Surveys of terrestrial and aquatic invertebrates were carried out on the following dates ;- 7th April, 17th May, 19th June, and 15th August 2023.

Species Totals: Peninsula area

In all 303 taxa were recorded (the list of species recorded are shown in Appendix 3). Conservation status definitions are provided in Appendix 5.

Species with conservation designations

Species	Family	Order	Conservation status
Tetragnatha striata	Tetragnathidae	Araneae	NS
Longitarsus lycopi	Chrysomelidae	Coleoptera	NS
Stenus butrintensis	Staphylinidae	Coleoptera	Notable
Ceraleptus lividus	Coreidae	Hemiptera	NS
Aquarius paludum	Gerridae	Hemiptera	NS
Lasius brunneus	Formicidae	Hymenoptera	Na
Euplagia quadripunctaria	Erebidae	Lepidoptera	LC (Global)
Nonagria typhae	Noctuidae	Lepidoptera	LC (Global)
Furcula furcula	Notodontidae	Lepidoptera	LC (Global)
Anodonta cygnea	Unionidae	Unionoida	NT (European)

Species Totals: Lake Edge

In all 245 taxa were recorded (the list of species recorded are shown in Appendix 4).

Species with conservation designations

Species	**Family**	**Order**	**Conservation status**
Tmeticus affinis	Linyphiidae	Araneae	NS
Tetragnatha striata	Tetragnathidae	Araneae	NS
Donacia thalassina	Chrysomelidae	Coleoptera	NS
Longitarsus lycopi	Chrysomelidae	Coleoptera	NS
Longitarsus rutilus	Chrysomelidae	Coleoptera	NS
Mecinus circulatus	Curculionidae	Coleoptera	Nb
Stenus butrintensis	Staphylinidae	Coleoptera	Notable
Aquarius paludum	Gerridae	Hemiptera	NS
Opisthograptis luteolata	Geometridae	Lepidoptera	LC (Global)
Sesia apiformis	Sesiidae	Lepidoptera	LC (Global)
Anodonta cygnea	Unionidae	Unionoida	NT (European)

Species new for Middlesex

Thinodromus arcuatus

INTRODUCTION

Baseline invertebrate surveys of the peninsula and lake edge were carried out on 7th April, 17th May, 19th June, and 15th August 2023.

Surveys were focussed on both terrestrial and emergent / riparian habitats. The site was split into two areas for survey: the peninsula (encompassing all habitat types including woodland, pools, flooded areas) and the remaining lake edge (encompassing wetland, tree-associated, open habitat).

Sampling locations are shown in Figure 1 and described in Appendix 1. Selected photographs are provided in Appendix 2.

NB. The path along the west shore became overgrown and the samples sites L3-L7 were not sampled in August.

Figure 1 Main sample sites

METHODS

Standard field techniques were employed to sample the invertebrate fauna across the site. These included sweeping vegetation with a wide mouthed sweep net, beating trees and bushes over a beating tray, and grubbing amongst tussocks and key host plant rosettes etc. A 0.5mm mesh GB nets net was used to sample the ponds and flowing water.

Sampling stations were selected for their accessibility and representativeness of the site habitats. Sampling was also carried out between these stations on a *ad hoc* basis primarily for flying insects.

Samples were collected and preserved in the field in ethanol, before being identified at a later date in a laboratory using a microscope.

Because it is impracticable to survey all the potential invertebrates within any given site, only specific groups of species were examined during fieldwork. These groups are sufficiently well known as to allow meaningful comparisons to be made with other sites, both locally and nationally. They are also important as indicators of the quality of a site and the habitats present (see Brooks 1993).

Groups covered during the survey were:

- Mollusca (slugs and snails)
- Arachnida (spiders, harvestmen & pseudoscorpions)
- Isopoda (woodlice)
- Thysanura (bristletails)
- Ephemeroptera (mayflies)
- Odonata (dragonflies & damselflies)
- Plecoptera (stoneflies)
- Orthoptera (grasshoppers & crickets)
- Dictyoptera (cockroaches)
- Dermaptera (earwigs)
- Hemiptera-Heteroptera (true-bugs)
- Hemiptera-Homoptera (hoppers)
- Neuroptera (lace-wings)
- Mecoptera (scorpion-flies)
- Lepidoptera (butterflies & moths)
- Trichoptera (caddis flies)
- Diptera (true flies)
- Aculeate Hymenoptera (ants, bees & wasps)
- Coleoptera (beetles)

HABITAT ASSESSMENT

USING PANTHEON AND ISIS TO MEASURE SITE QUALITY

Explanation of the underlying invertebrate assemblage framework.

ISIS is a computer spreadsheet application for recognising invertebrate assemblage types in species lists collected at scales ranging from management compartment to landscape character area. This has been developed into an online programme called Pantheon. The assemblage types are labelled in terms that relate to their favoured habitats in order to make them accessible to non-specialists. However, they are defined by lists of characteristic species that are generally found together in nature. Two levels are recognised in the classification. Broad assemblage types (BATs) are a comprehensive series of assemblage types that are characterised by more widespread species. They can be expressed in lists from a wide range of sites. Specific assemblage types (SATs) are characterised by ecologically restricted species and are generally only expressed in lists from sites with conservation value. Since 2008 there has also been a third category of assemblage types that cut across this classification. They are mainly defined by lists of species dependent on a particular environmental resource, such as flowers as a source of pollen and nectar. The assemblage type classification is given below. Textual descriptions of each assemblage type and its habitats have been prepared for incorporation into a web-based database.

RESULTS

PENINSULA

In all 303 taxa were recorded (the list of species recorded are shown in Appendix 3) and the species with a conservation designation are shown in Table 1. Conservation status definitions are provided in Appendix 5.

Table 1. Species with conservation designations from the peninsula

Species	Family	Order	Conservation status
Tetragnatha striata	Tetragnathidae	Araneae	NS
Longitarsus lycopi	Chrysomelidae	Coleoptera	NS
Stenus butrintensis	Staphylinidae	Coleoptera	Notable
Ceraleptus lividus	Coreidae	Hemiptera	NS
Aquarius paludum	Gerridae	Hemiptera	NS
Lasius brunneus	Formicidae	Hymenoptera	Na
Euplagia quadripunctaria	Erebidae	Lepidoptera	LC (Global)
Nonagria typhae	Noctuidae	Lepidoptera	LC (Global)
Furcula furcula	Notodontidae	Lepidoptera	LC (Global)
Anodonta cygnea	Unionidae	Unionoida	NT (European)

The removal of buddleja had caused disturbance of the brownfield habitats on the peninsula which were still recovering during the May visit as a result of the slow spring, but by the June and August visits the habitats had partially recovered and additional flowering ephemeral species noted in cleared open areas.

