Greengage

Brighter strategies
for greener projects

Client: London Borough of Hillingdon

Project: HWSFAC

Report: DRAFT MEMP Volume 1

QUALITY ASSURANCE

Issue/Revision:	Draft	Final
Date:	September 2023	October 2023
Comments:		
Prepared by:	Stephanie Harper	Stephanie Harper
Authorised by:	Mike Harris	Mike Harris
File Reference:	MEMP_Volume_1_150923 SH MJH_Quod_Comments.EF_SH _MJH_MJH.docx	552023shmjh17Oct23FV01_M EMP_Vol_1.docx

CONTENTS

Tables

Figures

1.0 NON-TECHNICAL SUMMARY

London Borough of Hillingdon (LBH) is seeking planning permission for the development of the Hillingdon Water Sports Facility and Activity Centre (HWSFAC) at Broadwater Lake. This centre will provide a new home for the Hillingdon Outdoor Activities Centre (HOAC) (closed as a result of HS2) and Broadwater Sailing Club (BSC) whose current facilities are reaching the point of being uneconomical to maintain.

Broadwater Lake lies within the Mid Colne Valley Site of Special Scientific Interest (SSSI); SSSIs are defined as those areas of land and water that are considered to best represent the country's natural heritage in terms of flora and fauna. The SSSI designation is made by Natural England under the Wildlife and Countryside Act (1981). Broadwater Lake is significant for its assemblages of breeding birds and over-wintering water birds. Responsibilities are placed on landowners to manage land within a SSSI effectively and appropriately to conserve the special features of the site. Currently Tarmac, as owners of Broadwater Lake, do this in conjunction with Hertfordshire and Middlesex Wildlife Trust. Ownership of the lake by LBH will place these responsibilities on them.

The introduction of the improved facilities for outdoor activities including water sports on to Broadwater Lake will introduce additional potential 'stressors' to the SSSI; these will need to be managed and mitigated to a high standard to maintain Natural England's objective of 'favourable condition' status for the SSSI (and all SSSIs). Favourable condition essentially means that the SSSI's habitats and features are in a healthy state and are being conserved by appropriate management. As described in full in the suite of planning documents 'stressors' may arise during construction and also during use of the outdoor activity centre, and are likely to include: construction activity, such as land reclamation, creation of new islands and additional habitat creation, and also the human activity generated by the outdoor activity centre, including boats on the lake. There is existing water sports and fishing activity use of the lake which will continue but the new outdoor activities centre will constitute a significant increase in activities on the water and at the peninsula.

It is proposed to mitigate these with interventions in advance of, and throughout, the lifetime of the HWSFAC. These interventions can be made pre-construction, during construction, post-construction and during operation. Interventions will include specific design and operational measures to reduce disturbance to wildlife as well as the creation of additional areas of habitat and ongoing management of the SSSI to maintain favourable condition. The approach to these interventions is intended to be both precautionary and also positive; precautionary as befits the SSSI designation and the wildlife importance that brings, but also positive in that the interventions will bring genuine enhancement to the biodiversity value of Broadwater Lake and the designated features of the SSSI.

The HS2 project, which runs to the west of Broadwater Lake will introduce its own 'stressors'; proposals for the outdoor activities centre have embedded mitigation for the potential cumulative or in combination effects of HS2.

This document forms Volume 1 of a draft Mitigation and Ecological Management Plan (MEMP) for the Site. It provides an overview of the ecological mitigation and enhancement principles that have shaped

the design and are embedded within the Proposed Development, focussing on the onsite SSSI and its designated features.

Volume 2 is a separate document (comprising four parts) covering practical implementation and details specification, management and monitoring of ecological habitats and features for site managers, covering a period of 30 years.

2.0 INTRODUCTION

2.1 BACKGROUND

Planning permission is being sought by the London Borough of Hillingdon (LBH) for the development of the Hillingdon Water Sports Facility and Activity Centre (HWSFAC) at Broadwater Lake ('the Site'), within the London Borough of Hillingdon. This centre will provide a new home for the Hillingdon Outdoor Activities Centre (HOAC) (closed as a result of HS2) and Broadwater Sailing Club (BSC) whose current facilities are reaching the point of being uneconomical to maintain. As a result of the relocation of BSC, the sailing facility at the northern end of Broadwater Lake would become redundant and would be demolished under the proposals.

The Site is comprised of approximately 20ha of land and 60ha of open water forming the large part of Broadwater Lake.

The Site forms part of the Mid-Colne Valley SSSI. In accordance with the National Planning Policy Framework[1](summarised in Appendix A) development proposals should be refused unless significant harm to biodiversity can be avoided or adequately mitigated for. Within or outside a SSSI, development which is likely to have an adverse effect on it (either individually or in combination with other developments) should not normally be permitted unless 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.

LBH, as a local planning authority and public body, has a statutory duty (under Section 28G of the Wildlife and Countryside Act) not only to avoid damage to SSSIs but to further their conservation and enhancement. There is also protection for SSSIs at the national policy level.

2.2 PLANNING APPLICATION

The London Borough of Hillingdon as the applicant is seeking detailed planning permission on 79.95ha of land (subsequently referred to as 'the Site') for:

“Redevelopment of the Site to create the Hillingdon Water Sports Facility and Activity Centre including demolition of existing Broadwater Lake Sailing Club (BSC) clubhouse at the north of the lake and erection of a building to be occupied by HOAC and BSC including changing facilities, meeting rooms, storage, Workshop and seasonal worker accommodation (sui generis), activity shelters; installation of pontoons and concrete slipways; boat shed; equipment storage huts (north of lake and at entrance); boat parking and racking areas; camping area; outdoor activity areas; ecological enhancement throughout the Site; new pedestrian routes through the peninsula; landscaping including new woodland, dense vegetation screens and boundary treatment; new access and access road; localised dredging and land reclamation; relocation of existing sailing area and creation of floating and fixed islands within the lake; coach drop off and turning area; vehicle parking; cycle parking; and associated works.”

