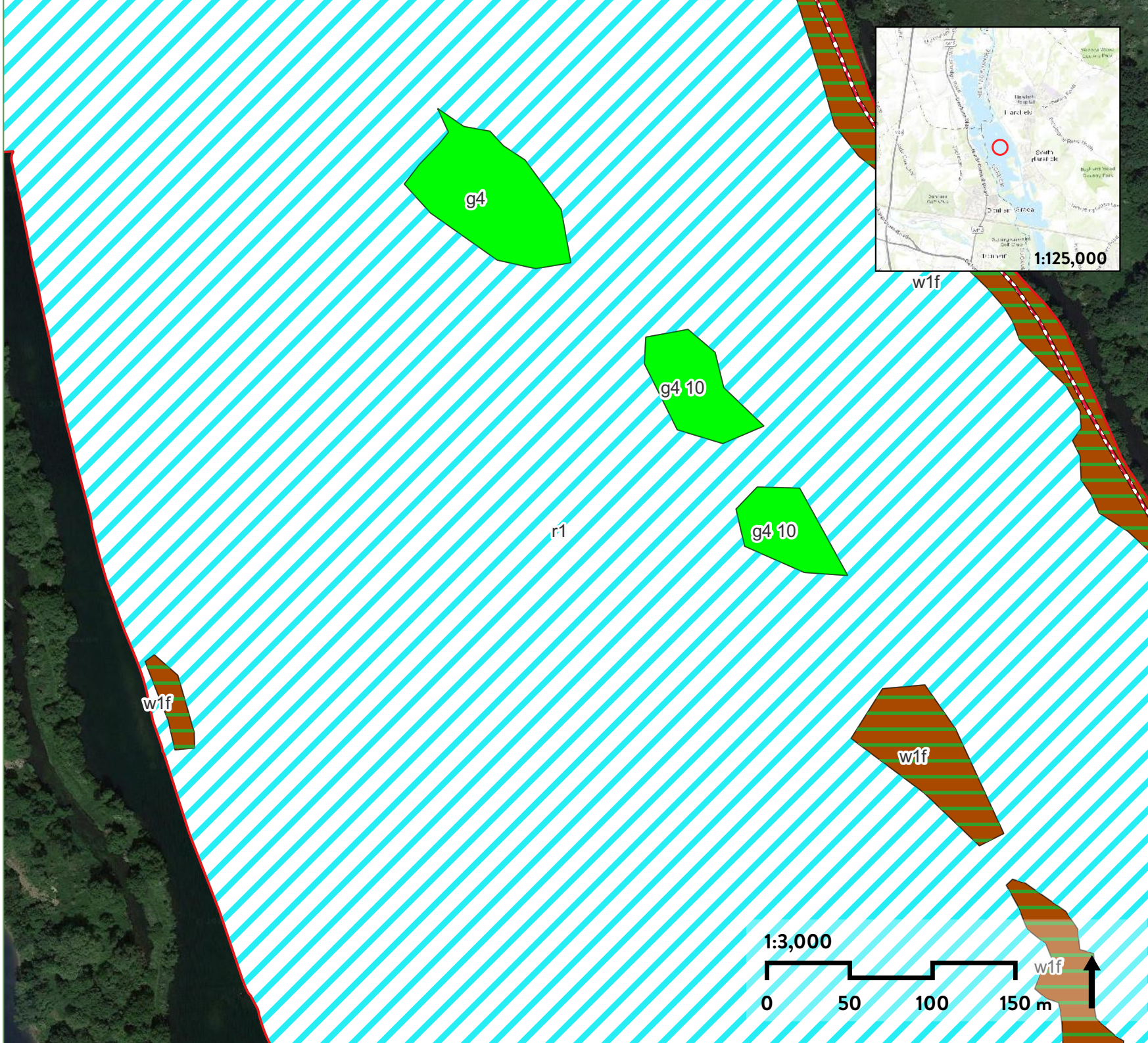
HWSFAC BROADWATER LAKE

- Site Boundary
- g4 - Modified grassland
- r1 - Standing open water and canals
- u1c - Artificial unvegetated unsealed surface
- w1f - Lowland mixed deciduous woodland



Title: Baseline Habitat Map, Map 2

Drawn by: JT
Date: 21/02/2023

Reviewed by: SH
Date: 21/02/2023

Project number: 552023
Sources: ESRI World Topo, Google Satellite

Greengage

HWSFAC BROADWATER LAKE

- Site Boundary
- Target Notes
- h3h - Mixed scrub
- r1 - Standing open water and canals
- u1b - Developed land. sealed surface
- u1b5 - Buildings
- u1c - Artificial unvegetated unsealed surface
- w1d - Wet woodland
- w1f - Lowland mixed deciduous woodland

Title: Baseline Habitat Map, Map 3

Target Notes:

1 - Japanese knotweed
2 - Black poplar
3 - Giant knotweed
4 - Giant knotweed

Drawn by: JT
Date: 21/02/2023

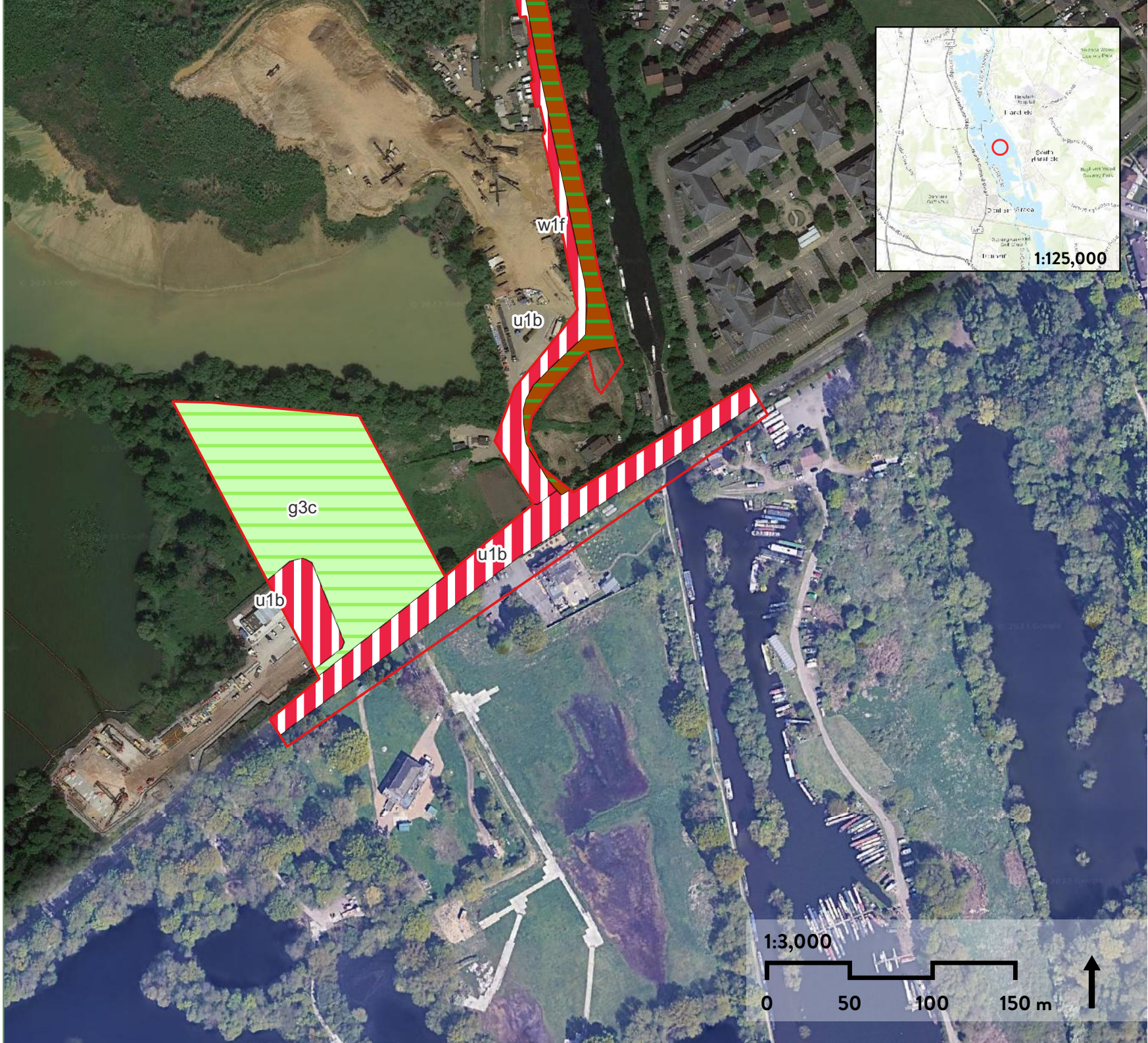
Reviewed by: SH
Date: 21/02/2023

Project number: 552023
Sources: ESRI World Topo, Google Satellite

Greengage

HWSFAC BROADWATER LAKE

- Site Boundary
- g3c - Other neutral grassland
- u1b - Developed land. sealed surface
- w1f - Lowland mixed deciduous woodland



Title: Baseline Habitat Map, Map 4

Drawn by: JT
Date: 20/02/2023

Reviewed by: SH
Date: 20/02/2023

Project number: 552023
Sources: ESRI World Topo, Google Satellite

Greengage

HWSFAC BROADWATER LAKE

- Site Boundary
- r1 - Standing open water and canals
- u1b - Developed land. sealed surface
- u1c - Artificial unvegetated unsealed surface
- w1d - Wet woodland
- w1f - Lowland mixed deciduous woodland