The woodland was flooded extensively, and the pools supported a good range of species including *Acilius sulcatus, Hygrobia hermanmi* and *Corixa panzeri.*

The woodland is largely secondary, however the older alder and willows include dead and moribund trees with saproxylic habitat. The ants *Lasius brunneus* and *Temnothorax nylanderi* were nesting under bark, where the predatory (and formerly notable) beetle *Uleiota planata* was frequent.

Table 2. Scores for Peninsula area

Code	SAT	No. of species	Reported condition
F001	scrub edge	11	Favourable (11 species, 11 required)
F002	rich flower resource	19	Favourable (19 species, 15 required)
F112	open short sward	5	Unfavourable (5 species, 13 required)
A212	bark & sapwood decay	11	Unfavourable (11 species, 19 required)
W211	open water on disturbed mineral sediments	5	Unfavourable (5 species, 6 required)
A211	heartwood decay	3	Unfavourable (3 species, 6 required)
W314	reed-fen & pools	3	Unfavourable (3 species, 11 required)
F003	scrub-heath & moorland	2	Unfavourable (2 species, 9 required)

LAKE EDGE

In all 245 taxa were recorded around the remaining lake edge habitats (the list of species recorded are shown in Appendix 4) and the species with a conservation designation are shown in Table 3.

Table 3. Species (11No.) with conservation designations from lake edge

Species	Family	Order	Conservation status
Tmeticus affinis	Linyphiidae	Araneae	NS
Tetragnatha striata	Tetragnathidae	Araneae	NS
Donacia thalassina	Chrysomelidae	Coleoptera	NS
Longitarsus lycopi	Chrysomelidae	Coleoptera	NS
Longitarsus rutilus	Chrysomelidae	Coleoptera	NS
Mecinus circulatus	Curculionidae	Coleoptera	Nb
Stenus butrintensis	Staphylinidae	Coleoptera	Notable
Aquarius paludum	Gerridae	Hemiptera	NS
Opisthograptis luteolata	Geometridae	Lepidoptera	LC (Global)
Sesia apiformis	Sesiidae	Lepidoptera	LC (Global)
Anodonta cygnea	Unionidae	Unionoida	NT (European)

The lake margin along the west shore has extensive reed beds: these yielded the nationally scarce spider *Tetragnatha striata*, the camphor beetle *Stenus butrintensis* and the soldier beetle *Silis ruficollis.* Figworts supported the nationally scarce flea beetle *Longitarsus rutilus* and water mint the nationally scarce flea beetle *Longitarsus lycopi* and the local weevil *Datonychus melanostictus.*

The money spider *Tmeticus affinis* was also taken amongst sedge litter. The rove beetle *Thinodromus arcuatus* was found in flotsam in the south-west corner of lake. The first record for Middlesex.

The W211 open water on disturbed mineral sediments assemblage is in favourable condition.

Table 4. SAT scores for lake edge

SAT	SAT	No. of species	Reported condition
W211	open water on disturbed mineral sediments	9	Favourable (9 species, 6 required)
A212	bark & sapwood decay	6	Unfavourable (6 species, 19 required)
W314	reed-fen & pools	5	Unfavourable (5 species, 11 required)
F001	scrub edge	2	Unfavourable (2 species, 11 required)
F002	rich flower resource	1	Unfavourable (1 species, 15 required)

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APPENDIX 1. SAMPLING STATIONS 2023

Station	Habitat	Description
PENINSULA SAMPLE SITES		
P1	Mosaic/ecocline	Herb rich verge at entrance to footpath along south edge of site. Waterlogged in winter but dry after spring/early summer drought
P2	Disturbed ground	Sparsely vegetated glade. Heavily disturbed by *Buddleja* removal operations
P3	Marginal habitat	Southwest corner of peninsula in area used to dump excess unset concrete. Extensive *Typha* and *Sparganium* beds
P4	Broadleaved woodand	Carr woodland with willows *Salix fragilis* and *S.cinerea/caprae*: Understorey dominated by nettle beds on drier ground.
P5	Carr woodand	Carr woodland with alder *Alnus glutinosa* and willows *Salix fragilis* and *S.cinerea/caprae*: Understorey dominated by nettle beds on drier ground. Inundated to 0.5-1m in April. Pools in open had *Iris pseudacorus, Mentha aquatica.* Also root plate pools in sockets where trees had recently fallen.
P6	Marginal habitat	Wave-washed north edge of peninsula with *Sparganium* bed with *Lycopus europaea* emergent from gravel substrate.
P7	Marginal habitat	Wave-washed north end of peninsula with root tangles over a gravel substrate. Secondary woodland on bank.
LAKE EDGE SAMPLE SITES		
L1	Marginal habitat	*Iris pseudacorus* and *Sparganium* beds with *Mentha aquatica, Scrophularia.* Free-floating *Elodea canadensis* abundant in water column
L2	Marginal habitat	*Iris pseudacorus* beds with *Mentha aquatica, Scrophularia, Lycopus, Solanum dulcamarae*. Free-floating *Elodea canadensis* abundant in water column
L3	Marginal habitat	Southwest corner of lake. Large accumulations of vegetable flotsam on open gravelly substrate. Abundant emergent *Mentha aquatica, Iris pseudacorus*
L4	Marginal habitat	*Carex acutiformis, Sparganium beds with Typha, Lycopus etc.*
L5	Marginal habitat	*Phragmites* bed with *Typha* and *Carex acutiformis*
L5	Marginal habitat	*Phragmites* bed with *Typha*
L5	Marginal habitat	*Phragmites* bed with *Typha, Sparganium* and *Carex acutiformis*

L8	Marginal habitat	*Iris pseudacorus* beds with *Mentha aquatica, Solanum dulcamarae*. Free-floating *Elodea canadensis* abundant in water column
L9	Marginal habitat	*Iris pseudacorus* beds with *Mentha aquatica, Eupatoria cannabinum.* Free-floating *Elodea canadensis* abundant in water column
L10	Marginal habitat	Woodland with short open section with *Iris pseudacorus* beds with *Mentha aquatica, Eupatoria cannabinum.* Free-floating *Elodea canadensis* abundant in water column
L11	Marginal habitat	Woodland with short open section with *Iris pseudacorus* beds with *Mentha aquatica, Eupatoria cannabinum.* Free-floating *Elodea canadensis* abundant in water column and extensive root tangles from willow trees
L12	Marginal habitat	Wooded bank with open water with occasional *Elodea canadensis*

APPENDIX 2 SAMPLING STATION PHOTOGRAPHS

Figure 2.1. Peninsula site 3 looking NW

Figure 2.2. Peninsula site 6 looking NW.