The main components of the Proposed Development with specific relevance to the ecological status / performance of the lake and wider area are as follows:

- Ecological mitigation and enhancement measures;
- Partial land reclamation within the lake using dredged material to create a suitable platform for development on the peninsula;
- Removal of two islands and creation of new floating and fixed islands within the lake;
- Relocation of a proposed ecological mitigation for HS2 (not yet delivered);
- Continued use of the lake for sailing and water-based activities;
- Improvements to the existing unnamed access road to Broadwater Lake from the south; and landscaping including new woodland, dense vegetation screens and boundary treatment.
- Localised dredging of the lake to create depths suitable for sailing and generate material to be re-used on-site,

The main user group for HOAC comprise; schools, colleges, scout and guides groups with the more local schools and residents of Buckinghamshire and South Bucks District visiting on a regular basis. The next largest group is the holiday/summer holiday course attendees. HOAC will operate at the Site on weekdays between 1 April and 31 September.

2.3 GOAL OF THE PROPOSED DEVELOPMENT

The overarching goals of the Proposed Development is to:

- Deliver the public benefits associated with the HWSFAC without adverse effects to the Mid-Colne Valley SSSI, and to secure its long-term conservation and enhancement through a commitment to long-term management; and
- Take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest.

2.4 DEVELOPMENT DESIGN PRINCIPLES

This draft Mitigation Enhancement and Management Plan (MEMP) demonstrates that this goal can be achieved through a number of principles as follows:

1. Design and operational management of all recreational waterside and landside activities in a way which avoids disturbance and conflict with the reasons for notification of the Mid-Colne Valley SSSI, including its significant ornithological interest;
2. Avoidance of terrestrial habitat loss, with enhancement of retained habitat and creation of new habitat of value for nature conservation;
3. Improvements to the quality of the aquatic ecosystem and water environment;

4. Increase the amount and quality of habitat of potential value to breeding and wintering birds, providing screened areas to act as refuges from visual disturbance, and with increased nesting opportunities;
5. Enhancement of food webs within the SSSI, with the ultimate goal of supporting increased numbers and diversity of breeding and wintering birds; and
6. Address existing and future threats to the value of the SSSI through design and ongoing management. Such threats include climate change, invasive species, water quality, contamination, unauthorised site uses and recreational pressure from an increased population.

The way the Proposed Development delivers these principles has been described in detail in Chapter 5.

2.5 OTHER RELEVANT DOCUMENTS

This MEMP Volume 1 should be cross-referenced with the following documents for the Site:

- Chapter 7 Biodiversity of the Environmental Statement (ES);
- Chapter 8 Water Resources and Flood Risk of the ES and associated Appendices;
- MEMP Volume 2 Parts A-D (setting out the specification and management of new habitats and features);
- Preliminary Ecological Assessment (PEA) (provided with Appendix 7.2 of the ES);
- Wintering Bird and Disturbance Survey Report (Appendix 7.6);
- Breeding Bird Survey Report (Appendix 7.7);
- Invertebrate Survey Report (Appendix 7.8);
- Ecology Report (terrestrial habitats, lacustrine habitats, survey for invasive non-native species, badger, otter, water vole) (Appendix 7.9);
- Bat Survey Report (Appendix 7.10);
- Biodiversity Net Gain Assessment (Appendix 7.11).

2.6 STRUCTURE OF THE DRAFT MEMP

This MEMP Volume 1 deals with the SSSI and the reasons for its designation only. Other biodiversity features, which are not a reason for the SSSI designation are detailed within the separate species reports and MEMP Volume 2 Part A. All MEMP documents should be read in conjunction with each other.

The remainder of this document is structured as follows:

- Chapter 3 Site of Special Scientific Interest - Ecological Baseline - describes the SSSI and the designated features in detail, and provides an overview of the survey data gathered for these features during 2022 and 2023;

- Chapter 4 Vision for the onsite SSSI - identifies stressors and highlights opportunities for the Proposed Development to improve the features of the SSSI;
- Chapter 5 Delivery of the design principles - demonstrates how the information and principles set out in Chapters 3-4 have been designed into the masterplan for the Proposed Development;
- Chapter 6 Management and Monitoring - provides a high-level overview of the management and monitoring to be prescribed, both for the SSSI designated features and also the non-designated ecological receptors. Further detail for these is provided within the Draft MEMP Volume 2 Parts A-D; and
- Chapter 7 Conclusion - provides a brief summary of the conclusions of the report.

The MEMP Vol 1 and 2 should be read in conjunction with the Lake Management Plan (Appendix 8.9 of the ES) and the Construction Environment Management Plan (CEMP) (Report Ref: Q2200454.CEMP.0.3.MT).

3.0 SITE OF SPECIAL SCIENTIFIC INTEREST - ECOLOGICAL BASELINE

3.1 INTRODUCTION

The Mid Colne Valley Site of Special Scientific Interest (SSSI) is a Nationally important statutory designation. The SSSI is comprised of multiple individual nature conservation sites or units, as set out in Section 3.3 below. The total area of the SSSI is 147.73 ha. A figure showing the SSSI and its component areas is provided in Appendix B (Figure B.1).

3.2 DESIGNATION

The citation for the Mid-Colne Valley SSSI was written in 1986 and is provided in full below:

The Mid Colne Valley is of significant ornithological interest, particularly for the diversity of breeding woodland and wetland birds, and for the numbers of wintering wildfowl. On the eastern valley slope is one of the last remaining examples of unimproved chalk grassland in Greater London.

The Site represents a cross-section of the River Colne flood-plain and the adjoining valley slopes; these rise abruptly to the east and west and lie on Upper Chalk with pebbly clay capping the higher western slopes. An extensive series of flooded pits occupy much of the flood-plain resulting from the gradual and continuing extraction of underlying river gravels. The main and most northern pit, known locally as Broadwater is one of the largest expanses of open water in the Colne Valley and is unusual with its scattering of small wooded islands. Around the pits and on the dividing causeways are remnants of the original alluvial grasslands and valley alderwoods. These grade into various types of beech and hornbeam woodland and mixed scrub on the western slopes.