Title: Baseline Habitat Map, Map 5

Drawn by: JT
Date: 20/02/2023

Reviewed by: SH
Date: 20/02/2023

Project number: 552023
Sources: ESRI World Topo, Google Satellite

Greengage

HWSFAC BROADWATER LAKE

- Badger latrine
- Moderate potential for invertebrates
- Ponds assessed for GCN eDNA
- Crayfish remains
- Otter spraint
- Potential otter spraint
- Inaccessible land
- Survey area (Peninsula)

Title: Peninsula Surveys

Surveys completed:

- Bat
- Badger
-GCN HSI and eDNA
- Invertebrate
- Otter and water vole
- Reptile

Drawn by: JT
Date: 14/02/2023

Reviewed by: SH
Date: 14/02/2023

Project number: 552023
Sources: ESRI World Topo, Google Satellite, Greenspace Information for Greater London (GiGL), Natural England

Greengage

APPENDIX B PREVIOUS SURVEY REPORTS

Reports	Survey Type
August 2021 by CGO Ecology Ltd - Preliminary Ecological Appraisal	PEA
June 2022 by RSK Biocensus - eDNA Survey	Great Crested Newt
August 2022 by Greengage - Breeding Bird Survey	Breeding birds - woodland (peninsula) Breeding birds - lake (around peninsula)
May 2022 by Ecology By Design - Scoping Report	Terrestrial Invertebrates
September 2022 by Dr Ross Piper - Terrestrial Invertebrate Survey Report	Terrestrial Invertebrates
November 2022 by Ecology By Design - Further Survey Report	Badger Bat Activity Reptiles Dormouse Water vole Otter
January 2023 by Five Rivers Environmental Contracting Ltd - Broadwater Aquatic Assessment Report	Fish Aquatic invertebrates

CGO Ecology Ltd 27a Ridgefield Gardens Christchurch Dorset BH23 4QG UK

Preliminary Ecological Appraisal for proposed Hillingdon Water Sports Facility, Broadwater Lake, Moorhall Road, Uxbridge, Greater London

CGO Ecology Ltd

Christchurch

4th August 2021

Author:
Dr Chris Gleed-Owen MCIEEM, Director & Principal Ecologist

Volume code: tbc

Project: HWSF, Broadwater Lake, Uxbridge

Document number: tbc

Issue number: P01

Suitability code: S3 Suitable for Review & Comment

Date of issue: 04/08/2021

Classification: Official

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Registered office: Suite 8 Bourne Gate, 25 Bourne Valley Road, Poole, Dorset, BH12 1DY. UK

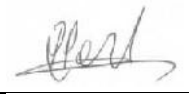
Project: Hillingdon Water Sports Facility, Broadwater Lake, Uxbridge

Deliverable: Preliminary Ecological Appraisal

Our reference: BLUX GIGL PEA

Version: 1

Date: 4th August 2021

Author:	Dr Chris Gleed-Owen BSc (Hons) PhD MCIEEM	
Checked by:	Rebecca Perl BA MA	
Approved by:	Dr Chris Gleed-Owen BSc (Hons) PhD MCIEEM	

Issued to: Mace Ltd. Anticipated circulation includes Mace internal use, London Borough of Hillingdon, other appointed consultancies, Natural England, and other relevant stakeholders.

Version control:

Version	Date	Summary of changes
1	04/08/2021	n/a

Non-technical summary

Introduction

CGO Ecology Ltd was instructed by Mace Ltd, on behalf of the London Borough of Hillingdon (LBH) to conduct a Preliminary Ecological Appraisal (PEA) of land adjacent to Broadwater Lake, Moorhall Road, Harefield, Uxbridge, UB9 6PE (TQ 0471 8921). LBH proposes to develop the Hillingdon Water Sports Facility (HWSF) on the 8ha site. The Local Planning Authority is Hillingdon Council.

Methodology

A Greenspace Information for Greater London (GiGL) standard 2km data search was conducted for local sites, protected and notable spedcies. Defra's MAGIC application was consulted for protected sites and species, habitat, and landscape information within 2km. A PEA (Extended Phase 1 Habitat Survey) was conducted by experienced and suitably-qualified ecologist Dr Chris Gleed-Owen MCIEEM on 9th July 2021. This mapped Phase 1 habitats, recorded species, and identified the site's biodiversity interests. Important ecological features were impact-assessed to inform the mitigation response.

Baseline ecological conditions and impacts

There site lies within the Mid Colne Valley SSSI (Site of Special Scientific Interest), and there are nine other protected sites within 2km with SSSI, National Nature Reserve, and Local Nature Reserve designations. The only mitigation licence issued by Natural England within 2km was for soprano pipistrelle bat 630m southwest. The GiGL returned records of 16 Sites of Interest to Nature Conservation, nine species of bat, and records of badger, water vole, hedgehog, over 100 bird species, GCN, grass snake, invertebrates, plants, and Invasive Non-Native Species (INNS) within 2km.

The PEA walkover recorded 122 plants, 11 birds, and at least 12 invertebrate species. The trees on site are numerous, and are likely to hold bat roost potential. No badger evidence was seen. Japanese knotweed and giant knotweed are present on site.

The proposed development will result in the permanent loss of significant areas of seminatural broadleaved woodland and wet woodland, and small areas of other habitats. Without mitigation, this could harm protected bats, otter, water vole, hedgehog, nesting birds (including Annex I/Schedule 1 species), reptiles, and invertebrates.

Mitigation and compensation recommendations

- Alternative locations for the development must be considered that would cause less loss of woodland. Any woodland loss must be compensated by a greater area of woodland creation (newly-planted woodland is scored much lower than mature woodland in the Biodiversity Metric). To achieve no net loss, significant off-site biodiversity provisions will be needed. This will require significant land acquisition and/or set aside of existing amenity land or other low-value habitats. Land reclamation on part of Broadwater Lake should be considered as a less-damaging and more realistic option.
- Further bat surveys are required, comprising monthly activity surveys (transects, static detectors) and/or roost assessments and emergence/re-entry surveys to determine the impacts on roosting, commuting, and foraging bats. After one month, sufficient data should be gathered to guide the need for tree roost surveys. Appropriate mitigation will be needed to compensate any loss of roosts, and minimise impacts on commuting/foraging bats (such as a low-impact lighting scheme).
- An otter and water vole survey will be needed to determine presence-absence around the shores of the site, with commensurate mitigation.
- Hedgehogs must be safeguarded during enabling works, and alternative habitat provided.

- Tree removal must avoid the March-August bird nesting season, and significant compensatory habitat provisions will be needed. Creation of a new island to shelter part of Broadwater Lake has been proposed. Construction and operation phases will need strict plans for avoiding disturbance and harm to breeding birds and wintering birds.
- No GCN/amphibian mitigation is needed.
- Reptile mitigation may be needed in some areas of the site.
- An aquatic survey for fish and invertebrates will be necessary to identify the fauna that may be impacted within the lake. Appropriate mitigation may then be needed.
- A strict Biosecurity Plan must be in place for the duration of the construction phase, to avoid accidental spread of INNS. A comprehensive eradication programme must be completed for INNS plants on site prior to construction.
- Dialogue should be opened with Natural England at the earliest opportunity.

BNG enhancement recommendations

- The Environment Bill will require at least 10% habitat-based BNG, calculated using Biodiversity Metric 3.0. Achieving 10% BNG will be difficult under the proposed level of woodland removal. Off-site habitat enhancements will be necessary.
- 10 batboxes must be installed in suitable retained trees.
- 10 hedgehog homes must be placed in undisturbed woodland locations.
- 10 bird nestboxes for a range of species must be installed on retained trees. Commensal species should also be targeted by nestbox provisions on buildings.
- Bee-bricks should be included in new buildings, and other provisions to be decided in due course.

Contents

1. Introduction

1.1. Background and proposed development

CGO Ecology Ltd was instructed by Mace Ltd, on behalf of the London Borough of Hillingdon (LBH) to conduct a Preliminary Ecological Appraisal (PEA) of land adjacent to Broadwater Lake, Moorhall Road, Harefield, Uxbridge, UB9 6PE (TQ 0471 8921). LBH proposes to develop the Hillingdon Water Sports Facility (HWSF) on the 8ha site. The Local Planning Authority is Hillingdon Council. The initial proposed design layout and biodiversity mitigation provisions are shown in figure 1 below. Access is via a track to the south that is shared by an aggregate extraction site. The site is a former sand and gravel pit.