Figure 2.3. Lake site 1 looking NW

Figure 2.4. Lake site 2 looking NW

Figure 2.5. Lake site 5 looking NW

APPENDIX 3. SPECIES LIST FOR PENINSULA 2023

Species	Family	Order	Conservation status
Arcitalitrus dorrieni	Talitridae	Amphipoda	naturalised
Agelena labyrinthica	Agelenidae	Araneae	common
Eratigena duellica	Agelenidae	Araneae	common
Anyphaena accentuata	Anyphaenidae	Araneae	common
Gibbaranea gibbosa	Araneidae	Araneae	common
Mangora acalypha	Araneidae	Araneae	common
Nuctenea umbratica	Araneidae	Araneae	common
Zilla diodia	Araneidae	Araneae	local
Clubiona lutescens	Clubionidae	Araneae	common
Clubiona phragmitis	Clubionidae	Araneae	common
Dictyna arundinacea	Dictynidae	Araneae	common
Dictyna uncinata	Dictynidae	Araneae	common
Nigma walckenaeri	Dictynidae	Araneae	local
Harpactea hombergi	Dysderidae	Araneae	common
Gnathonarium dentatum	Linyphiidae	Araneae	common
Hypomma bituberculatum	Linyphiidae	Araneae	common
Linyphia triangularis	Linyphiidae	Araneae	common
Tenuiphantes tenuis	Linyphiidae	Araneae	common
Pardosa nigriceps	Lycosidae	Araneae	common
Pardosa pullata	Lycosidae	Araneae	common
Trochosa terricola	Lycosidae	Araneae	common
Philodromus albidus	Philodromidae	Araneae	common
Philodromus aureolus	Philodromidae	Araneae	common
Philodromus dispar	Philodromidae	Araneae	common
Pisaura mirabilis	Pisauridae	Araneae	common
Euophrys frontalis	Salticidae	Araneae	common
Heliophanus flavipes	Salticidae	Araneae	common
Tetragnatha extensa	Tetragnathidae	Araneae	common
Tetragnatha montana	Tetragnathidae	Araneae	common
Tetragnatha striata	Tetragnathidae	Araneae	NS
Paidiscura pallens	Theridiidae	Araneae	common
Platnickina tincta	Theridiidae	Araneae	common
Steatoda nobilis	Theridiidae	Araneae	common
Theridion mystaceum	Theridiidae	Araneae	common
Theridion pictum	Theridiidae	Araneae	local
Theridion varians	Theridiidae	Araneae	common
Apion frumentarium	Apionidae	Coleoptera	common
Protapion assimile	Apionidae	Coleoptera	common
Cantharis cryptica	Cantharidae	Coleoptera	common

Cantharis rustica	Cantharidae	Coleoptera	common
Rhagonycha fulva	Cantharidae	Coleoptera	common
Abax parallelepipedus	Carabidae	Coleoptera	common
Agonum marginatum	Carabidae	Coleoptera	common
Amara aenea	Carabidae	Coleoptera	common
Amara plebeja	Carabidae	Coleoptera	common
Amara similata	Carabidae	Coleoptera	common
Bembidion articulatum	Carabidae	Coleoptera	common
Bembidion dentellum	Carabidae	Coleoptera	common
Carabus granulatus	Carabidae	Coleoptera	common
Carabus violaceus	Carabidae	Coleoptera	common
Harpalus affinis	Carabidae	Coleoptera	common
Harpalus rufipes	Carabidae	Coleoptera	common
Leistus ferrugineus	Carabidae	Coleoptera	common
Leistus fulvibarbis	Carabidae	Coleoptera	common
Nebria brevicollis	Carabidae	Coleoptera	common
Notiophilus biguttatus	Carabidae	Coleoptera	common
Notiophilus substriatus	Carabidae	Coleoptera	common
Ocys harpaloides	Carabidae	Coleoptera	common
Paradromius linearis	Carabidae	Coleoptera	common
Pterostichus madidus	Carabidae	Coleoptera	common
Pterostichus melanarius	Carabidae	Coleoptera	common
Pterostichus nigrita	Carabidae	Coleoptera	common
Syntomus foveatus	Carabidae	Coleoptera	common
Syntomus obscuroguttatus	Carabidae	Coleoptera	local
Grammoptera ruficornis	Cerambycidae	Coleoptera	common
Agelastica alni	Chrysomelidae	Coleoptera	common
Altica lythri	Chrysomelidae	Coleoptera	common
Chaetocnema concinna	Chrysomelidae	Coleoptera	common
Cryptocephalus moraei	Chrysomelidae	Coleoptera	local
Longitarsus jacobaeae	Chrysomelidae	Coleoptera	common
Longitarsus lycopi	Chrysomelidae	Coleoptera	NS
Longitarsus parvulus	Chrysomelidae	Coleoptera	common
Phyllotreta nigripes	Chrysomelidae	Coleoptera	common
Plagiodera versicolora	Chrysomelidae	Coleoptera	common
Psylliodes affinis	Chrysomelidae	Coleoptera	common
Psylliodes chrysocephala	Chrysomelidae	Coleoptera	common
Psylliodes dulcamarae	Chrysomelidae	Coleoptera	common
Adalia bipunctata	Coccinellidae	Coleoptera	common
Adalia decempunctata	Coccinellidae	Coleoptera	common
Anisosticta novemdecimpunctata	Coccinellidae	Coleoptera	local
Calvia quattuordecimguttata	Coccinellidae	Coleoptera	common
Coccidula rufa	Coccinellidae	Coleoptera	local
Coccidula scutellata	Coccinellidae	Coleoptera	local
Coccinella septempunctata	Coccinellidae	Coleoptera	common