The ornithological interest of the Site is considerable with over 70 breeding and 80 wintering species of bird regularly recorded. This high diversity reflects the close proximity of the wide range of habitats present: woodland, scrub, grassland, running and standing water, marginal fen and gravel banks. Breeding woodland birds include kestrel, lesser whitethroat, nuthatch, tawny owl and three species of woodpecker. The gravel pits and River Colne attract one of the most important wetland breeding bird communities in Greater London and the Colne Valley: coot, greylag goose, little ringed plover, kingfisher, mute swan and tufted duck nest regularly, while others such as gadwall and shoveler are resident and occasionally breed. Recently a heronry has become established on the islands in Broadwater and is expanding rapidly. Many species of wintering wildfowl are attracted to the extensive water areas; the numbers of tufted duck frequently reach levels of national importance, and pochard and shoveler occasionally reach levels of similar significance. In winter Broadwater's islands are also the site of a large cormorant roost.

Coppermill Down on the east side of the valley contains an area of chalk grassland and scrub in which downland grasses such as upright brome Bromus erectus and yellow oat-grass Trisetum flavescens are abundant. Among these grasses typical chalk herbs occur including dwarf thistle Cirsium acaule, rough hawkbit Leontodon hispidus, fairy flax Linum atharticum and cowslip Primula veris. The Down is also one of

the few remaining sites in North London for pyramidal orchid Anacamptis pyramidalis and bee orchid Ophrys apifera.

The banks of the gravel pits, although of relatively recent origin, already support a variety of willow species and many fen plants such as water plantain Alisma plantagoaquatica, yellow iris Iris pseudacorus and gipsywort Lycopus europaeus. In sheltered areas where the banks are gently shelving more extensive stands of tall swamp vegetation occur, comprising mainly common reed Phragmites australis and bulrush Typha latifolia. The relatively unimproved stretch of the River Colne adds further diversity top the range of wetland habitats. Above the river-side alderwoods, a steep chalk escarpment gives rise to a beech hanger wood with ash and pedunculate oak. The woodland is notable for an abundance of coralroot Cardamine bulbifera, a plant with a nationally restricted distribution, but a characteristic species of long-established woodland on calcareous soils in this locality.

3.3 UNITS OF THE SSSI

There are four designated units of the SSSI as follows in Table 3.1. The units are shown in Appendix B Figure B.1.

Only Unit 3 is onsite.

Table 3.1 Designated units of the SSSI

Unit	Unit name	Area (ha)	Habitat Features	Location Relative to the Site
1	Coppermill Down	6.9749	Lowland calcareous grassland	Offsite approximately 100m north of the Site
2	Tilehouse South	26.5665	Standing open water and canals	Offsite immediately to the west of the Site
3	Broadwater Lake	80.8467	Standing open water and canals	Onsite
4	Harefield Lake and Korda Lake	33.3375	Standing open water and canals	Offsite immediately south of the Site
	Total area	147.7256		

Three of the four units that make up the SSSI (units 1, 2 and 4) lie outside the red line boundary of the Proposed Development. These three units combined make up approximately 67.88ha, which is 46% of the total SSSI area. The Site therefore comprises 54% of the total SSSI area.

3.4 HABITAT FEATURES OF THE SSSI

According to unpublished data supplied by Natural England (*pers. comm*) there are three habitat features of the SSSI with associated targets, as follows in Table 3.2:

Table 3.2 Habitat Features of the SSSI

Habitat Feature	Estimated Extent	Site Specific Target Range and Measures
Unimproved calcareous grassland	6.9ha	No significant reduction in the overall extent of unimproved grassland, in relation to the baseline.
Standing open water	93.79ha	No significant reduction in the overall extent of standing open water, in relation to the baseline.
Broadleaved, mixed and yew woodland, scrub, damp grassland, swamp and fen	41.48ha	No reduction in extent of more than 5% of any component habitat of the habitat mosaic supporting the breeding bird assemblage.

There is no calcareous grassland within the Site; there is also no damp grassland, swamp or fen. There is very limited scrub habitat also. With regard to the SSSI habitat features, the Site mainly comprises open water and woodland. UKHAB Plans are provided in Appendix B.

Standing open water

The Site provides approximately 60ha of the 93.79ha (64%) of the designated open water habitat within the SSSI as a whole.

Broadwater Lake has been assessed using Environment Agency (EA) criteria as a lake of medium alkalinity[1] due to test results of 120 mg/l of calcium carbonate ($CaCO_3$).

The Freshwater Biological Association 'Habitat Naturalness Assessment' may be used to assess the condition of lakes (this is used for the DEFRA Biodiversity Metric). Scores for four attributes (physical, hydrological, chemical, and biological naturalness) are averaged to generate an overall 'habitat naturalness assessment score' which can then be translated into a condition score.

Using these criteria, the lake has been assessed as being in moderate condition. The criteria and assessment are set out in Appendix C.

Woodland

There are two types of woodland at the Site: wet woodland and lowland mixed deciduous woodland. The Site provides approximately 10ha of woodland which is approximately 24% of the 41.48ha designated terrestrial habitats within the SSSI.

[1] EA Definition of medium alkalinity: Lakes with alkalinity levels between 50 mg/L and 150 mg/L of CaCO3 are generally classified as having medium alkalinity. They are somewhat buffered against changes in acidity.

Wet woodland occurs at the peninsula within an area which was formerly a silt lagoon. It was characterised by pools of water and deep layers of deadwood on the ground. Tree species recorded were dominant willows (Salix sp.) including weeping willow (S. pendula), crack willow (S. fragilis), goat willow (S. caprea), grey willow (S.cinerea), along with frequent alder (Alnus glutinosa) and silver birch (Betula pendula) and occasional sycamore (Acer pseudoplatanus). Ground flora recorded comprised dominant nettle (Urtica dioica) with frequent St John's wort (Hypericum perforatum), and occasional to rare herbs including forget-me-not (Myosotis sylvatica), self-heal (Prunella vulgaris), great burdock (Arctium lappa), field mint (Mentha arvensis), cleavers (Galium aparine), spear thistle (Circium vulgare), woodland sedge (Carex pendula), ground ivy (Glechoma hederacea), cotoneaster (Cotoneaster sp.), stone parsley (Sison amomum). Species typical of damp and wet habitats recorded were occasional gypsywort (Lycopus europaeus) hemp agrimony (Eupatorium cannabinum) and yellow flag iris (Isis pseudacorus).

On the peninsula, there are two distinct areas of lowland mixed deciduous woodland this woodland type, both meeting the description however varying in underlying ground conditions and species diversity.