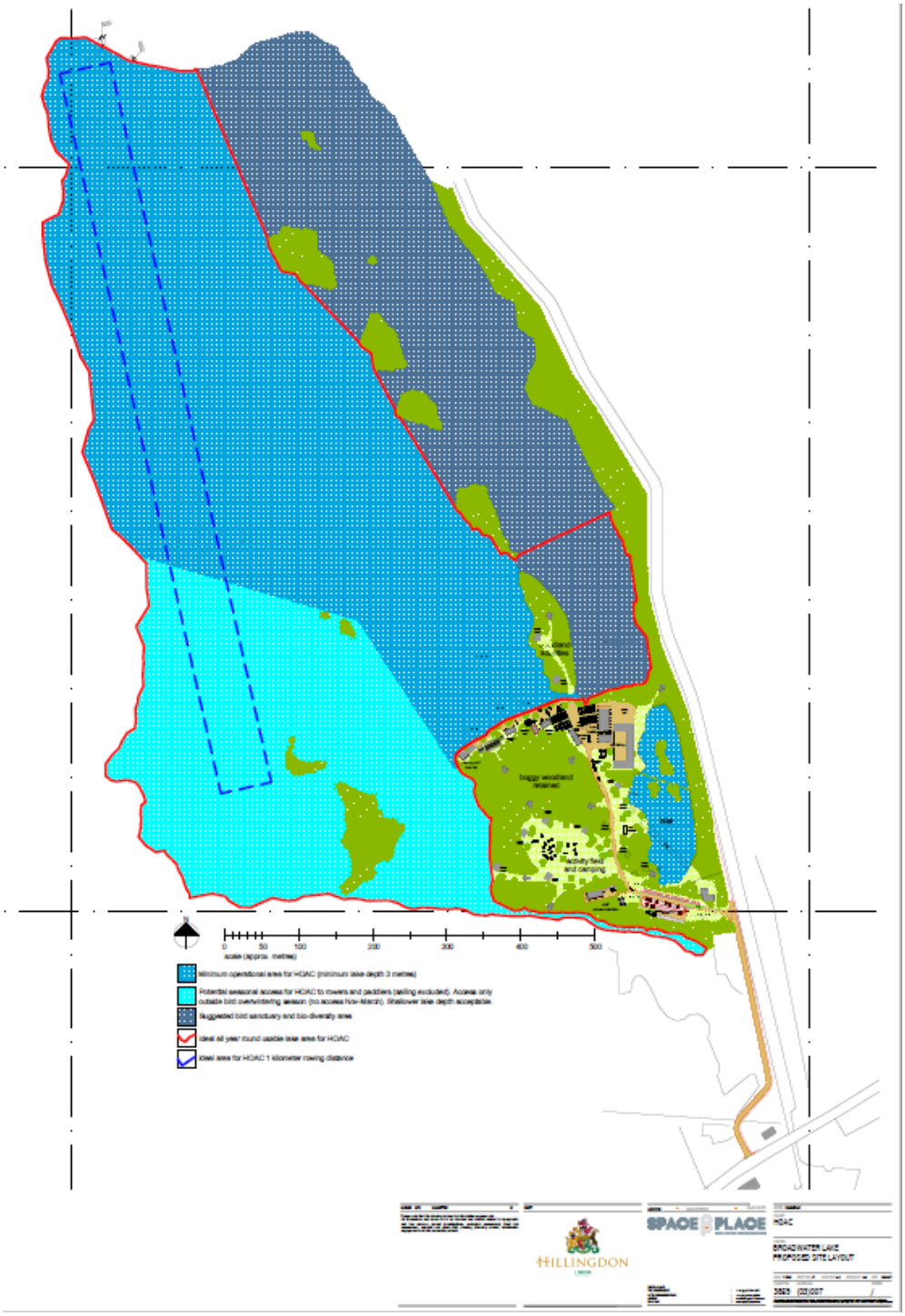


Figure 1 – Proposed layout and mitigation areas. Light blue to the southwest depicts "Potential seasonal access for HWSF to rowers and paddlers (sailing excluded). Access only outside bird overwintering season (no access Nov-March). Shallower lake depth acceptable." Medium blue in the middle shows "Minimum operational area for HWSF (minimum lake depth 3m). Potential seasonal access for HWSF to rowers and paddlers (sailing excluded)." Dark blue to the east is "Suggested bird sanctuary and biodiversity area." Red line is all-year access; blue dashed line is summer-only 1km rowing.

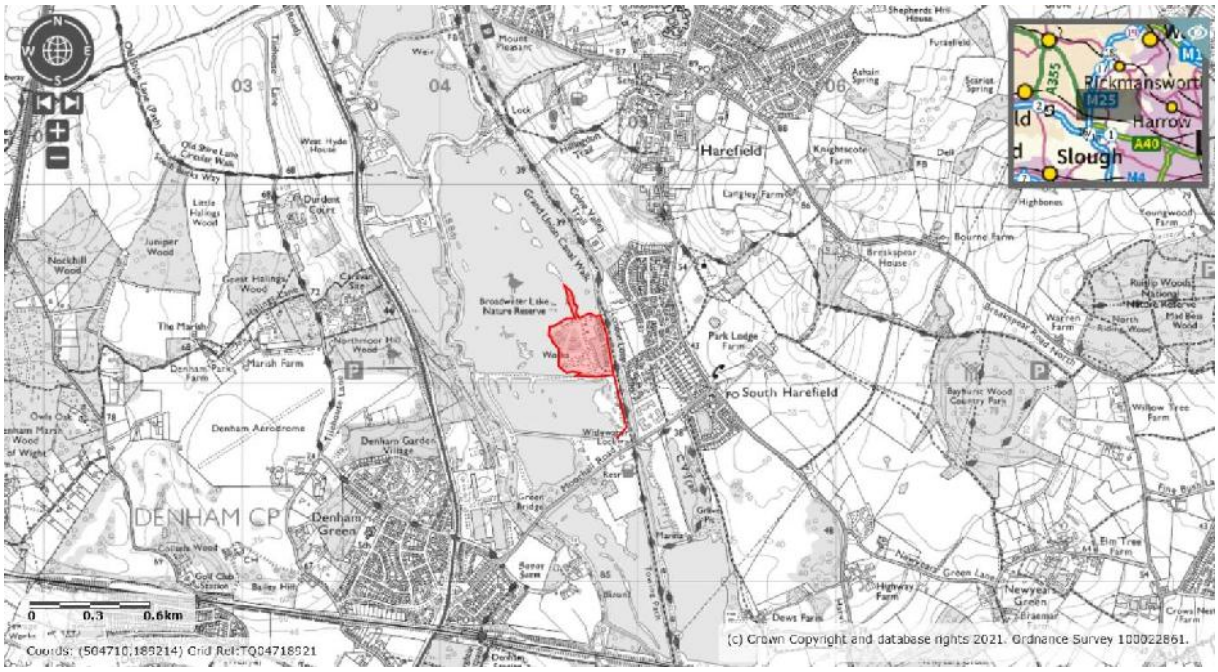


Figure 2 – Defra MAGIC map showing site location (red polygon) on Ordnance Survey map.

1.2. Legislation and policy

Many species of wildlife and habitat types in Britain are protected by laws such as the Wildlife and Countryside Act 1981 (as amended) (WCA 1981), Protection of Badgers Act 1992, Habitats Regulations 2017 (as amended post-Brexit), NERC Act 2006 (esp. Section 41), and Hedgerow Regulations 1997. Works that may harm or disturb protected species, or damage their habitats, must be impact-assessed by an ecologist, and mitigated/compensated as necessary.

A PEA is the first stage, typically involving an Extended Phase 1 Habitat Survey to assess the site's ecological value and potential impacts of the proposed development on protected and notable species, habitats and protected sites. This may be followed by 'phase 2' species surveys and/or a full Ecological Impact Assessment (EcIA) if required under The Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

Buildings, structures, and trees may require a PRA for bats, either as part of a PEA, or as a separate survey. This may result in the need for further surveys to satisfy planning.

Trees can be protected individually or as a group/area by a Tree Preservation Order (TPO) under the Town and Country Planning Act 1990 (as amended) and/or the Town and Country Planning (Tree Preservation) (England) Regulations 2012.

Where a development may have an impact on an internationally-protected site, an Appropriate Assessment (AA) also known as Habitats Regulations Assessment (HRA) may be necessary under the Habitats Regulations 2017 (as amended). The 'competent authority' responsible for this process is usually the LPA, but an ecological consultancy can provide HRA screening and/or full HRA on its behalf. Where the developer conducts this exercise in parallel, it is known as shadow HRA (sHRA).

LPAs also have a duty under the National Planning Policy Framework (NPPF) (MHCLG, 2021) to deliver measurable Biodiversity Net Gain (BNG), i.e. no net loss, plus enhancements, for all developments. BNG must be in addition to any mitigation or compensation provisions required to achieve no net loss. Defra's Biodiversity Metric has become widely adopted as the standard calculator, using a habitat list based on the new UKHab system rather than traditional Phase 1 habitat system.

The Environment Bill, which is due to be enacted in autumn 2021, will require at least 10% BNG on all developments, and mandatory use of Metric 3.0 for sites over 0.5ha in area, or the Small Sites Metric for sites smaller than 0.5ha.

1.3. Author and surveyor

The PEA was conducted by Dr Chris Gleed-Owen BSc (hons) PhD MCIEEM, Director & Principal Ecologist of CGO Ecology Ltd, and author of this report. He has been an ecological consultant since 2008 (13 years). Survey licences: CL09 great crested newt (GCN, *Triturus cristatus*), sand lizard (*Lacerta agilis*), smooth snake (*Coronella austriaca*), natterjack toad (*Epidalea calamita*), Roman snail (*Helix pomatia*). Previous mitigation licence-holder for smooth snake and/or sand lizard (6), badger (*Meles meles*) sett closure (3). Experienced in Phase 1 habitats, UKHab, Biodiversity Metric 2.0/3.0, BREEAM 2014/2018, National Vegetation Classification (NVC), botanical Field Identification Skills Certificate (FISC) level 4, vertebrates, invertebrates. Trained in First Aid at Work, Fire Marshal, Asbestos Awareness, CDM Awareness, COSHH, Manual Handling, Health & Safety Management.

The Phase 1 habitat map was drawn by CGO Ecology GIS technician Jack Parker.

2. Methodology

2.1. Desk study

2.1.1. MAGIC online search

The Defra MAGIC website (https://magic.defra.gov.uk/MagicMap.aspx) was consulted on 30th July 2021 for protected sites, EPS mitigation licences, species records, Priority Habitats, habitat networks, and landscape information within a 2km radius.

2.1.2. GiGL search

A 2km standard data search was sought from Greenspace Information for Greater London (GiGL) for local sites, and records of rare, protected, and otherwise notable species. This was conducted on 28th June 2021 by eCountability Ltd (Ritchie, 2021) on behalf of GiGL, and yielded 7148 protected and notable species records, and 200 London invasive species records. Pertinent species are included in the respective species sections below.

2.2. Field survey

The PEA involved an Extended Phase 1 Habitat Survey. Phase 1 habitats were mapped following the JNCC (2010) methodology, and a floral list was recorded, including abundance using the DAFOR (Dominant, Abundant, Frequent, Occasional, Rare)) scale. Any birds, mammals, and other vertebrates seen were identified and recorded where possible, including searches for tracks, nests, burrows, droppings, and other evidence. Bat roost potential was scoped. Invertebrates were recorded and identified where possible from an active search. This allowed for all protected and notable species and habitats to be appropriately impact-assessed, and suitable mitigation responses and enhancements to be conceived.