Halyzia sedecimguttata	Coccinellidae	Coleoptera	common
Harmonia quadripunctata	Coccinellidae	Coleoptera	common
Nephus quadrimaculatus	Coccinellidae	Coleoptera	local
Nephus redtenbacheri	Coccinellidae	Coleoptera	common
Propylea quattuordecimpunctata	Coccinellidae	Coleoptera	common
Rhyzobius chrysomeloides	Coccinellidae	Coleoptera	common
Subcoccinella vigintiquattuorpunctata	Coccinellidae	Coleoptera	common
Anthonomus pomorum	Curculionidae	Coleoptera	common
Ceutorhynchus pallidactylus	Curculionidae	Coleoptera	common
Dorytomus tortrix	Curculionidae	Coleoptera	local
Euophryum confine	Curculionidae	Coleoptera	common
Sciaphilus asperatus	Curculionidae	Coleoptera	local
Sitona lineatus	Curculionidae	Coleoptera	common
Xylocleptes bispinus	Curculionidae	Coleoptera	local
Acilius sulcatus	Dytiscidae	Coleoptera	common
Agbus bipustulatus	Dytiscidae	Coleoptera	common
Colymbetes fuscus	Dytiscidae	Coleoptera	common
Hyphydrus ovatus	Dytiscidae	Coleoptera	common
Hydroporus planus	Dytiscidae	Coleoptera	common
Laccophilus hyalinus	Dytiscidae	Coleoptera	local
Laccophilus minutus	Dytiscidae	Coleoptera	common
Agriotes pallidulus	Elateridae	Coleoptera	common
Helophorus aequalis	Helophoridae	Coleoptera	common
Helophorus brevipalpis	Helophoridae	Coleoptera	common
Cercyon sternalis	Hydrophilidae	Coleoptera	local
Anacaena limbata	Hydrophilidae	Coleoptera	common
Anacaena globulus	Hydrophilidae	Coleoptera	common
Enochrus testaceus	Hydrophilidae	Coleoptera	common
Helochares lividus	Hydrophilidae	Coleoptera	local
Hydrobius fuscipes	Hydrophilidae	Coleoptera	common
Hygrobia hermanni	Hygrobiidae	Coleoptera	local
Brachypterus glaber	Kateretidae	Coleoptera	common
Brachypterus urticae	Kateretidae	Coleoptera	common
Malachius bipustulatus	Malachiidae	Coleoptera	common
Pyrochroa coccinea	Pyrochroidae	Coleoptera	local
Pyrochroa serraticornis	Pyrochroidae	Coleoptera	common
Deporaus betulae	Rhynchitidae	Coleoptera	common
Melolontha melolontha	Scarabaeidae	Coleoptera	common
Contacyphon coarctatus	Scirtidae	Coleoptera	common
Anaspis maculata	Scraptiidae	Coleoptera	common
Phosphuga atrata	Silphidae	Coleoptera	common
Psammoecus bipunctatus	Silvanidae	Coleoptera	common
Uleiota planatus	Silvanidae	Coleoptera	local
Alianta incana	Staphylinidae	Coleoptera	common
Anotylus rugosus	Staphylinidae	Coleoptera	common

Hygronoma dimidiata	Staphylinidae	Coleoptera	local
Lathrobium elongatum	Staphylinidae	Coleoptera	local
Ocypus olens	Staphylinidae	Coleoptera	common
Paederus riparius	Staphylinidae	Coleoptera	common
Stenus bimaculatus	Staphylinidae	Coleoptera	common
Stenus butrintensis	Staphylinidae	Coleoptera	Notable
Stenus flavipes	Staphylinidae	Coleoptera	common
Stenus impressus	Staphylinidae	Coleoptera	common
Stenus juno	Staphylinidae	Coleoptera	common
Stenus solutus	Staphylinidae	Coleoptera	common
Forficula auricularia	Forficulidae	Dermaptera	common
Pegomya solennis	Anthomyiidae	Diptera	common
Dilophus febrilis	Bibionidae	Diptera	common
Bombylius major	Bombyliidae	Diptera	common
Medetera truncorum	Dolichopodidae	Diptera	common
Empis livida	Empididae	Diptera	common
Erioptera lutea	Limoniidae	Diptera	common
Opomyza germinationis	Opomyzidae	Diptera	common
Pollenia amentaria	Polleniidae	Diptera	common
Ptychoptera contaminata	Ptychopteridae	Diptera	common
Chrysopilus cristatus	Rhagionidae	Diptera	common
Rhagio scolopaceus	Rhagionidae	Diptera	common
Tetanocera ferruginea	Sciomyzidae	Diptera	common
Sepsis fulgens	Sepsidae	Diptera	common
Themira annulipes	Sepsidae	Diptera	common
Themira superba	Sepsidae	Diptera	common
Chloromyia formosa	Stratiomyidae	Diptera	common
Pachygaster atra	Stratiomyidae	Diptera	common
Pachygaster leachii	Stratiomyidae	Diptera	common
Criorhina berberina	Syrphidae	Diptera	common
Episyrphus balteatus	Syrphidae	Diptera	common
Myathropa florea	Syrphidae	Diptera	common
Syrphus ribesii	Syrphidae	Diptera	common
Tipula pagana	Tipulidae	Diptera	common
Tipula vernalis	Tipulidae	Diptera	common
Cyphoderus albinus	Cyphoderidae	Entomobryomorpha	common
Entomobrya multifasciata	Entomobryidae	Entomobryomorpha	common
Entomobrya nivalis	Entomobryidae	Entomobryomorpha	common
Lepidocyrtus lanuginosus	Entomobryidae	Entomobryomorpha	common
Orchesella cincta	Entomobryidae	Entomobryomorpha	common
Isotomurus unifasciatus	Isotomidae	Entomobryomorpha	common
Parisotoma notabilis	Isotomidae	Entomobryomorpha	common
Pogonognathellus longicornis	Tomoceridae	Entomobryomorpha	common
Tomocerus minor	Tomoceridae	Entomobryomorpha	common
Tomocerus vulgaris	Tomoceridae	Entomobryomorpha	common

Glomeris marginata	Glomeridae	Glomerida	common
Anthocoris confusus	Anthocoridae	Hemiptera	common
Temnostethus pusillus	Anthocoridae	Hemiptera	common
Pemphigus spyrothecae	Aphididae	Hemiptera	common
Philaenus spumarius	Aphrophoridae	Hemiptera	common
Aneurus avenius	Aradidae	Hemiptera	common
Athysanus argentarius	Cicadellidae	Hemiptera	local
Cicadula quadrinotata	Cicadellidae	Hemiptera	common
Ceraleptus lividus	Coreidae	Hemiptera	NS
Coreus marginatus	Coreidae	Hemiptera	common
Syromastus rhombeus	Coreidae	Hemiptera	local
Corixa panzeri	Corixidae	Hemiptera	common
Paracorixa concinna	Corixidae	Hemiptera	common
Sigara dorsalis	Corixidae	Hemiptera	common
Conomelus anceps	Delphacidae	Hemiptera	common
Aquarius paludum	Gerridae	Hemiptera	NS
Gerris lacustris	Gerridae	Hemiptera	common
Hydrometra stagnorum	Hydrometridae	Hemiptera	common
Cymus claviculus	Lygaeidae	Hemiptera	common
Kleidocerys resedae	Lygaeidae	Hemiptera	common
Closterotomus norwegicus	Miridae	Hemiptera	common
Dryophilocoris flavoquadrimaculatus	Miridae	Hemiptera	common
Lygus pratensis	Miridae	Hemiptera	common
Lygus rugulipennis	Miridae	Hemiptera	common
Phytocoris varipes	Miridae	Hemiptera	common
Psallus varians	Miridae	Hemiptera	common
Nabis limbatus	Nabidae	Hemiptera	common
Nabis ferus	Nabidae	Hemiptera	common
Notonecta glauca	Notonectidae	Hemiptera	common
Notonecta viridis	Notonectidae	Hemiptera	common
Palomena prasina	Pentatomidae	Hemiptera	common
Pentatoma rufipes	Pentatomidae	Hemiptera	common
Zicrona caerulea	Pentatomidae	Hemiptera	local
Myrmus miriformis	Rhopalidae	Hemiptera	common
Stictopleurus punctatonervosus	Rhopalidae	Hemiptera	common
Eurygaster testudinaria	Scutelleridae	Hemiptera	common
Tingis cardui	Tingidae	Hemiptera	common
Microvelia reticulata	Veliidae	Hemiptera	common
Velia caprai	Veliidae	Hemiptera	common
Andrena chrysosceles	Andrenidae	Hymenoptera	common
Andrena dorsata	Andrenidae	Hymenoptera	common
Andrena fulva	Andrenidae	Hymenoptera	common
Andrena haemorrhoa	Andrenidae	Hymenoptera	common
Andrena minutula	Andrenidae	Hymenoptera	common
Andrena nigroaenea	Andrenidae	Hymenoptera	common