Woodland occurring on former mineral working areas across the Site surrounds the wet woodland; it occurs on very hard and organic-poor substrate. The habitat was species-poor and comprised mainly willow, birch and alder. Willows occurred on the shorelines. It had a very sparse and species-poor ground flora comprising of dominant nettle (Urtica dioica) with frequent St John's wort, and occasional bramble (Rubus fruticosus agg.), cleavers (Galium aparine) ivy (Hedera helix) and buttercup (Ranunculus sp.), being quite choked with buddleia in many places.

Along areas of remaining natural ground at the peninsula and along the southern boundary of the Site, this habitat was more species-rich as natural soil was present. Species included pedunculate oak (Quercus robur), alder, birch and hazel (Corylus avellana) as well as willows. This woodland had a diverse ground flora of ruderal / ephemeral where buddleia and bramble scrub had been kept from encroaching along a pathway running through this area.

Along the access road, at the sides of the lake and along the canal all the way to BSC, lowland mixed deciduous woodland occurs with a typical native woodland understorey of mixed scrub, herbs and grasses. Species included oaks (Quercus spp.), willows, black poplar (Populus nigra) with alder, birch and hazel, and understorey of bramble, nettles, ivy.

3.5 DESIGNATED FEATURES OF THE SSSI

There are a number of designated features of the SSSI. These are:

- Standing open water;
- Woodland;
- Aggregations of non- breeding birds - population of tufted duck;
- Aggregations of non-breeding birds - variety of wintering species;
- Assemblage of breeding birds - mixed: lowland open waters and their margins, lowland fen and lowland damp grassland (defined by an index score calculated from qualifying species present);

- Assemblage of breeding birds - mixed: scrub, woodland (defined by an index score calculated from qualifying species present); and
- Assemblages of breeding birds - variety of species (defined by a number of species).

These features occur either partly or wholly onsite (although the distribution is not made clear within the information available for the SSSI as a whole).

How the designated features are defined

Definitions given within Drewitt et al (2023)[2] for the designated features are:

Aggregations of non-breeding birds (variety of wintering species; tufted duck)

- Localities which regularly support 1% or more of the total British non-breeding population of any native species in any season and non-breeding waterbird assemblages of over 20,000 individuals will qualify for SSSI selection. The main use of this criterion will be for wintering populations, but, where data are available, it can be applied at other seasons (for example for pre- and post-breeding gatherings, non-breeding summer flocks, moulting flocks and passage concentrations). Current estimates for non-breeding populations (and 1% of GB populations) are given in Musgrove et al (2013). Use of this criterion for passage rather than wintering populations requires particular care, as the numbers recorded on sites and nationally during these times will underestimate true populations due to turnover of individuals through sites.

Assemblage of breeding birds - mixed: lowland damp grassland, lowland fen, open waters and their margins, scrub, woodland

- Localities which support an especially good range of bird species characteristic of a particular habitat, as defined by an index value, will qualify for SSSI selection. Different habitats support different numbers of bird species, and there are geographical differences within the same habitat type. Therefore, the index value denoting a breeding assemblage of special quality differs between habitats and may differ geographically in order to maintain the range of the birds concerned. Refer to Annex 1 for use of species lists and index values, and for the approach to sites consisting of mixed habitats.

3.6 CURRENT STATUS UNDER STATUTORY MONITORING

The published condition statuses for the units of the SSSI have been reproduced in Table 3.3 below. This information has been obtained from the Natural England Designated Sites website[3].

Table 3.3 SSSI Units: Current Status Under Statutory Monitoring

Unit	Date assessed	Unit name	Status	Published Comment
1	22/09/2011	Coppermill Down	Unfavourable - Declining	This site has significant areas where nettles, creeping thistle, bindweed and ragwort are abundant- frequent. The western side has small pockets of chalk grassland indicator species.
2	15/05/2023	Tilehouse South	Unfavourable - no change	Unit condition based on least favourable feature condition. Summary of CSM compliant feature assessment: <u>Habitat Extent</u> Common standards monitoring sets a basic target for ornithological SSSIs that there should be no reduction in extent of more than 5% of any component habitat of the habitat mosaic supporting the breeding bird assemblage. **Broadleaved, mixed and yew woodland, scrub, damp grassland, swamp and fen:** The overall extent of habitat has declined by c.5% due to the direct impact of development. This has reduced the availability of good quality woodland and wetland habitat in the western fringe of the SSSI, an area known to be of particular value for breeding birds of waterside fringe and wet woodland as it includes part of the habitat corridor of the River Colne. **Standing open water:** The extent of standing open water has slowly declined since 2013 in unit 4 (Harefield Lake) where sedimentation has resulted in the lake contracting, which translates to a reduction in overall extent of standing open water of nearly 5%. Harefield Lake is of relatively low value to most wintering and wetland birds because of the high levels of turbidity which prevail here (there is a gravel processing facility on the lake margin), but this nevertheless represents a significant loss of open water habitat. Even in the absence of site survey it is clear that there has been a marked reduction in the extent of component habitat types that support the ornithological interest features, due to a range of factors. There is clear evidence of change in the relative extent of water fringe habitats since notification as a natural consequence of habitat succession, and areas that were once scrub and fen have developed into woodland that will support a different range of species. There has been significant loss of extent of fringing reed bed due to shading by bankside trees, such as at Tilehouse Lake. The formerly open, unvegetated nature of some exposed islands has long since been lost through growth of willow, and as a consequence there has been loss of supporting habitat for common tern and little-ringed plover, but conversely has provided suitable habitat for nesting cormorant and grey heron. This places even more importance on conserving the remaining areas of good quality, semi-natural, water fringe habitat with lower levels of disturbance. It is acknowledged that some of this habitat loss is temporary in nature and compensatory measures are proposed for losses in connection with HS2 construction works but any further habitat loss should be viewed as representing a serious threat to the maintenance of the ornithological interest of the SSSI. <u>Aggregations of non-breeding birds - Tufted duck, Aythya fuligula:</u> 5yr average count 2015-2020 = 341. The target is to maintain the population at or above a minimum count of 450 individuals. WeBS data shows the wintering population of Tufted duck has been below the site target population since 2016/17 and there appears to be a continuous downward trend in the 2015/16 to 2019/2020 period. Recent data indicates a more positive picture. Even so, it is clear that Mid-Colne Valley SSSI remains locally important for wintering tufted duck and contributes significantly to the wider Colne Valley Gravel Pits population which is a national stronghold for wintering tufted duck. Habitat suitability for wintering tufted duck at Broadwater Lake is considered to remain good and the Colne Valley group of pits continue to contribute towards maintaining favourable conservation status across the species range in England. Therefore, Mid Colne Valley SSSI is considered to remain favourable for wintering tufted duck.
3	15/05/2023	Broadwater Lake	Unfavourable - no change	
4	15/05/2023	Harefield Lake and Korda Lake	Unfavourable - no change	