The PEA/PRA walkover took place on 9th July 2021, 12:00-15:00, in dry partly-cloudy weather (21°C, 40% cloud cover, 66% relative humidity, wind Beaufort 0-2 southwest).

2.3. Limitations

The season and conditions were optimal for biological recording, mapping habitats accurately, and assessing the site's potential for protected and notable species. Dense scrub and wet woodland areas were impenetrable, and there is a quicksand area on the south edge of the site. These constraints prevented access to all parts the site.

2.4. Impact assessment

The important ecological features (sites, habitats, species) within the development's Zone of Influence (ZOI) were identified as far as possible without further (Phase 2) surveys. Potential impacts were identified, and their nature, magnitude, extent, timing, duration, reversibility, frequency, and distance considered. Whilst this exercise does not constitute a formal EcIA, it aims to gather sufficient information, or recommend further surveys, to enable production of an EcIA report (cf. CIEEM, 2018) in due course if required.

3. Baseline ecological conditions

3.1. Protected sites

The Defra MAGIC website shows 10 protected site designations within 2km. The site lies within the Mid Colne Valley SSSI (Site of Special Scientific Interest). Nine other protected sites have SSSI, National Nature Reserve, and Local Nature Reserve designations. Table 1 summarises the sites, distances, and designated interest features.

Site name	Desig-nation	Dist (m)	Dir	Reasons for designation
Mid Colne Valley	SSSI	0	n/a	Breeding birds (>70spp), wintering birds (>80spp): "significant ornithological interest, particularly for the diversity of breeding woodland and wetland birds, and for the numbers of wintering wildfowl."
Harefield Pit	SSSI	430	NE	Mesozoic and Tertiary geology (Upper Chalk, Reading Beds, London Clay).
Northmoor Hill Wood	LNR	700	W	Ancient woodland
Denham Quarry Park	LNR	1140	S	Wet meadows
Denham Country Park	LNR	1140	S	River, wetland, meadow, and woodland habitats.
Old Park Wood	SSSI	1230	N	Ancient woodland, "some of the most floristically rich ancient woods in Greater London".
Frays Valley	LNR	1250	S	Wetland and grassland habitats, ancient woodland indicator plants, wildfowl, Desmoulin's whorl snail (*Vertigo moulinsiana*).
Ruislip Woods	SSSI	1530	E	Ancient woodland, "extensive example of ancient semi-natural woodland, including some of the largest unbroken blocks that remain in Greater London", birds, insects.
Ruislip Woods	NNR	1530	E	Ancient woodland, flora, fauna.
Old Rectory Meadows	SSSI	1930	SW	Grassland, "base-rich and poor marsh, wet alluvial meadows and water meadows with grazed wet and damp meadows, as well as alder carr woodland" on calcareous gley soils.

Table 1 – Protected sites within 2km of the site.

The GiGL search returned details of 16 Sites of Interest to Nature Conservation (SINCs) within 2km. SINCs are non-statutory designations with *de facto* protection through the planning process. The following SINCs are within 2km: London's Canals, Ruislip Woods and Poor's Field, Old Park Wood, Mid Colne Valley, Coppermill Down, Harefield Chalk Pit, Harefield Churchyard and Wood, Shepherd's Hill Woods and Fields, Dew's Dell, Newyears Green, Medipark Site, The Dairy Farm Harefield, Knightscote Farm Ponds, Harefield Green Pond, Breakspear House Wood, Harefield Hospital Ponds and the Old Orchard.

As the site is within a SSSI, the LPA must consult Natural England for all planning applications.

The National Character Area is Thames Valley.

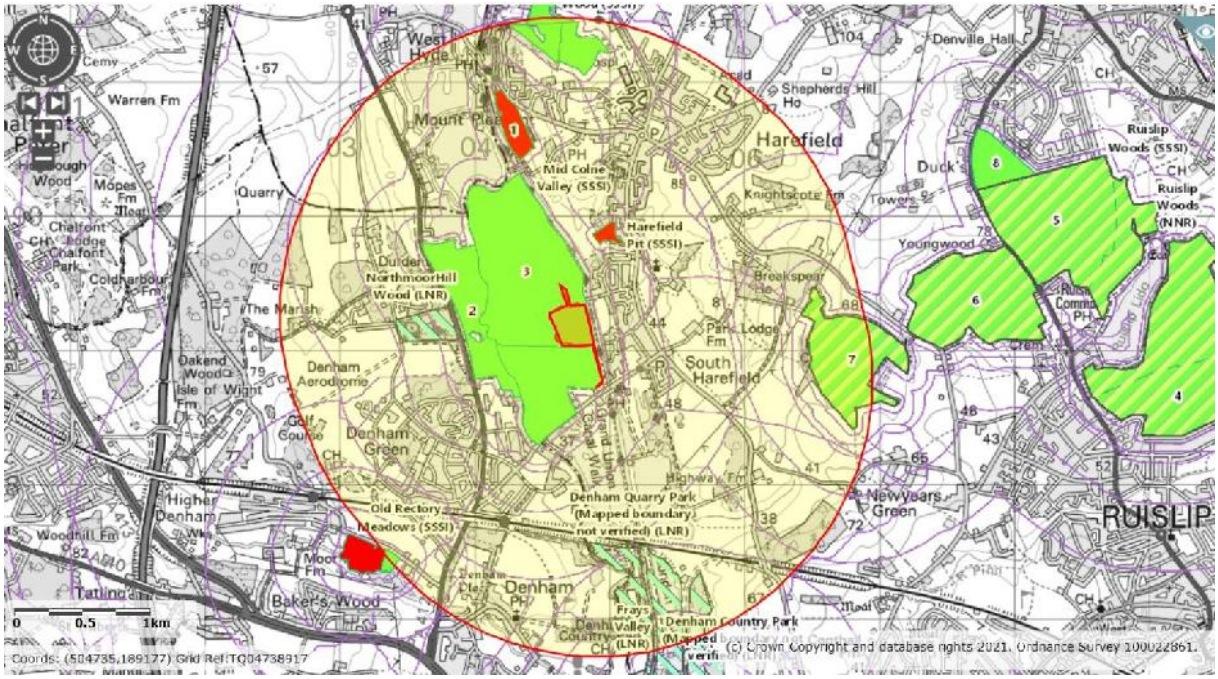


Figure 3 – MAGIC map showing statutory sites (red and green areas) and 2km radius from site.

3.2. Habitats

3.2.1. MAGIC search

According to MAGIC, soils here are naturally-wet loamy and clayey floodplain soils, with naturally-high groundwater and moderate natural fertility. Characteristic seminatural habitats are wet flood meadows and pasture with carr woodlands (wet woodlands). Traditional farming is grazing with some arable. The area has been quarried for aggregates through the 20th century, a practice which continues immediately south of the site.

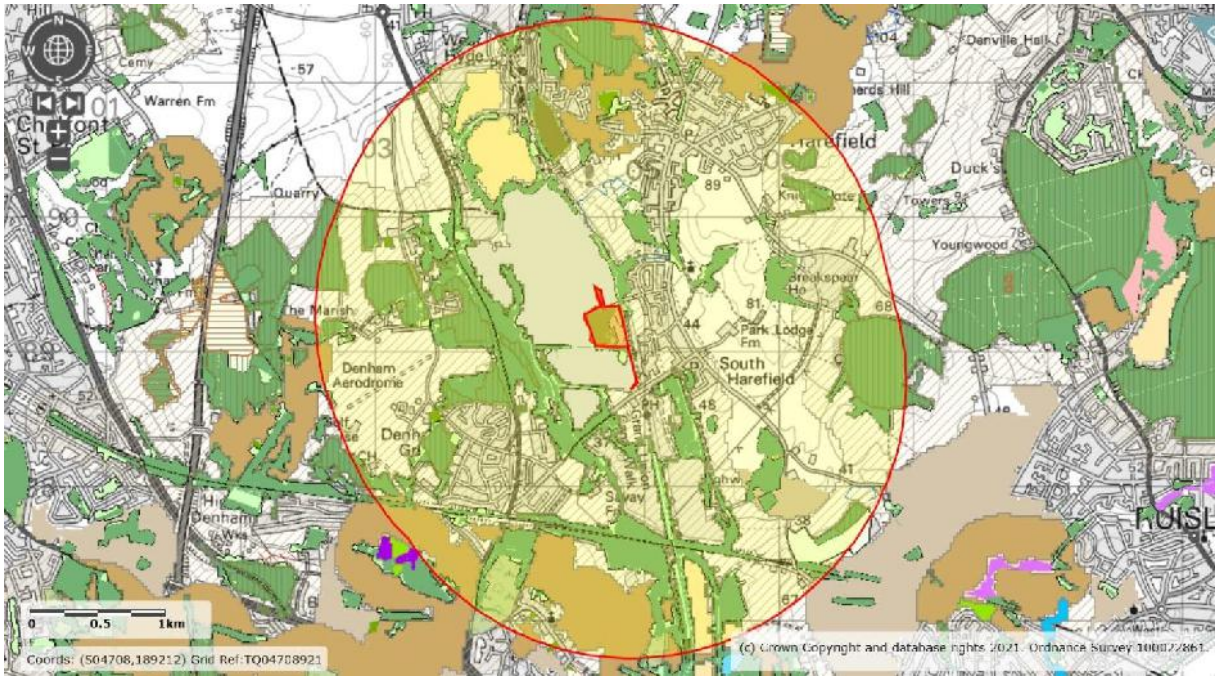


Figure 4 – Defra MAGIC map showing Priority Habitats and National Habitat Network 'Network Expansion Zone' (NEZ) areas in relation to the site and 2km buffer. The site itself is mapped as deciduous woodland in the National Forest Inventory 2014.