Apis mellifera	Apidae	Hymenoptera	common
Bombus hypnorum	Apidae	Hymenoptera	common
Bombus lapidarius	Apidae	Hymenoptera	common
Bombus pascuorum	Apidae	Hymenoptera	common
Bombus pratorum	Apidae	Hymenoptera	common
Bombus terrestris	Apidae	Hymenoptera	common
Bombus vestalis	Apidae	Hymenoptera	common
Nomada flava	Apidae	Hymenoptera	common
Omalus aeneus	Chrysididae	Hymenoptera	common
Hylaeus communis	Colletidae	Hymenoptera	common
Crossocerus megacephalus	Crabronidae	Hymenoptera	common
Trypoxylon attenuatum	Crabronidae	Hymenoptera	common
Trypoxylon clavicerum	Crabronidae	Hymenoptera	common
Lasius brunneus	Formicidae	Hymenoptera	Na
Lasius platythorax	Formicidae	Hymenoptera	common
Myrmica rubra	Formicidae	Hymenoptera	common
Myrmica ruginodis	Formicidae	Hymenoptera	common
Myrmica sabuleti	Formicidae	Hymenoptera	common
Temnothorax nylanderi	Formicidae	Hymenoptera	common
Halictus tumulorum	Halictidae	Hymenoptera	common
Lasioglossum calceatum	Halictidae	Hymenoptera	common
Lasioglossum leucopus	Halictidae	Hymenoptera	common
Sphecodes monilicornis	Halictidae	Hymenoptera	common
Ancistrocerus trifasciatus	Vespidae	Hymenoptera	common
Vespula germanica	Vespidae	Hymenoptera	common
Vespula vulgaris	Vespidae	Hymenoptera	common
Armadillidium vulgare	Armadillidiidae	Isopoda	common
Oniscus asellus	Oniscidae	Isopoda	common
Philoscia muscorum	Philosciidae	Isopoda	common
Porcellio scaber	Porcellionidae	Isopoda	common
Tachypodoiulus niger	Julidae	Julida	common
Acentria ephemerella	Crambidae	Lepidoptera	common
Euplagia quadripunctaria	Erebidae	Lepidoptera	LC (Global)
Nonagria typhae	Noctuidae	Lepidoptera	LC (Global)
Furcula furcula	Notodontidae	Lepidoptera	LC (Global)
Aglais io	Nymphalidae	Lepidoptera	common
Maniola jurtina	Nymphalidae	Lepidoptera	common
Pararge aegeria	Nymphalidae	Lepidoptera	common
Pyronia tithonus	Nymphalidae	Lepidoptera	common
Vanessa atalanta	Nymphalidae	Lepidoptera	common
Gonepteryx rhamni	Pieridae	Lepidoptera	common
Pieris rapae	Pieridae	Lepidoptera	common
Emmelina monodactyla	Pterophoridae	Lepidoptera	common
Panorpa communis	Panorpidae	Mecoptera	common
Sialis lutaria	Sialidae	Megaloptera	common

Aeshna grandis	Aeshnidae	Odonata	common
Aeshna mixta	Aeshnidae	Odonata	common
Brachytron pratense	Aeshnidae	Odonata	local
Calopteryx splendens	Calopterygidae	Odonata	common
Erythromma najas	Coenagrionidae	Odonata	common
Orthetrum cancellatum	Libellulidae	Odonata	common
Platycnemis pennipes	Platycnemididae	Odonata	common
Leiobunum rotundum	Phalangiidae	Opiliones	common
Phalangium opilio	Phalangiidae	Opiliones	common
Chorthippus brunneus	Acrididae	Orthoptera	common
Pseudochorthippus parallelus	Acrididae	Orthoptera	common
Conocephalus fuscus	Conocephalidae	Orthoptera	common
Leptophyes punctatissima	Phaneropteridae	Orthoptera	common
Tetrix subulata	Tetrigidae	Orthoptera	common
Podura aquatica	Poduridae	Poduromorpha	common
Polydesmus angustus	Polydesmidae	Polydesmida	common
Polydesmus denticulatus	Polydesmidae	Polydesmida	common
Valenzuela flavidus	Caeciliusidae	Psocoptera	common
Graphopsocus cruciatus	Stenopsocidae	Psocoptera	common
Cepaea nemoralis	Helicidae	Pulmonata	common
Cornu aspersum	Helicidae	Pulmonata	common
Monacha cantiana	Hygromiidae	Pulmonata	common
Lehmannia marginata	Limacidae	Pulmonata	common
Limacus maculatus	Limacidae	Pulmonata	common
Oxychilus cellarius	Oxychilidae	Pulmonata	common
Discus rotundatus	Patulidae	Pulmonata	common
Xeroplexa intersecta	Geomitridae	Stylommatophora	common
Deuterosminthurus pallipes	Bourletiellidae	Symphypleona	common
Dicyrtoma fusca	Dicyrtomidae	Symphypleona	common
Dicyrtomina ornata	Dicyrtomidae	Symphypleona	common
Sminthurinus aureus	Katiannidae	Symphypleona	common
Sminthurinus elegans	Katiannidae	Symphypleona	common
Allacma fusca	Sminthuridae	Symphypleona	common
Sminthurus viridis	Sminthuridae	Symphypleona	common
Mystacides longicornis	Leptoceridae	Trichoptera	common
Limnephilus rhombicus	Limnephilidae	Trichoptera	common
Anodonta cygnea	Unionidae	Unionoida	NT (European)
Euglesa subtruncata	Sphaeriidae	Veneroida	common
Sphaerium corneum	Sphaeriidae	Veneroida	common