Unit	Date assessed	Unit name	Status	Published Comment
				Aggregations of non-breeding birds - variety of wintering species: This criterion is no longer used for SSSI selection as it is regarded as not really reflecting true value for specialised birds of scarce habitats. The objective is to maintain the variety of wintering bird species recorded within 10% of the minimum threshold number applicable at time of last revision of the SSSI, which is 81 or over. This target applies to any bird present. Based on the list of birds recorded from WeBS counts, recent site surveys and interrogation of databases, the number of wintering species remains within 25% of target. It would appear there is still a good variety of wintering species using the site, consistent with the citation. Therefore, this feature of interest remains Favourable-maintained. Assemblages of breeding birds - Mixed: Lowland open waters and their margins, Lowland fen and Lowland damp grassland: The 3yr peak mean of BTO index assemblage scores from 2018-2022 = 38. This is a 17% decline below baseline (46). The assemblage score has not declined below the minimum threshold value and has remained stable since 2018. Therefore, this feature is assessed as Favourable – maintained. Assemblages of breeding birds - Mixed: Scrub, Woodland: The 3yr peak mean of BTO index assemblage scores from 2018-2022 = 13. This is a 69% decline below baseline (42). The assemblage score has declined below the minimum threshold value, although has remained stable since 2018. Therefore, this feature is assessed as unfavourable - no change. Assemblages of breeding birds - variety of species: The 3yr peak mean of BTO index assemblage scores from 2018-2022 = 32. This is a 54% decline below baseline (69). The assemblage score has declined more than 10% below the baseline, although has remained stable (2012 score = 37) therefore this feature is assessed as unfavourable - no change.

Units 2-4 appear to have been assessed in combination rather than as individual lakes, with the same comment applied to all three units. It may therefore be assumed that the designated features are spread across these three units.

It is unclear what scoring system was used but the scores appear similar to the index value / scoring system for assemblages of breeding birds. The score may relate to an earlier version of the current published guidance. A query had been raised with Natural England on the scoring system at the time of report production.

3.7 SSSI FEATURES AND UNITS OCCURING ONSITE

The development proposal for the HWSFAC directly affects Broadwater Lake, a number of its islands, and the peninsula (the Site). All these areas lie within a parcel of land ('Broadwater Lake') which is one (Unit 3) of the four component parcels of land that together make up the Mid Colne Valley SSSI.

As such, the Site does not comprise a discrete SSSI in its own right. It should be regarded as contributing a significant proportion of the overall biodiversity of the Mid Colne Valley SSSI.

In total, 75.7ha of the Broadwater Lake unit of the Mid Colne Valley SSSI lies onsite within the planning application boundary (areas of the Site that lie outside the SSSI boundary include the land parcels to the south and east and the access road, totally approximately 4ha).

The Site and the extent of the SSSI designation is shown in Appendix B Figure B.1 Mid-Colne Valley SSSI and SINC.

Table 3.4 SSSI Features and Units occurring onsite

Habitat Feature	Estimated Extent	Present Onsite
Unimproved calcareous grassland	6.9ha	No
Standing open water	93.79ha	60ha (~64%) of open water
Broadleaved, mixed and yew woodland, scrub, damp grassland, swamp and fen	41.48ha	10.2ha (~25%). Broadleaved and mixed woodland, scrub. (Absent: yew woodland, damp grassland, fen and swamp)

4.0 VISION FOR THE ONSITE SSSI

It is considered that the Site has a wealth of unrealised potential. It could be a much richer and greater bastion of biodiversity than it currently is.

The vision for the SSSI is to return the Broadwater Lake unit of the SSSI to favourable condition and to improve its resilience now and in the future and to measurably increase its intrinsic biodiversity value. This will be achieved through interventions and management aimed at increasing the total amount of life it supports. The water would be clearer for longer periods; the amount of green plant life within the lake, on islands, floating rafts, and at its margins would be greater; the number of fish and fowl would be increased. A greater range of species of waterbirds would be breeding, and in better numbers. In winter, Broadwater Lake would be a haven for passage and wintering birds. The inherent resilience of the SSSI to climate change / global warming would be significantly bolstered to secure its survival over the foreseeable future (50+ years) and hopefully much longer.

4.1 BIODIVERSITY CONSTRAINTS

Physical Limitations

In its present condition, as a lake formed from a gravel extraction pit, the ecology of Broadwater Lake has been shaped and constrained by the processes that created it.

Broadwater Lake has a relatively flat bottom with limited bathymetric (topographic) variation, formed mainly of hard clay although with intermittent patches of gravel. The lake also has artificial steeply banked sides with minimal shallow areas adjacent to the bank. This has created a fairly inhospitable substrate unsuited to supporting good numbers of plants and invertebrates.

There are a number of limiting factors that prevent aquatic macrophytes (plants) from establishing and thriving. The water is somewhat enriched with nutrients, evidenced by turbidity and green colour during the summer (the nutrients support the overgrowth of algae in the water column). The source of the nutrient enrichment is considered to be due to large numbers of waterfowl defecating into the water. The resultant green algal growth prevents light penetration into the water column, restricting plant growth below the surface. The limited availability of organic matter and soft sediments, along with the water depth and lack of light to deeper levels, ensures that the majority of the lake bottom cannot support macrophytes.

There are some areas of emergent vegetation (common reed, yellow flag iris, rosebay willowherb, purple loosestrife, watermint) where the lake bed is shallow enough to support these. When water levels drop, as they did in 2022 due to the drought, the majority of these areas were killed off (as observed during surveys on the Site within 2022 and 2023 and pers comms from BSC); this degree of water level fluctuation is a fairly typical artefact of the lake's artificial origin, and is a further constraint to development of healthy reedbeds.

The lake condition assessment is provided in Appendix C.