MAGIC shows that the site is mostly mapped as deciduous woodland (Priority Habitat) in the National Forest Inventory 2014. There are no National Habitat Network Expansion Zones on or near the site.

3.2.2. Phase 1 habitats

Seminatural broadleaved woodland

Much of the site is covered with seminatural woodland comprising alder (*Alnus glutinosa*), silver birch (*Betula pendula*), willows (*Salix* spp), and along the fringes of former tracks and hardstanding, patches and strips of buddleia (*Buddleja davidii*). The ground flora is quite diverse, and there are aquatic emergent along the shorelines. Without topographic survey, it is not possible to map the extent of 'dry' woodland accurately. At least one native black poplar (*Populus nigra betulifolia*) is present at the northeast corner of the site. A rotten wooden footbridge provides unsafe access to the north island. Paths into the west part of the site are choked with vegetation, and have few points where the shore can be safely accessed. At one point on the northwest shore is a patch of Japanese knotweed (*Fallopia japonica*) under treatment. Adjacent to the cottage at the southeast corner of the site are at least two stands of giant knotweed (*Fallopia sachalinensis*).

Wet woodland

Lower-lying areas of the site are naturally colonised by wet woodland trees, mainly alder and willows. Again, the extent of this habitat type cannot be accurately mapped without topographic survey and/or safe paths cleared into the woodland in order to survey it. The fringes of drier areas are essentially wet woodland too. There are some small standing waterbodies within the wet woodland areas, but under the Phase 1 habitat system, they are not separately mapped. (Under the UKHab mapping system, they would be mapped as secondary features).

Standing water

The lake to the north and west, and an area of enclosed water within the east part of the site are in this habitat type. The trophic status is unknown at present, and warrants further survey to identify the aquatic invertebrate flora and submerged aquatic flora. In the absence of evidence to the contrary, it is assumed to be mesotrophic.

Introduced shrub

Buddleia is present throughout the site, but where it forms dense patches at a scale that can be mapped, it can be classified as introduced shrub. This is mainly along the east side of the central north-south track within the site.

Buildings

A private house (TQ 04858 89066) is within the southeast corner of the site. There is a collapsed brick and concrete structure (TQ 04700 89308) at a junction in track near the footbridge crossing to the north island. Adjacent to the central north-south track within the site is a wall (TQ 04754 89137) which was probably a storage bay. At the south end of the site is a weighbridge (TQ 04828 89048) with brick walls containing several holes.

Hardstanding

The access tracks and localised areas of made ground are best described as hardstanding rather than bare ground.

Amenity grassland

There is a small area of lawn associated with the private residence.

Other habitats

There are localised areas of marshy grassland, ephemeral/short perennial, and tall ruderal around the site, but these are too small to map.

Figure 5 – Phase 1 habitat map of proposed HWSF site. Colour scheme after JNCC (2010).

Figure 6 – Aerial imagery from MAGIC website, showing differences in tree canopy species makeup.

3.3. Flora, fungi

3.3.1. GiGL search

Within 2km, the GiGL search returned high-resolution records (100m^2) of 29 higher plant species and low-resolution records (1km^2 to 10km^2) of 227 species, including some national rarities and Red Data Book species. Three lower plant species were also returned at low resolution. Many are ancient woodland, meadow, and wetland species that would not be expected on this site. Native black poplar is listed, but only at coarse coordinate level.

Common name	Species	DAFOR
Alder	*Alnus glutinosa*	D
Annual meadow-grass	*Poa annua*	F
Ash	*Fraxinus excelsior*	F
Balm	*Melissa officinalis*	R
Barren brome	*Anisantha sterilis*	O
Biting stonecrop	*Sedum acre*	O
Black-poplar	*Populus nigra*	O
Blue Water-Speedwell	*Veronica anagallis-aquatica*	O
Bramble	*Rubus fruticosus* agg.	A
Bristly oxtongue	*Picris echioides*	O
Broad-leaved dock	*Rumex obtusifolius*	A
Buddleia/butterfly-bush	*Buddleja davidii*	D
Cherry laurel	*Prunus laurocerasus*	O
Cleavers/goosegrass	*Galium aparine*	F
Cock's-foot	*Dactylis glomerata*	A
Colt's-foot	*Tussilago farfara*	O
Common bent	*Agrostis capillaris*	A
Common centaury	*Centaurium erythraea*	A
Common field-speedwell	*Veronica persica*	O
Common figwort	*Scrophularia nodosa*	O
Common fleabane	*Pulicaria dysenterica*	O
Common ivy	*Hedera helix*	A
Common knapweed	*Centaurea nigra*	O
Common mouse-ear	*Cerastium fontanum*	F
Common nettle	*Urtica dioica*	A
Common ragwort	*Senecio jacobaea*	F
Common stork's-bill	*Erodium cicutarium*	F
Cow parsley	*Anthriscus sylvestris*	O
Crack-willow	*Salix fragilis*	F
Creeping cinquefoil	*Potentilla reptans*	A
Creeping thistle	*Cirsium arvense*	F
Cut-leaved crane's-bill	*Geranium dissectum*	O
Daisy	*Bellis perennis*	F
Dandelion	*Taraxacum officinale* agg.	F
Dog-rose	*Rosa canina*	F
Dove's-foot crane's-bill	*Geranium molle*	F
Elder	*Sambucus nigra*	O
English stonecrop	*Sedum anglicum*	A
False fox-sedge	*Carex otrubae*	O
False oat-grass	*Arrhenatherum elatius*	A
Fat-hen	*Chenopodium album*	O
Fern-grass	*Catapodium rigidum*	R
Field forget-me-not	*Myosotis arvensis*	F
Field maple	*Acer campestre*	O
Floating pennywort	*Hydrocotyle ranunculoides*	O
Foxglove	*Digitalis purpurea*	F
Garden privet	*Ligustrum ovalifolium*	O
Garlic mustard	*Alliaria petiolata*	F
Giant knotweed	*Fallopia sachalinensis*	O
Goat willow	*Salix caprea*	A
Goat's-rue	*Galega officinalis*	A
Great mullein	*Verbascum thapsus*	F
Great willowherb	*Epilobium hirsutum*	A

Greater plantain	*Plantago major*	F
Green alkanet	*Pentaglottis sempervirens*	F
Grey willow	*Salix cinerea*	D
Ground-ivy	*Glechoma hederacea*	A
Gypsywort	*Lycopus europaeus*	F
Hard rush	*Juncus inflexus*	F
Hawthorn	*Crataegus monogyna*	F
Hazel	*Corylus avellana*	O
Hedge bindweed	*Calystegia sepium*	F
Hedge mustard	*Sisymbrium officinale*	O
Hedge woundwort	*Stachys sylvatica*	O
Hemlock	*Conium maculatum*	F
Hemp-agrimony	*Eupatorium cannabinum*	A
Herb-Robert	*Geranium robertianum*	A
Hogweed	*Heracleum sphondylium*	O
Honeysuckle	*Lonicera periclymenum*	O
Hop	*Humulus lupulus*	O
Horse-chestnut	*Aesculus hippocastanum*	O
Hybrid black-poplar	*Populus canadensis*	O
Japanese knotweed	*Fallopia japonica*	O
Lawson's cypress	*Chamaecyparis lawsoniana*	R
Lesser burdock	*Arctium minus*	F
Lesser trefoil	*Trifolium dubium*	F
Male-fern	*Dryopteris filix-mas* agg.	O
Meadow foxtail	*Alopecurus pratensis*	O
Midland hawthorn	*Crataegus laevigata*	O
Mugwort	*Artemisia vulgaris*	O
Musk-mallow	*Malva moschata*	O
Nipplewort	*Lapsana communis*	F
Opium poppy	*Papaver somniferum*	O
Oxford ragwort	*Senecio squalidus*	F
Osier	*Salix viminalis*	F
Pendulous sedge	*Carex pendula*	F
Perforate St. John's-wort	*Hypericum perforatum*	A
Prickly sow-thistle	*Sonchus asper*	A
Purple-loosestrife	*Lythrum salicaria*	O
Redshank	*Persicaria maculosa*	A
Ribwort plantain	*Plantago lanceolata*	F
Rosemary	*Rosmarinus officinalis*	R
Rough meadow-grass	*Poa trivialis*	A
Rowan	*Sorbus aucuparia*	R
Scarlet pimpernel	*Anagallis arvensis* subsp. *arvensis*	F
Scented mayweed	*Matricaria recutita*	F
Selfheal	*Prunella vulgaris*	A
Short-fruited willowherb	*Epilobium obscurum*	F
Silver birch	*Betula pendula*	D
Silver-berry	*Elaeagnus commutata*	O
Small-flowered crane's-bill	*Geranium pusillum*	F
Small-leaved lime	*Tilia cordata*	O
Spear thistle	*Cirsium vulgare*	F
Sycamore	*Acer pseudoplatanus*	O
Tall tutsan	*Hypericum x inodorum*	F
Traveller's-joy	*Clematis vitalba*	A
Tufted vetch	*Vicia cracca*	F
Tutsan	*Hypericum androsaemum*	O

Walnut	*Juglans regia*	R
Water figwort	*Scrophularia auriculata*	O
Water mint	*Mentha aquatica*	F
White bryony	*Bryonia dioica*	R
White clover	*Trifolium repens*	F
White comfrey	*Symphytum orientale*	O
White willow	*Salix alba*	D
Wild cherry	*Prunus avium*	O
Wild teasel	*Dipsacus fullonum*	F
Wilson's honeysuckle	*Lonicera nitida*	O
Wood avens	*Geum urbanum*	F
Yarrow	*Achillea millefolium*	A
Yellow iris	*Iris pseudacorus*	F
Yorkshire-fog	*Holcus lanatus*	A

Table 2 - Floral list (118 species) and DAFOR scale of abundance

3.3.2. Field survey

122 higher plant species were recorded during the PEA walkover. The only species among them on the GiGL notables list was native black poplar. The north-south track on the east edge of the site (to Broadwater Sailing Club) has a large old specimen at the northeast corner of the site, with twin stems (c.1000mm and 900mm) and about 40m height. More specimens may exist further north on this track, but the walkover survey did not extend beyond the site. Further survey of shorelines, and more detailed examination of the whole site, would undoubtedly expand the floral list.