APPENDIX 4. SPECIES LIST FOR LAKE EDGE 2023

Species	Family	Order	Conservation status
Crangonyx pseudogracilis	Crangonyctidae	Amphipoda	common
Gammarus pulex sens. str.	Gammaridae	Amphipoda	common
Erpobdella octoculata	Erpobdellidae	Arhynchobdellida	common
Amaurobius fenestralis	Amaurobiidae	Araneae	common
Anyphaena accentuata	Anyphaenidae	Araneae	common
Araneus diadematus	Araneidae	Araneae	common
Larinioides cornutus	Araneidae	Araneae	common
Clubiona phragmitis	Clubionidae	Araneae	common
Dictyna arundinacea	Dictynidae	Araneae	common
Dictyna uncinata	Dictynidae	Araneae	common
Harpactea hombergi	Dysderidae	Araneae	common
Bathyphantes gracilis	Linyphiidae	Araneae	common
Erigone atra	Linyphiidae	Araneae	common
Hypomma bituberculatum	Linyphiidae	Araneae	common
Linyphia triangularis	Linyphiidae	Araneae	common
Microlinyphia pusilla	Linyphiidae	Araneae	common
Porrhomma pygmaeum	Linyphiidae	Araneae	common
Tenuiphantes tenuis	Linyphiidae	Araneae	common
Tmeticus affinis	Linyphiidae	Araneae	NS
Pirata piraticus	Lycosidae	Araneae	common
Trochosa terricola	Lycosidae	Araneae	common
Philodromus dispar	Philodromidae	Araneae	common
Pisaura mirabilis	Pisauridae	Araneae	common
Pachygnatha degeeri	Tetragnathidae	Araneae	common
Tetragnatha extensa	Tetragnathidae	Araneae	common
Tetragnatha montana	Tetragnathidae	Araneae	common
Tetragnatha striata	Tetragnathidae	Araneae	NS
Anelosimus vittatus	Theridiidae	Araneae	common
Enoplognatha ovata sensu stricto	Theridiidae	Araneae	common
Platnickina tincta	Theridiidae	Araneae	common
Theridion pictum	Theridiidae	Araneae	local
Ozyptila praticola	Thomisidae	Araneae	common
Cantharis cryptica	Cantharidae	Coleoptera	common
Cantharis pellucida	Cantharidae	Coleoptera	common
Silis ruficollis	Cantharidae	Coleoptera	Nb
Bembidion articulatum	Carabidae	Coleoptera	common
Bembidion dentellum	Carabidae	Coleoptera	common
Bembidion quadrimaculatum	Carabidae	Coleoptera	common

Carabus granulatus	Carabidae	Coleoptera	common
Elaphrus riparius	Carabidae	Coleoptera	common
Leistus fulvibarbis	Carabidae	Coleoptera	common
Ocys harpaloides	Carabidae	Coleoptera	common
Oxypselaphus obscurus	Carabidae	Coleoptera	common
Paradromius linearis	Carabidae	Coleoptera	common
Paranchus albipes	Carabidae	Coleoptera	common
Pterostichus nigrita	Carabidae	Coleoptera	common
Pterostichus strenuus	Carabidae	Coleoptera	common
Grammoptera ruficornis	Cerambycidae	Coleoptera	common
Agelastica alni	Chrysomelidae	Coleoptera	common
Altica lythri	Chrysomelidae	Coleoptera	common
Cassida viridis	Chrysomelidae	Coleoptera	common
Crepidodera aurata	Chrysomelidae	Coleoptera	common
Crepidodera aurea	Chrysomelidae	Coleoptera	common
Crepidodera fulvicornis	Chrysomelidae	Coleoptera	common
Donacia simplex	Chrysomelidae	Coleoptera	common
Donacia thalassina	Chrysomelidae	Coleoptera	NS
Epitrix pubescens	Chrysomelidae	Coleoptera	common
Galerucella calmariensis	Chrysomelidae	Coleoptera	common
Longitarsus lycopi	Chrysomelidae	Coleoptera	NS
Longitarsus rubiginosus	Chrysomelidae	Coleoptera	common
Longitarsus rutilus	Chrysomelidae	Coleoptera	NS
Plagiodera versicolora	Chrysomelidae	Coleoptera	common
Anisosticta novemdecimpunctata	Coccinellidae	Coleoptera	local
Coccidula rufa	Coccinellidae	Coleoptera	common
Coccidula scutellata	Coccinellidae	Coleoptera	local
Coccinella septempunctata	Coccinellidae	Coleoptera	common
Harmonia axyridis	Coccinellidae	Coleoptera	common
Curculio glandium	Curculionidae	Coleoptera	common
Datonychus melanostictus	Curculionidae	Coleoptera	local
Mecinus circulatus	Curculionidae	Coleoptera	Nb
Sitona lineatus	Curculionidae	Coleoptera	common
Trichosirocalus troglodytes	Curculionidae	Coleoptera	common
Colymbetes fuscus	Dytiscidae	Coleoptera	common
Hyphydrus ovatus	Dytiscidae	Coleoptera	common
Laccophilus hyalinus	Dytiscidae	Coleoptera	local
Laccophilus minutus	Dytiscidae	Coleoptera	common
Haliplus confinis	Haliplidae	Coleoptera	common
Haliplus flavicollis	Haliplidae	Coleoptera	local
Helophorus brevipalpis	Helophoridae	Coleoptera	common
Ochthebius minimus	Hydraenidae	Coleoptera	common
Anacaena limbata	Hydrophilidae	Coleoptera	common
Cercyon convexiusculus	Hydrophilidae	Coleoptera	local
Cercyon sternalis	Hydrophilidae	Coleoptera	local