Ramifications for Biodiversity

As a result of the factors set out above, the lake is relatively impoverished ecologically from what might be expected. Ecological food webs within the lake are poorly supported and therefore fragile. Minimal aquatic macrophytes and emergent / marginal vegetation support only localised populations of macro-invertebrates (although these open water assemblages are moderately diverse and in favourable condition where they do occur). There are low fish populations, possibly constrained by a lack of aquatic vegetation and by lack of refuge and breeding areas within the lake (due to its largely featureless and denuded bed).

Bird species that feed on either aquatic vegetation or fish will therefore likely occur in lower numbers than might otherwise be possible. Although the lake is likely to be big enough to support a larger number of birds, it may not provide those birds with sufficient food to reside at the lake all day. As going in search of food creates an energetic toll, birds are more likely to find a home within waterbodies that have ample food and roosting resources.

The lack of extensive areas of floating / emergent or riparian vegetation such as reedbeds means that birds also have few refuge areas within the lake, leaving them more vulnerable to effects from disturbance from recreational activities e.g. sailing and fishing, as well as illegal activities such as fly tipping, camping, poaching, quad bike racing and illegal fishing. The limited availability of island-based nest / roost sites may also limit the numbers of certain species using the Site.

Table 4.1 Summary of biodiversity constraints arising as a result of the artificial origin of the lake

Physical Constraint	Effect on Biodiversity
Flat bottom with limited bathymetric (topographic) variation	Inhospitable substrate unsuited to supporting good numbers of plants and invertebrates; few refuge and breeding areas for fish
Bottom formed mainly of hard clay although with intermittent patches of gravel	Inhospitable substrate unsuited to supporting good numbers of plants and invertebrates
Artificial steeply banked sides with minimal shallow areas adjacent to the bank	Unnatural landform unsuited to supporting good numbers of plants and invertebrates
Moderate nutrient enrichment of water environment, evidenced by turbidity and green colour during the summer	Inhospitable to aquatic macrophytes
Water too deep and too little light penetrates to allow macrophytes to flourish	Inhospitable to aquatic macrophytes
Fluctuations in water level killing off emergent planting / reedbeds	Inhospitable to aquatic macrophytes
Limited availability of island-based nest / roost sites; limited sheltered areas due to absence of areas of extensive emergent / floating vegetation.	Limitations to the Site's ability to support good numbers of successfully breeding waterbird pairs / territories.

4.2 IDENTIFICATION OF STRESSORS/PRESSURES

Definition

Definition of 'stressor': something that causes a state of strain or tension. Alternative term: 'pressure' (as used by Natural England to identify threats to SSSIs). Ecological stressors are thought of as a) pressures or dynamics that impact ecosystem components or b) processes caused by human and associated activities.

There are a range of environmental and anthropogenic factors which may easily be recognised as potential 'stressors' to any ecologically sensitive site. These include existing current and likely future scenarios. Unlikely or extreme scenarios are not typically considered.

Stressors typically vary in the degree of pressure they impose over time, and are of medium-long term or permanent duration.

Stressors are a cause for concern for any ecologically valuable habitat, as over time they may detrimentally affect habitats and species (both individual species and assemblages of species).

Change in itself is a natural part of any ecosystem, whereby habitats and species exist in a dynamic equilibrium. However, a loss of biodiversity, such as from a reduction in species composition and habitat complexity, is a cause for concern particularly within a SSSI. These are recognised as key sites for supporting both UK and European biodiversity.

Stressors identified for the Site

Stressors identified for the Site (current or potential) are set out in Table 4.2 below, along with a brief description of potential effects if the stress is unalleviated, or in the absence of mitigation.

Table 4.2 Stressors identified for the Site

Stressor	Description	If unmitigated / unalleviated
Environmental		
Climate change - direct impacts	More extreme temperatures (air and water) during summers and winters, alongside extreme weather events.	Resultant damage / death / reduced fecundity to individual trees / habitats / species. Potential loss of species from a specific site, area or country (reduced biodiversity). Loss of permanent open water.
Climate change - indirect impacts	Alteration to water table. Water quality likely to change as a result of greater / lesser water inflows to a water body.	Aquatic and terrestrial habitat change (change of assemblage of plant species). Resultant changes to assemblage of animal species supported by the altered habitat.

Stressor	Description	If unmitigated / unalleviated
Anthropogenic		
Current permitted sailing activities (BSC)	Ongoing stressor forming part of the baseline - visual and noise disturbance to areas of open water and waterbirds using those areas and within zone of influence. Activity at a stable and relatively low level and within defined area.	No change predicted - assemblage and breeding success of waterbirds is a reflection of current level of stress / disturbance. Birds habituated to standard activities. *Population increase may increase club numbers (but this is a choice or may be regulated by planning permission). This may increase the number of sailing events, with resultant slight elevation of daytime disturbance.*
Trespassing / poaching (fish / fowl) / camping and / logging / anti-social behaviour.	Ongoing stressor (occasional / intermittent temporary short-term) - visual and noise disturbance to any areas of lake margins. Incidents may increase as population increases.	More likely during summer months. Potential effects include reduced breeding success of waterbirds using lake margins or potential abandonment of nests. In winter - increased morbidity of waterbirds as result of increased disturbance; potential displacement to other waterbodies.
Fly-tipping	Illegal waste disposal (solid and liquid) to land or water onsite. Visual and noise disturbance to habitats and species - occasional / intermittent temporary short-term. Incidents may increase as population increases. Potential fish and bird kills.	Reduction in quality of habitats; potential reduction of food webs and lower numbers of species supported. Effect on sensitive breeding or wintering birds - energetic toll / potential abandonment of nests.
HS2	Construction of viaduct: ongoing - intermittent noise and visual disturbance from cranes, plant and workers over next few years until the targeted completion (currently mid-2025). Visual disturbance from night-time lighting of crane. Operation of railway: Permanent intermittent short-duration noise disturbance to habitats and areas of open water, and birds using those areas and within zone of influence	Designed-in mitigation (and therefore unavoidable). Birds known to habituate to regular noise. Residual impact on the lake identified as not significant within EIA. HS2 have assumed no long-term residual impacts. Monitoring will detect any adverse impacts over the longer term with mechanism to secure required remediation in place. The monitoring of the impacts of HS2 will remain with HS2. Collaboration and sharing of results to better inform any remedial action, should any be needed, will be encouraged.