3.4. Bats

3.4.1. MAGIC search

MAGIC showed that only one bat mitigation licence has been issued within 2km of the site. This is for soprano pipistrelle 630m southwest of the site, running from 2018-2022.

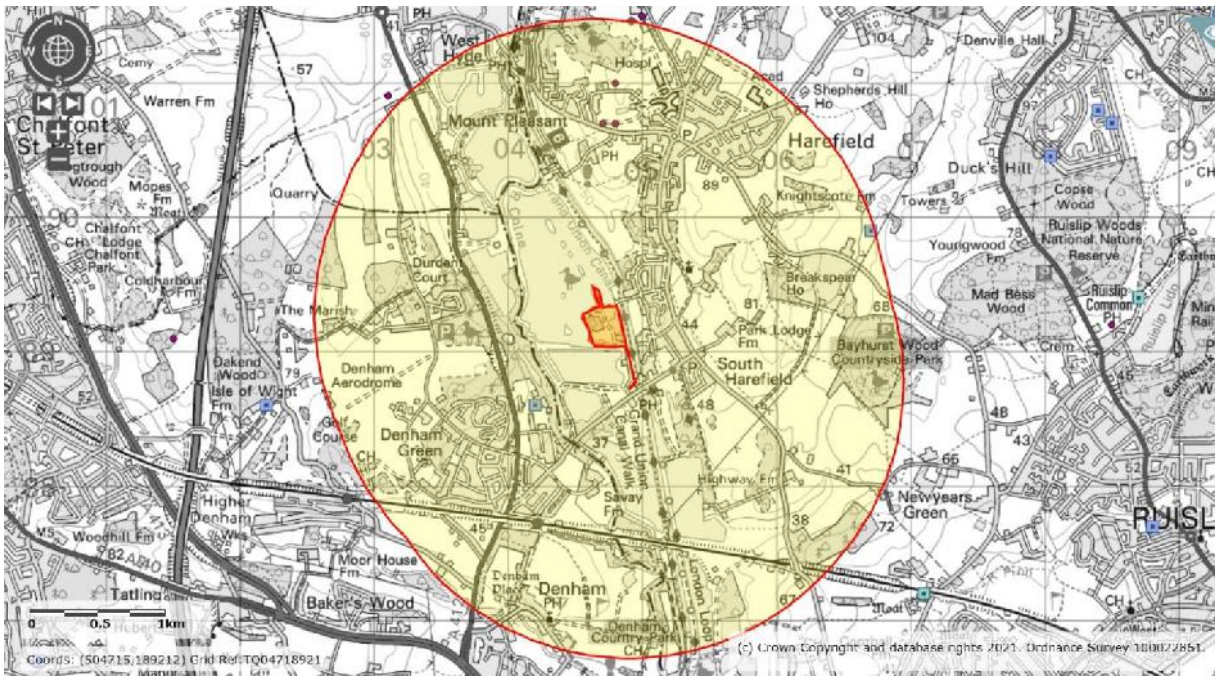


Figure 6 – MAGIC map showing EPS mitigation licences issued by Natural England within 2km (small blue square = soprano pipistrelle) and GCN survey records (purple dots = positive records).

3.4.2 GiGL search

At least nine bat species are recorded within 2km: serotine (*Eptesicus serotinus*), Daubenton's bat (*Myotis daubentonii*), Natterer's bat (*Myotis nattereri*), Brandt's bat (*Myotis brandtii*), Leisler's bat (*Nyctalus leisleri*), common pipistrelle (*Pipistrellus pipistrellus*), Nathusius's pipistrelle (*Pipistrellus nathusii*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*).

3.4.3. Field survey

The trees on site are generally not large and old specimens, but still have the capacity to contain Potential Roost Features (PRFs) suitable for bats. A full Potential Roost Assessment (PRA) was not conducted, but scoping the site was scoped for bat roost potential during the PEA walkover, and it was concluded that further survey will be required. Access to the whole site is not currently possible.

The woodland fringes around the shores of the site, and the narrow access track corridors running through the site, provide good commuting and foraging habitat for bats. The lake provides foraging habitat for Daubenton's bat and Nathusius' pipistrelle.

3.5. Other mammals

3.5.1. GiGL search

GiGL yielded five water vole (*Arvicola amphibius*) records within 2km, the nearest 900m west. There are also 24 hedgehog (*Erinaceus europaeus*) records, 12 badger records, and one of water shrew (*Neomys fodiens*).

3.5.2. Field survey

The PEA walkover did not record any mammals, but the dry woodland and scrub areas of the site provide good habitat for hedgehog which is present in the area. Water shrew could also occupy the shorelines. No badger evidence was seen, and the high water table throughout the site makes it unsuitable for badger inhabitation. Otter and water vole could inhabit the lake and its margins. Several empty valves of swollen river mussel (*Unio tumidus*) were found in the young birch clearing in the southwest part of the site, which could indicate otter predation. There is a mound of earth near the footbridge to the north island that contains at least two disused burrows that appear to be a former rabbit (*Oryctolagus cuniculus*) warren.

3.6. Birds

3.6.1. MAGIC search

Important bird records exist within 2km for lapwing (*Vanellus vanellus*), although there are no habitats on site that would attract it.

3.6.2. GiGL search

The GiGL search returned accurate records of 100 bird species, and low-resolution records of 37 species, within 2km. It also holds confidential records of 17 additional species (mainly Annex I and/or Schedule 1 species). These comprise a diverse assemblage of waterfowl, waders, and wetland birds as might be expected; but also a wide range of woodland birds, and species of open terrestrial habitats.

The lake's breeding and wintering avifauna is well-known, and the primary reason for the Mid Colne Valley SSSI designation. For further details of the species list, the GiGL report (Ritchie, 2021) should be consulted directly.

3.6.3. Field survey

The following bird species were recorded on or near site during the PEA walkover: black-headed gull (*Chroicocephalus ridibundus*), blue tit (*Cyanistes caeruleus*), buzzard (*Buteo buteo*), carrion crow (*Corvus corone*), chiffchaff (*Phylloscopus collybita*), coot (*Fulica atra*), cormorant (*Phalacrocorax carbo*), jay (*Garrulus glandarius*), magpie (*Pica pica*), robin (*Erithacus rubecula*), and wood pigeon (*Columba palumbus*). The site has the potential to support a wide range of woodland and riparian species, such as kingfisher (*Alcedo atthis*).

3.7. Amphibians

3.7.1. MAGIC search

No mitigation licences have been issued for GCN within 2km. However, MAGIC show three recent survey records for GCN between 1180-1510m north (see figure 6).

3.7.2. GiGL search

GiGL returned records of GCN and two widespread amphibians including common toad (*Bufo bufo*) within 2km. Common toad is a Section 41 (NERC Act 2006) species, requiring consideration in planning.

3.7.3. Field survey

A common toad metamorph was observed in a wooded track margin (TQ 04828 89048) near the weighbridge on the south edge of the site. Common toad therefore breeds on site. It is the only UK amphibian tolerant of fish presence, and can breed in large open waterbodies of every trophic status. No other protected amphibian is likely.

3.8. Reptiles

3.8.1. GiGL search

Grass snake (*Natrix helvetica*) is the only reptile recorded within 2km.

3.8.2. Field survey

The open tracksides to the south of the site have small areas of unshaded grass and scrub-edge habitat that would support resident grass snakes (as well as other widespread reptile species if they were present in the area). Transitory individual grass snakes might also pass through the site and around the shores whilst foraging or searching for egg-laying sites.

3.9. Fish

The ichthyofauna of the lake is unknown. The only species record returned by GiGL is a record of barbel (*Barbus barbus*) 354m from the centre of the site (most likely in the river Colne). Indeterminate fish fry were seen in the lake by the northwest edge of the site, adjacent to the Japanese knotweed infestation.

3.10. Invertebrates

3.10.1. GiGL search

The GiGL search returned accurate records of 55 insect species comprising six butterflies, 42 moths, five beetles, one dragonfly, and one damselfly. Coarse-resolution records are held for 110 insect species, comprising one beetle, seven butterflies, and 102 moths. They include many Section 41 species, including some which could inhabit the site. One additional invertebrate is returned in the INNS section of the GiGL report (Ritchie, 2021).

3.10.2. Field survey

The following invertebrates were recorded during the PEA walkover: black ant (*Lasius niger* agg.), devil's coach-horse beetle (*Staphylinus olens*), Kentish snail (*Monacha cantiana*), large white (*Pieris brassicae*), leopard slug (*Limax maximus*), robin's pincushion gall wasp (*Diplolepis rosae*), small white (*Pieris rapae*), and swollen river mussel. Among the unidentified species were biting midges (Chironomidae), damselflies (Odonata), a horsefly (Tabanidae), skipper (Hersperiidae), and waterboatman (Corixidae).

3.11. Invasive species

3.11.1. GiGL search

24 Invasive Non-Native Species (INNS) plants are listed among the GiGL results within 2km. They include records of some of the most damaging terrestrial invasives such as Japanese knotweed (44 records), giant knotweed (5 records), Himalayan balsam (*Impatiens glandulifera,* 18 records), and giant hogweed (*Heracleum mantegazzianum,* 3 records).