Enochrus testaceus	Hydrophilidae	Coleoptera	common
Helochares lividus	Hydrophilidae	Coleoptera	local
Hydrobius fuscipes	Hydrophilidae	Coleoptera	common
Hygrobia hermanni	Hygrobiidae	Coleoptera	common
Nanophyes marmoratus	Nanophyidae	Coleoptera	common
Acrotrichis grandicollis	Ptiliidae	Coleoptera	common
Pyrochroa serraticornis	Pyrochroidae	Coleoptera	common
Contacyphon laevipennis	Scirtidae	Coleoptera	local
Psammoecus bipunctatus	Silvanidae	Coleoptera	local
Uleiota planatus	Silvanidae	Coleoptera	[Na]
Alianta incana	Staphylinidae	Coleoptera	common
Anotylus rugosus	Staphylinidae	Coleoptera	common
Gabrius breviventer	Staphylinidae	Coleoptera	common
Gabrius splendidulus	Staphylinidae	Coleoptera	common
Hygronoma dimidiata	Staphylinidae	Coleoptera	local
Lathrobium elongatum	Staphylinidae	Coleoptera	local
Ocyusa picina	Staphylinidae	Coleoptera	common
Paederus riparius	Staphylinidae	Coleoptera	common
Stenus bimaculatus	Staphylinidae	Coleoptera	common
Stenus boops	Staphylinidae	Coleoptera	common
Stenus butrintensis	Staphylinidae	Coleoptera	Notable
Stenus flavipes	Staphylinidae	Coleoptera	common
Stenus impressus	Staphylinidae	Coleoptera	common
Stenus juno	Staphylinidae	Coleoptera	common
Stenus solutus	Staphylinidae	Coleoptera	common
Tachyporus hypnorum	Staphylinidae	Coleoptera	common
Tachyporus nitidulus	Staphylinidae	Coleoptera	common
Tachyporus pallidus	Staphylinidae	Coleoptera	common
Thinodromus arcuatus	Staphylinidae	Coleoptera	local
Forficula auricularia	Forficulidae	Dermaptera	common
Cerodontha phragmitidis	Agromyzidae	Diptera	common
Pegomya solennis	Anthomyiidae	Diptera	common
Dilophus febrilis	Bibionidae	Diptera	common
Bombylius major	Bombyliidae	Diptera	common
Lucilia sericata	Calliphoridae	Diptera	common
Elachiptera brevipennis	Chloropidae	Diptera	common
Medetera truncorum	Dolichopodidae	Diptera	common
Lonchoptera lutea	Lonchopteridae	Diptera	common
Opomyza germinationis	Opomyzidae	Diptera	common
Epistrophe eligans	Syrphidae	Diptera	common
Episyrphus balteatus	Syrphidae	Diptera	common
Eristalis arbustorum	Syrphidae	Diptera	common
Eristalis pertinax	Syrphidae	Diptera	common
Eristalis tenax	Syrphidae	Diptera	common
Helophilus pendulus	Syrphidae	Diptera	common

Myathropa florea	Syrphidae	Diptera	common
Cyphoderus albinus	Cyphoderidae	Entomobryomorpha	common
Entomobrya multifasciata	Entomobryidae	Entomobryomorpha	common
Entomobrya nivalis	Entomobryidae	Entomobryomorpha	common
Lepidocyrtus lanuginosus	Entomobryidae	Entomobryomorpha	common
Orchesella cincta	Entomobryidae	Entomobryomorpha	common
Isotomurus unifasciatus	Isotomidae	Entomobryomorpha	common
Parisotoma notabilis	Isotomidae	Entomobryomorpha	common
Pogonognathellus longicornis	Tomoceridae	Entomobryomorpha	common
Tomocerus minor	Tomoceridae	Entomobryomorpha	common
Tomocerus vulgaris	Tomoceridae	Entomobryomorpha	common
Ephemera vulgata	Ephemeridae	Ephemeroptera	common
Elasmucha grisea	Acanthosomatidae	Hemiptera	common
Anthocoris confusus	Anthocoridae	Hemiptera	common
Pemphigus spyrothecae	Aphididae	Hemiptera	common
Philaenus spumarius	Aphrophoridae	Hemiptera	common
Aneurus avenius	Aradidae	Hemiptera	common
Cixius nervosus	Cixiidae	Hemiptera	common
Coreus marginatus	Coreidae	Hemiptera	common
Corixa panzeri	Corixidae	Hemiptera	local
Cymatia coleoptrata	Corixidae	Hemiptera	local
Paracorixa concinna	Corixidae	Hemiptera	common
Sigara dorsalis	Corixidae	Hemiptera	common
Sigara falleni	Corixidae	Hemiptera	common
Sigara fossarum	Corixidae	Hemiptera	common
Aquarius paludum	Gerridae	Hemiptera	NS
Gerris argentatus	Gerridae	Hemiptera	local
Gerris lacustris	Gerridae	Hemiptera	common
Hydrometra stagnorum	Hydrometridae	Hemiptera	common
Cymus glandicolor	Lygaeidae	Hemiptera	common
Cymus melanocephalus	Lygaeidae	Hemiptera	common
Ischnodemus sabuleti	Lygaeidae	Hemiptera	common
Scolopostethus affinis	Lygaeidae	Hemiptera	common
Scolopostethus thomsoni	Lygaeidae	Hemiptera	common
Deraeocoris lutescens	Miridae	Hemiptera	common
Dicyphus epilobii	Miridae	Hemiptera	common
Harpocera thoracica	Miridae	Hemiptera	common
Liocoris tripustulatus	Miridae	Hemiptera	common
Lygocoris pabulinus	Miridae	Hemiptera	common
Rhabdomiris striatellus	Miridae	Hemiptera	common
Nabis lineatus	Nabidae	Hemiptera	common
Ilyocoris cimicoides	Naucoridae	Hemiptera	common
Ranatra linearis	Nepidae	Hemiptera	common
Notonecta glauca	Notonectidae	Hemiptera	common
Notonecta viridis	Notonectidae	Hemiptera	common

Palomena prasina	Pentatomidae	Hemiptera	common
Pentatoma rufipes	Pentatomidae	Hemiptera	common
Zicrona caerulea	Pentatomidae	Hemiptera	local
Plea minutissima	Pleidae	Hemiptera	common
Chartoscirta cincta	Saldidae	Hemiptera	common
Microvelia reticulata	Veliidae	Hemiptera	common
Velia caprai	Veliidae	Hemiptera	common
Bombus lapidarius	Apidae	Hymenoptera	common
Bombus pratorum	Apidae	Hymenoptera	common
Bombus pascuorum	Apidae	Hymenoptera	common
Bombus terrestris	Apidae	Hymenoptera	common
Lasius platythorax	Formicidae	Hymenoptera	common
Temnothorax nylanderi	Formicidae	Hymenoptera	local
Armadillidium vulgare	Armadillidiidae	Isopoda	common
Asellus aquaticus	Asellidae	Isopoda	common
Oniscus asellus	Oniscidae	Isopoda	common
Pyrausta aurata	Crambidae	Lepidoptera	common
Opisthograptis luteolata	Geometridae	Lepidoptera	LC (Global)
Maniola jurtina	Nymphalidae	Lepidoptera	common
Pararge aegeria	Nymphalidae	Lepidoptera	common
Pyronia tithonus	Nymphalidae	Lepidoptera	common
Vanessa atalanta	Nymphalidae	Lepidoptera	common
Gonepteryx rhamni	Pieridae	Lepidoptera	common
Emmelina monodactyla	Pterophoridae	Lepidoptera	common
Sesia apiformis	Sesiidae	Lepidoptera	LC (Global)
Endothenia gentianaeana	Tortricidae	Lepidoptera	common
Sialis lutaria	Sialidae	Megaloptera	common
Aeshna grandis	Aeshnidae	Odonata	common
Aeshna cyanea	Aeshnidae	Odonata	common
Aeshna mixta	Aeshnidae	Odonata	common
Anax imperator	Aeshnidae	Odonata	common
Brachytron pratense	Aeshnidae	Odonata	local
Orthetrum cancellatum	Libellulidae	Odonata	common
Sympetrum striolatum	Libellulidae	Odonata	common
Calopteryx splendens	Calopterygidae	Odonata	common
Enallagma cyathigerum	Coenagrionidae	Odonata	common
Erythromma najas	Coenagrionidae	Odonata	common
Ischnura elegans	Coenagrionidae	Odonata	common
Platycnemis pennipes	Coenagrionidae	Odonata	local
Pyrrhosoma nymphula	Coenagrionidae	Odonata	common
Tetrix subulata	Tetrigidae	Orthoptera	common
Podura aquatica	Poduridae	Poduromorpha	common
Valenzuela flavidus	Caeciliusidae	Psocoptera	common
Graphopsocus cruciatus	Stenopsocidae	Psocoptera	common