Stressor	Description	If unmitigated / unalleviated
	(south-west area of the lake and surrounding terrestrial habitats).	
Invasive Species	A number of non-native invasive species, both faunal and floral, have been identified on site through the various surveys completed. These include signal crayfish, Japanese Knotweed and Buddleia.	Reduction in quality of habitat through continued spread of non-native invasive species, likely to be at the expense of native species and overall species richness. Reduces the area of suitable foraging, sheltering and breeding habitat for a swathe of faunal species.
HWSFAC - Construction of Proposed Development	Construction: Increased activity on lake between August and November 2024 including deployment of floating reedbeds and tern rafts, placement of concrete caissons, removal of islands, creation of new islands, dredging of central area of lake for material to reclaim land to north of peninsula. Increased activity on land between November 2024 and August 2025 including construction of HWSFAC facilities. Significant increase in day-time visual and noise disturbance to open water, adjacent bankside, island and peninsula habitats. Impacting start of overwintering bird season and bird breeding season.	Potential effects in-lake include reduced over wintering population, displacement of over wintering species to other water bodies, reduced breeding success of waterbirds using islands and lake margins, potential abandonment of nests and potential displacement of breeding pairs to other waterbodies. There could be potential loss of sensitive species (breeding and non-breeding) from the Site. Potential reduced breeding of birds within woodland and adjacent open water and bankside habitats.
HWSFAC - Operation of Proposed Development	Operation: daytime sailing activities 1 April - 31 September weekdays for up to 200 children per day (peak numbers on the lake at any one time: 50 plus instructors). Significant increase in day-time visual and noise disturbance to open water used for sailing, and adjacent bankside, island and peninsula habitats. Impacting bird breeding season.	Potential effects in-lake include reduced breeding success of waterbirds using islands and lake margins, potential abandonment of nests and potential displacement of breeding pairs to other waterbodies. There could be potential loss of sensitive species (breeding and non-breeding) from the Site. Potential reduced breeding of birds within woodland and adjacent open water and bankside habitats.

Stressor	Description	If unmitigated / unalleviated
		Potential displacement of sensitive species from the Site to adjacent sites, or otherwise reduction of breeding population within the area.

The above table of stressors serves to show that the most vulnerable receptors at the Site are its populations of wintering and breeding waterbirds (both designated features of the SSSI), particularly species identified to be of greater sensitivity.

The open water habitat itself is also highly vulnerable to both environmental and anthropogenic pressures, as the water environment is a highly dynamic and responsive medium that reflects any change swiftly.

4.3 OPPORTUNITIES

There are ample opportunities to enhance the biodiversity of the Site. Mitigating or countering the physical biodiversity constraints and increasing the resilience of the features of the Site / SSSI to the stressors identified above is a simple strategy that should reap significant dividends.

The opportunities identified have been set out in the sections below.

The important role of aquatic macrophytes within a lake ecosystem

Aquatic macrophytes, which include various types of submerged, floating, and emergent plants, play several important roles in a lake ecosystem. By introducing or increasing the total area and biodiversity of macrophytes present within a waterbody, they can be used to deliver a range of benefits:

- Nutrient cycling: Aquatic macrophytes play a crucial role in the cycling of nutrients within the lake ecosystem. They uptake and assimilate nutrients, such as nitrogen and phosphorus, from the water column and sediments. This uptake helps in reducing nutrient levels, preventing excessive algal growth (eutrophication), and maintaining water clarity.
- Filtration and water quality improvement: The presence of aquatic macrophytes can enhance water quality by acting as natural filters. They trap suspended particles, absorb dissolved nutrients, and remove pollutants, including heavy metals, from the water column. As a result, macrophytes contribute to improved water clarity and reduce the potential for algal blooms.
- Oxygen production: Aquatic macrophytes perform photosynthesis, producing oxygen as a byproduct. They release oxygen into the water, helping to maintain adequate oxygen levels for fish and other aquatic organisms. This is particularly crucial during daylight hours when photosynthesis rates are high.
- Thermal regulation: The above-water parts of emergent macrophytes provide shade, which can help regulate water temperature and prevent excessive heating in shallow areas. This shading effect can

be beneficial for fish and other temperature-sensitive organisms, providing a more favourable habitat.

- Sediment stabilization: Macrophytes have root systems that help anchor them in the sediment, reducing erosion and stabilizing shorelines. By reducing wave action, they help prevent sediment resuspension and the resulting turbidity, which can negatively impact water quality.
- Primary productivity: Aquatic macrophytes are primary producers and contribute to the overall productivity of the lake ecosystem. Through photosynthesis, they convert solar energy into organic matter, providing a food source for herbivorous organisms and forming the base of the food web.
- Habitat and shelter: Macrophytes provide a habitat and shelter for a wide range of organisms. They create complex structures that offer hiding places, breeding grounds, and nursery areas for fish, invertebrates, amphibians, and even smaller aquatic plants. The dense growth of macrophytes provides refuge from predators and helps support biodiversity in the lake.

As such, increasing the total area of macrophytes within the lake is a key strategy for achieving the vision for the SSSI.

Achieving the vision - addressing physical constraints

Targeting and remediating / ameliorating the limiting physical features of the Site / SSSI provides significant opportunities for ecological enhancement. Table 4.3 sets out the measures designed into the Proposed Development.

Table 4.3 Measures to address physical constraints to biodiversity at the SSSI

Physical Constraint	Mitigation
Flat bottom with limited bathymetric (topographic) variation	Dredging to increase depth in central sailing areas Creation of solid islands and adjacent submerged planting beds - increase in shallow and emergent areas Floating islands and reedbeds along with an artificial reef will provide underwater features for fish (beneath and within vegetation or roots)
Water too deep and too little light penetrates to allow macrophytes to flourish	Creation of submerged planting beds - increase in shallow and emergent areas
Bottom formed mainly of hard clay although with intermittent patches of gravel	Use of coir mattresses and floating vegetated islands to provide growing medium for macrophytes
Artificial steeply banked sides with minimal shallow areas adjacent to the bank	New islands to have shallower slopes and shallow water areas adjacent on at least one side

Physical Constraint	Mitigation
Moderate nutrient enrichment of water environment	Increased macrophytes will remove nutrients improving water quality
Fluctuations in water level killing off emergent planting / reedbeds	Floating islands rise and fall with the water column, preventing death of plants. Submerged planting beds set at a range of depths, with sediments retained within caissons, potentially increasing survival rates during drought events.
Limited availability of island-based nest / roost sites	Creation of new islands and improving bank profiles on the islands. Provision of more nesting and roosting sites (boxes, baskets, rafts, extra trees and shrubs out of the reach of predators).