3.11.2. Field survey

At least two WCA Schedule 9 plant species (illegal to plant in the wild, or to allow to spread in the wild) are present on site: Japanese knotweed and giant knotweed. The remnants of a stand of Japanese knotweed exist on the northwest shore of the site (TQ 04636 89305), apparently at an advanced stage of eradication treatment. At the time of survey, only small shoots were visible, albeit scattered over an area of approximately 20m x 10m. At the southeast corner of the site are at least two small stands of giant knotweed (TQ 04877 89103, TQ 04881 89088) on the east side of the Broadwater Sailing Club access track. It is likely that there are more as-yet-undiscovered stands of INNS plants on site. A third Schedule 9 species – floating pennywort – is present in the River Colne immediately east of the site, and could also be present on the lake shores.

4. Impacts, mitigation, compensation, and enhancement recommendations

4.1. Protected sites

4.1.1. Impacts

Any development here has the potential to damage the integrity of the Mid Colne Valley SSSI. The site was designated for a breeding avifauna of over 70 species, and wintering avifauna of over 80 species. The loss or reduction in population size of any of these species could be viewed by Natural England as a negative impact on the SSSI. It is unlikely that Natural England would contemplate a development such as HWSF within a SSSI unless it fully mitigated the risks to breeding and wintering bird interests.

The development will cause permanent loss of woodland, including its potential for supporting breeding woodland bird species. The loss of shore habitats, and disturbance to retained shore habitats, would also damage the site's capacity to support breeding waterfowl. Increased leisure activity on the water would potentially have a significant negative effect on wintering birds.

4.1.2. Mitigation

Construction could be timed to avoid impacts on breeding birds or wintering birds, but it is difficult to conceive how both goals can be achieved. Breeding season is March to August as a general rule. Wintering season is October to March. This would leave only September for construction.

The loss of breeding habitat cannot be directly mitigated, and would require compensatory habitat creation elsewhere. Creation of a new lake island has been suggested.

Operational disturbance could be minimised by partitioning of the lake into areas for leisure activities of different types, taking place in different seasons; and an area set aside solely for birds, essentially a strictly-controlled nature reserve.

4.1.3. Enhancements

Nestboxes could be added to new buildings to cater for species that do not currently occupy the site.

4.2. Habitats

4.2.1. Impacts

There will be a net loss of deciduous woodland and riparian habitats to the HWSF development (areas tbc). The woodland is not particularly notable, but in planning terms, all woodland is important. The site's habitats, and the impacts upon them, cannot be accurately evaluated until the topographical survey is available, and the site has improved pedestrian access.

4.2.2. Mitigation and compensation

In line with the NPPF (MHCLG, 2019), the principle of no net loss and BNG must be incorporated into the mitigation response. BNG calculations must be made using Defra Metric 3.0 to measure baseline conditions against proposed design options. The upcoming Environment Bill is anticipated to require 10% BNG, which would need to involve off-site compensatory habitat provisions.

Any loss of deciduous woodland would have to invoke a greater area of compensatory off-site planting. This would necessarily involve additional land to be set aside for biodiversity interests. The Biodiversity Metric weights down new woodland planting, and assumes that it will take 30 years to become a like-for-like replacement.

With this in mind, it becomes difficult to justify the loss of one area of woodland if it means a greater area has to be created elsewhere. The value of land in Greater London often precludes purchase of land for mitigation.

Furthermore, for Natural England to consider accepting damage to a SSSI, the developer must have evaluated alternative options. In this case, land reclamation of current open water on the south shore of the lake is one such alternative option. A cost-benefit analysis would be needed to allow comparison of the impacts of woodland loss vs land reclamation.

4.2.3. Enhancements

Under the existing plans (significant woodland loss), BNG will require off-site woodland planting on land with low biodiversity value, such as amenity grassland. Land reclamation would involve a reduction in open water, but would allow for BNG enhancements on land. Under both scenarios, the removal of introduced shrub areas (dominated by buddleia), to be replaced by native tree planting, would be a positive intervention.

4.3. Flora, fungi

4.3.1. Impacts

The development is not likely to have any negative impact on flora *per se.* The site is not currently known to support any rare or notable species other than native black poplar along the unaffected east edge.

4.3.2. Mitigation and compensation

Any native black poplar must be protected during construction and operation. Further botanical survey, such as National Vegetation Classification (NVC), would be useful to demonstrate the

likely absence of notable species. (It also runs the risk of identifying notable species presence).

4.3.3. Enhancements

The removal of INNS (see section 4.11 below) would benefit native flora.

4.4. Bats

4.4.1. Impacts

The loss of woodland will have a currently-unknown impact on bat roosts, but could have a significant impact. All bat roosts are strictly protected. The bat species present on and near the site, and the importance of the site for their foraging and commuting, is also unknown. It is likely, however, that the HWSF development would have a significant negative effect on bats in the absence of mitigation.

4.4.2. Mitigation and compensation

Further survey will be necessary to identify the nature and scale of the bat presence. Monthly activity surveys are recommended, initially in August, September, and October 2021, using dusk transects and five-day deployment of four static detectors per month. This would build a picture of the species present, their numbers, and their commuting routes. Roost assessment of all affected trees will also be required, unless it can be triaged-out by favourable results from the activity surveys (i.e. few species, low numbers of bats, and absence from certain areas of the site).

Roost assessment of all trees on site would involve ground-level assessment initially, followed by climbed (aerial) assessment and/or multiple nocturnal surveys of all trees with moderate to high potential. It could be begun in parallel with activity surveys. It is difficult to predict which line of evidence would be most useful in isolation.

One month of activity surveys (August 2021) would provide a good initial picture of the bat presence on site, and could then guide the level of effort place on roost assessment of all individual trees.

Once intelligence is gathered on bat presence and use of the site, appropriate mitigation must be designed. A Natural England mitigation licence and associated mitigation provisions would be required for any roosts to be lost. Compensatory roosting habitat must be provided. Any loss of foraging and/or commuting habitat would need to be fully compensated. The creation of an island, or widening of rides to create new woodland-edge foraging routes, would be possible options.

To mitigate impacts of construction and operation on commuting and foraging bats, nocturnal lighting must be minimised, and must conform to a strict lighting plan in line with standard guidance (BCT & ILP, 2018).

4.4.3. Enhancements

In addition to any mitigation, at least 10 batboxes for a range of species (e.g. Schwegler 2F) should be erected on suitable retained trees. Woodland management to create new foraging and commuting habitat would also be beneficial.

4.5. Other mammals

4.5.1. Impacts

Otter, water vole, and hedgehog could be present. No impacts on badger or other protected mammals are anticipated.

4.5.2. Mitigation and compensation

The shores of the whole site must be surveyed for otter and water vole presence-absence, in order to determine whether mitigation is necessary. If either species is present, significant mitigation (e.g. displacement, compensatory habitat creation) involving a Natural England licence might be necessary. Hedgehog must be safeguarded during site clearance by checking possible shelter habitat prior to clearance. Compensatory shelter must be provided for any hedgehogs encountered.

4.5.3. Enhancements

10 artificial hedgehog homes must be installed in undisturbed retained woodland. Discreet wicker domes would be the preferred option. They need to be covered in a thick layer of dead leaves. Hedgehogs use them as hibernation habitat, or day shelter during their active period.

4.6. Birds

4.6.1. Impacts

As discussed in the protected sites section (4.1), the development could impacts breeding and wintering birds. The loss of woodland and riparian habitat would impact breeding birds. The construction and operation of the site could disturb breeding and wintering birds. This could lead to the abandonment of the site by some species, or at the least, a reduction in breeding or wintering bird numbers.

4.6.2. Mitigation and compensation

Alternative options must be explored, such as land reclamation instead of loss of existing woodland and shore habitat. Disturbance effects can be mitigated by avoiding sensitive times of year. However, September is the only low-risk month to avoid breeding season (March-August) and overwintering (October-March). Creation of a new island to partition the lake is a possibility. This could separate leisure activities from sensitive bird areas.

4.6.3. Enhancements

10 bird nestboxes, for a range of species, could be installed in suitable retained trees. These could include Schwegler 1B with 26mm or 32mm holes for a variety of small passerines. In addition, careful selection of box types and locations could attract further species that are not currently present on site. For example, swift (*Apus apus*), house martin (*Delichon urbicum*), and house sparrow (*Passer domesticus*) if suitable nestbox locations could be provided.

4.7. Amphibians

No impacts on amphibians are anticipated, and no mitigation, compensation, or enhancements are proposed.

4.8. Reptiles

4.8.1. Impacts

Grass snakes could be present in some areas of the site, and there is a small chance of them being harmed during site clearance. All reptiles are protected by the WCA 1981 from intentional killing and injury. In the absence of mitigation, works conducted in the knowledge of reptile presence could be deemed to have intentional effects.

4.8.2. Mitigation and compensation

A reptile survey of likely areas of grass snake occurrence in the April-September period would determine the risk and necessary mitigation response, if any.

4.8.3. Enhancements

No enhancements are necessary.

4.9. Fish

4.9.1. Impacts

It is possible that protected or notable fish are present, and that they could be affected by the HWSF development. For example, shallow-water fry nurseries might be lost or otherwise impacted.

4.9.2. Mitigation

An electric-fishing survey is recommended, to gain intelligence of the ichthyofauna of the lake, and to determine whether any species might be affected by the HWSF development.

4.9.3. Enhancements

The results of the fish survey would determine whether any enhancement opportunities exist.

4.10. Invertebrates

4.10.1. Impacts

The loss of woodland may have an impact on notable terrestrial invertebrates. Equally, the creation of a more diverse suite of habitats might have a benefit. Aquatic invertebrates could be affected by loss or disturbance of habitats.