Cepaea nemoralis	Helicidae	Pulmonata	common
Lehmannia marginata	Limacidae	Pulmonata	common
Limacus maculatus	Limacidae	Pulmonata	common
Aegopinella nitidula	Oxychilidae	Pulmonata	common
Oxychilus cellarius	Oxychilidae	Pulmonata	common
Alboglossiphonia heteroclita	Glossiphoniidae	Rhynchobdellida	common
Deuterosminthurus pallipes	Bourletiellidae	Symphypleona	common
Dicyrtoma fusca	Dicyrtomidae	Symphypleona	common
Dicyrtomina ornata	Dicyrtomidae	Symphypleona	common
Sminthurinus aureus	Katiannidae	Symphypleona	common
Sminthurinus elegans	Katiannidae	Symphypleona	common
Allacma fusca	Sminthuridae	Symphypleona	common
Sminthurus viridis	Sminthuridae	Symphypleona	common
Sminthurides aquaticus	Sminthurididae	Symphypleona	common
Ecnomus tenellus	Ecnomidae	Trichoptera	common
Athripsodes cinereus	Leptoceridae	Trichoptera	common
Mystacides longicornis	Leptoceridae	Trichoptera	common
Limnephilus rhombicus	Limnephilidae	Trichoptera	common
Molanna angustata	Molannidae	Trichoptera	common
Girardia tigrina	Dugesiidae	Tricladida	common
Anodonta cygnea	Unionidae	Unionoida	NT (European)
Euglesa subtruncata	Sphaeriidae	Veneroida	common
Sphaerium corneum	Sphaeriidae	Veneroida	common
Valvata piscinalis	Valvatidae	Pulmonata	common
Ampullaceana balthica	Lymnaeidae	Hygrophila	common
Physa fontinalis	Physidae	Hygrophila	common
Gyraulus crista	Planorbidae	Hygrophila	common
Gyraulus albus	Planorbidae	Hygrophila	common
Planorbis carinatus	Planorbidae	Hygrophila	common
Bithynia tentaculata	Bithyniidae	Littorinimorpha	common
Potamopyrgus antipodarum	Tateidae	Littorinimorpha	common

APPENDIX 5. STATUS CATEGORIES FOR RARE AND NOTABLE SPECIES

Red Data Book Category 1 (RDB 1) – Endangered

Definition.
Taxa in danger of extinction *in Great Britain* and whose survival is unlikely if the causal factors continue operating.

Included are those taxa whose numbers have been reduced to a critical level or whose habitats have been so dramatically reduced that they are deemed to be in immediate danger of extinction. Also included are *some* taxa that are *possibly* extinct.

Criteria.
Species which are known *or believed to occur* as only a single population within one 10 km square of the National Grid.

Species which only occur in habitats known to be especially vulnerable.

Species which have shown a rapid or continuous decline over the last twenty years and are now *estimated* to exist in five or fewer 10 km squares.

Species which are *possibly* extinct *but have been recorded this century* and if rediscovered would need protection.

Red Data Book Category 2 (RDB 2) - Vulnerable

Definition.
Taxa *believed* likely to move into the endangered category in the near future if the causal factors continue operating.

Included are taxa of which most or all of the populations are decreasing because of *over-exploitation*, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security is not yet assured; and taxa with populations that are still abundant but are under threat from serious adverse factors throughout their range.

Criteria.
Species declining throughout their range.

Species in vulnerable habitats.

Red Data Book Category 3 (RDB 3) – Rare

Definition.
Taxa with small populations *in Great Britain* that are not at present endangered or vulnerable, but are at risk.

These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range.

Criterion.
Species which are estimated to exist in only fifteen or fewer 10 km squares. *This criterion may be relaxed where populations are likely to exist in over fifteen 10 km squares but occupy small areas of especially vulnerable habitat*

Nationally Scarce Category A - Notable A (Na)

Definition.
Taxa which do not fall within **RDB** categories but which are none-the-less uncommon in Great Britain and are thought to occur in 30 or fewer 10 km squares of the National Grid or, for less well recorded groups, within seven or fewer vice-counties.

Nationally Scarce Category B - Notable B (Nb)

Definition.
Taxa which do not fall within **RDB** categories but which are none-the-less uncommon in Great Britain and are thought to occur in between 31 and 100 10 km squares of the National Grid or, for less well recorded groups, within eight and twenty vice-counties.

Nationally Scarce - Notable (N)

Definition.
Taxa which do not fall within **RDB** categories but which are none-the-less uncommon in Great Britain and are thought to occur in between 16 to 100 10 km squares of the National Grid. Species within this category are often too poorly known for their status to be more precisely estimated.

Summary of the IUCN categories and criteria.

- **REGIONALLY EXTINCT (RE)**
  A taxon is Extinct when there is no reasonable doubt that the last individual has died. In this review the last date for a record is set at fifty years before publication.
- **CRITICALLY ENDANGERED (CR)**
  A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered.
- **ENDANGERED (EN)**
  A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered.
- **VULNERABLE (VU)**
  A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable.
- **NEAR THREATENED (NT)**
  A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
- **LEAST CONCERN (LC)**
  A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
- **DATA DEFICIENT (DD)**
  A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
- **NOT EVALUATED (NE)**
  A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

GB Rarity Status categories and criteria

- **Nationally Rare (NR)**
  Native species which have not been recorded from more than 15 British hectads since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species which are probably extinct.
- **Nationally Scarce (NS)**
  Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 British hectads since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

Other species status terminology.

- **Local**. Species that are restricted in distribution either geographically or by habitat. Also used for species that are widespread but infrequently encountered, e.g. encountered in no more than 300 10km squares of the national Ordnance Survey grid since 1970. Or those species listed as such, based upon modern geographical data, by ISIS (2010) and/or relevant recording schemes.
- **Widely Scattered.** Generally distributed but at low densities.
- **Southern.** Mainly or completely confined to southern England and/or its westerly or easterly regions – as indicated.
- **Common.** Generally widespread throughout the UK.
- **Unknown**. Usually indicates a lack of available data for difficult taxa but may also imply recent taxonomic confusion.