4.10.2. Mitigation and compensation

Loss of seminatural invertebrate habitats must be mitigated and compensated as far as possible. An aquatic invertebrate survey would assist in determining whether any impacts need to be mitigation in the aquatic environment.

4.10.3. Enhancements

Bee-bricks should be installed in all new buildings. Other enhancements will depend on the site location, design, and landscaping provisions.

4.11. Invasive species

4.11.1. Impacts

The development could be a potential vector for spread of INNS, especially invasive plants.

4.11.2. Mitigation and compensation

A strict Biosecurity Plan must be in place throughout the construction phase. Contractors must be briefed in biosecurity, and operate a strict check-clean-dry policy for all vehicles, plant, clothing, equipment, and materials entering or leaving site. The risk of INNS dispersal is greatest in aquatic environments. To prevent the spread of tree pathogens, tree surgeons must disinfect chainsaws and other equipment before and after work on trees. Suppliers must demonstrate awareness of the risks posed by INNS.

An INNS survey of the whole site must be conducted during summer, to identify all INNS plant stands. An eradication programme must be completed for all INNS plants identified. This must be timed such that it does not conflict with construction and operational activities. An aquatic invertebrate survey is recommended, to identify whether any Schedule 9 INNS invertebrates such as zebra mussel (*Dreissena polymorpha*), killer shrimp (*Dikerogammarus villosus*), or demon shrimp (*Dikerogammarus haemobaphes*) are present locally.

4.11.3. Enhancements

As an enhancement, any INNS identified on or near the site could be targeted for eradication.

5. Conclusions

An 8ha woodland site in a former gravel pit is proposed for construction of an outdoor leisure facility at Broadwater Lake, Harefield. The site is within the Mid Colne Valley SSSI, designated for its diverse bird fauna.

The development would cause a net loss of deciduous woodland, and could impact breeding and wintering birds, damaging the integrity of the SSSI. Bats, riparian mammals, and other protected species could also be impacted.

A series of Phase 2 ecology surveys is needed, to gain intelligence on the likely impacts of the development. Alongside this, alternative options must be considered for the development location. Land reclamation is one option.

For Natural England to sanction damage to a SSSI would be exceptional if another option were possible (regardless of whether it is more costly). The Environment Bill will also require at least 10% BNG for this development (in addition to offsetting any woodland loss). It is recommended that dialogue be opened with Natural England at the earliest opportunity.

6. References

BCT & ILP (2018) *Bats and artificial lighting in the UK. Guidance Note 08/18.* Bat Conservation Trust, London & Institution of Lighting Professionals, Rugby.

CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1 (Sept 2019).* Chartered Institute of Ecology and Environmental Management, Winchester.

Collins, J. (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 3rd Edition. Bat Conservation Trust, London.

JNCC (2010) *Handbook for Phase 1 habitat survey - A technique for environmental audit.* Joint Nature Conservation Committee, Peterborough.

MHCLG (2021) *National Planning Policy Framework*. Ministry for Housing, Communities & Local Government, London.

Natural England (2011). *Technical Information Note TIN101 - Solar parks: maximising environmental benefits*. Natural England, York.

Ritchie, D. (2021) *An Ecological Data Search for Broadwater Lake, Uxbridge, UB9 6PE on behalf of CGO Ecology.* eCountability Ltd, for Greenspace Information for Greater London, London.

7. Photographs

Plate 1 – Entrance to site.

Plate 2 – Access track, looking south.

Plate 3 – Weighbridge.

Plate 4 – Hardstanding west of weighbridge.

Plate 5 – Track north of weighbridge.

Plate 6 – Bare ground to west of north-south track.

Plate 7 – Swollen river mussel shells, possibly predated by otter.

Plate 8 – Pond beneath woodland canopy.

Plate 9 – Path to west edge of site.

Plate 10 – View west across lake.

Plate 11 – Shore vegetation on west edge of site.

Plate 12 – View north from west edge of site.

Plate 13 – Track north through site.

Plate 14 – Dense buddleia on both sides of track.

Plate15 – Collapsed structure.

Plate 16 – Track towards northwest corner of site.

Plate 17 – Japanese knotweed under treatment.

Plate 18 – West side of north island, viewed from Japanese knotweed eradication site.

Plate 19 – Japanese knotweed regrowth.

Plate 20 – Tall ruderals on track in north part of site.

Plate 21 –Tall herbs/ruderals on north edge of site.

Plate 22 – Unsafe wooden footbridge to north island.

Plate 23 – Lake to northeast of site.

Plate 24 – Broadwater Sailing Club track entrance.

Plate 25 – Giant knotweed infestation.

Plate 26 – Giant knotweed leaf.

Plate 27- North-south track on east edge of site.

Plate 28 – Floating pennywort on River Colne.

Plate 29 – Native black poplar lower stems.

Plate 30 – Native black poplar upper stems.

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16 June 2022

Our reference: 2483631 T1 Broadwater Lake GCN Survey Results Rev00

Dear Richard,

Broadwater Lake – Great Crested Newt HSI and eDNA Surveys

This letter provides the results of the great crested newt (GCN) habitat suitability index (HSI) assessments and environmental DNA (eDNA) analysis of the water bodies located on an area of land in close proximity to Broadwater Lake, Uxbridge (OS grid reference: TQ 0471 8921; Figure 1), hereafter referred to as 'the site'. A preliminary ecological appraisal (PEA) conducted in 2021 by CGO Ecology Ltd identified an area of standing water in the eastern part of the site. This was the primary target for further survey, with a site walkover also conducted to identify any additional bodies of water that should be subject to further survey.

Methods

Any water bodies encountered during the site walkover were subjected to HSI assessment to determine suitability for GCN. Any habitat deemed suitable was then sampled for eDNA analysis. The survey was undertaken on 20 April 2022 by Sophie Elliot with assistance from Joe Pepper. Sophie holds a licence to survey for GCN (2017-30376-CLS-CLS) and has been trained to carry out eDNA and HSI surveys.

HSI Assessment

Following methods set out in ARG (2010), how suitable a pond might be for GCN was scored using a habitat suitability index (HSI) developed by Oldham et al. (2000); this uses a scale on which 0 indicates unsuitable habitat and 1 represents optimal habitat. The score is derived from information on ten factors that affect GCN. By convention these are called suitability indices (SIs) and coded as SI 1 to SI 10 in the order given below:

- geographic location;
- surface area;
- hydrology (drying);
- water quality;
- shade;
- presence of water fowl;
- presence of fish;

- number of adjacent water features;
- terrestrial habitat; and
- macrophyte cover.

BDS data and field survey results are used in combination with graphs in Oldham et al. (2000) to score each SI individually on a scale from 0.01 to 1, and an overall HSI score for the pond is calculated using the following formula:

HSI = (SI1 × SI2 × SI3 × SI4 × SI5 × SI6 × SI7 × SI8 × SI9 × SI10)1/10.

The suitability of a pond for GCN can then be categorised on the basis of its HSI score following a convention established by Brady (unpublished) as follows:

- poor - HSI <0.5
- below average - HSI 0.5 – 0.59
- average - HSI 0.6 – 0.69
- good - HSI 0.7 – 0.79
- excellent - HSI > 0.8

An HSI score measures the suitability of a pond for GCN, but cannot indicate whether or not they are actually there. If they are, it may be that the higher the HSI score the larger the population of GCN and vice versa, but this will not always hold true.

eDNA analysis

Ponds with a HSI score of below average or above were then subject to eDNA analysis. Ponds scoring poor suitability were deemed unlikely to support GCN and therefore were not subject to further testing. eDNA methodology investigates whether Great Crested Newts have been in a pond by analysing the water for their DNA (which can be shed in skin secretions, excrement etc). Using kits from approved suppliers, 20 samples were taken from the ponds adhering to strict protocols (Biggs et al. 2014) approved by Natural England, which - among other things - ensure that samples do not get cross-contaminated. Sampling took place at the recommended time, i.e. between mid-April and June (the actual sampling date was the 20 April 2022). Subject to safety of access, sample spacing was regular, except in so far as it targeted aquatic vegetation that might be used for egg-laying. The 20 samples from the pond were finally collected into a single sample bag and gently homogenized, after which 6 sub-samples were preserved in an ethanol-based preservative, and sent to the ADAS laboratory for analysis.

Limitations

The primary standing water body (waterbody 1) was heavily overgrown with vegetation, with banks that were too steep to safely access the water's edge. However, the results of the HSI assessment at this pond did not require eDNA analysis, meaning that the impact of this constraint is negligible.

Results

Four bodies of water with potential for GCN were found on site, including the enclosed area of standing water described in the PEA (CGO Ecology, 2021). Sampling protocols were followed successfully throughout. Three of these water bodies (waterbodies 1,2,4) were found to have 'poor' suitability (HSI<0.5), and as such were not analysed further. Waterbody 3, an extension of the main lake in the north-west corner of the site, was judged to be of 'below average' suitability (HSI 0.52), but still eligible for eDNA analysis.

The eDNA analysis of waterbody 3 returned a negative result, meaning that no great crested newt DNA was present in the pond at the time of sampling. GCN DNA degrades in water from 7 to 21 days. See *Appendix 2* for full eDNA analysis results.

Evaluation and Conclusions

The eDNA results show that GCNs are not currently present onsite and are therefore unlikely to be present within the working area. No further surveys are recommended for GCN on site and no licence is required. GCN and their habitat (both terrestrial and aquatic) are protected by law, therefore in the event that GCN are found on site during works then work should stop and an ecologist should be consulted.

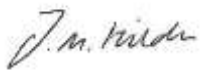
If you have any questions about the contents of this letter, I can be contacted by email on Joe.Pepper@rskbiocensus.com or by phone on 07587 039248.

Yours sincerely,

Joe Pepper, Assistant Ecologist

On behalf of RSK Biocensus

Technical review by



James Hildreth
Associate Director

Figures