Achieving the vision - addressing stressors

Strategies to mitigate for current and future stressors are set in Table 4.4 below.

It can be seen that some of the mitigation measures (as detailed above in Table 4.3) also work to alleviate / neutralise stressors. This is frequently the case in natural environments, where a single intervention provides multiple benefits.

Table 4.4 Mitigation measures to address stressors

Stressor	Effective Mitigation Measures
More extreme temperatures (air and water) during summers and winters.	Long-term regular water temperature monitoring to understand spatio-temporal variability. Deeper water and enhanced macrophyte coverage will retain cooler water areas. Pumps (for the water source heating system for the proposed new facility) will enhance water circulation in shallower / more enclosed areas, reducing localised high water temperatures. Solar powered aerators may be deployed to enhance oxygenation of water in discrete locations in summer (the capacity of water to hold oxygen is reduced at higher temperatures).
Extreme weather events e.g. storms, precipitation - turbulence of water column, erosion of banks	Increased macrophytes and emergent vegetation will stabilise lake sediments, reducing impacts.
Alteration to water table - reduced open water area.	Areas of increased depth - retain open water areas even with extreme water level drops.

Stressor	Effective Mitigation Measures
	If required, dredging of deeper channels through shallow areas.
Water quality changes as a result of lower water volume.	Increased macrophytes will improve water quality.
Recreational disturbance (noise/visual/light) from sailing activities (current for BSC and future planned for HOAC)	New and enhanced sheltered refuge areas around the lake, providing a larger total undisturbed area for waterbirds. New screening, both manmade and natural, on terrestrial habitats to screen sensitive habitats and the inhabitants from potential recreational disturbance.
Trespassing / poaching (fish / fowl) / camping and / logging / anti-social behaviour.	Enhanced security of the Site with greater control over who accesses it - reduction / cessation of incidents.
Fly-tipping	Enhanced security of the Site with greater control over who accesses it - reduction / cessation of incidents.
Disturbance from construction and operation of HS2	Increased sheltered refuge areas within the lake, including in the north at the furthest extent of the Site away from HS2.
Invasive species	Suitable management/eradication schemes implemented to reduce occurrence/spread of non-native invasive species. Habitat management implemented to maximise native species growth to deliver increased areas of habitat suitable for foraging, sheltering and breeding species such as birds, bats, badger amongst others.

Further ways to enhance the SSSI

Further ways to enhance the biodiversity of the Site and hence strengthen its robustness as a SSSI, as well as ensuring LBH meet their statutory duty (under Section 28G of the Wildlife and Countryside Act), exist through supporting the designated features of the SSSI to increase their value (as measured by condition status).

The designated features of the SSSI are set out below in Table 4.5, along with the interventions that will benefit each feature. **Additional opportunities not already provided in the sections above are highlighted in bold.**

Table 4.5 Enhancements that will benefit the designated features of the SSSI

Features of the SSSI	Beneficial Mitigation / Enhancements
Standing open water	Increase in deeper and shallower / island areas improving bathymetric variability. Increased macrophytes improving water quality.

Features of the SSSI	Beneficial Mitigation / Enhancements
Broadleaved, mixed and yew woodland	Management to improve structure and planting to increase species composition and improve long term resilience to climate change.
Aggregations of non-breeding birds - - variety of wintering species - population of tufted duck	Improved food webs (plants, fish) to increase food resource for wintering birds. Increased islands, floating rafts and floating vegetation to provide additional roost sites. **Reprofiling an existing island (Island 2) to improve the terrestrial habitat provided. Creation of muddy scrapes / pools for passage birds / waders**
Aggregations of breeding birds - variety of species	Increased food resource; increased nesting site opportunities. Decreased disturbance of shallow areas and nest sites through enhanced screening and creation of additional refuge areas. **Selected new islands to have a steep bank for diving ducks.** Provision of nest boxes, baskets, **kingfisher tunnels. Provision of an artificial sand bank to attract sand martin to the Site.**
Assemblage of breeding birds - mixed: lowland damp grassland, scrub, woodland	**Creation of additional scrub / hedgerows near water. Increased number of fruiting and flowering plants on former hardstanding and at BSC site. Enhancements to increase invertebrates (increasing food resource for many woodland birds).** Provision of nest boxes.

4.4 SUMMARY

The main mitigation and enhancement strategies that will work together to maintain the SSSI in a favourable condition, increase Biodiveristy at the site, ensure LBH meet their statutory duty (under Section 28G of the Wildlife and Countryside Act), whilst also facilitating the development of the HWSFAC at the Site, are summarised below:

- Improve heterogeneity of lakebed topography;
- Increase macrophyte cover within the lake to improve water quality and enhance food webs;
- Increase sheltered areas within the lake free of physical and visual disturbance from sailing and other activities;
- Increase roosting opportunities (benefiting all passage, wintering, breeding and non-breeding waterbird and non-waterbird species);
- Greater Site security and management;
- Effective, long-term management of the site, by LBH, who have a successful track record of delivering this on other sites such as Ruislip Lido and Ruislip Woods.

Overall, these measures would ensure that the vision for the SSSI is delivered.

5.0 DELIVERY OF THE DESIGN PRINCIPLES

A very extensive schedule of ecological mitigation and enhancements measures has been formulated as part of the proposed HWSFAC development. These are shown and labelled on Figure B.3 in Appendix B. As will be seen, every stressor and opportunity (as identified and described in Chapter Four) has been incorporated into the design and delivery phasing of the Proposed Development.

This section provides relevant detail with regard to the SSSI designated features only.

Within the design of the Proposed Development, the design principles (originally set out in Section 2.4) have been incorporated as follows:

Table 5.1 Design principles and how these have been incorporated in the Proposed Development

Design Principle		How delivered through design / phasing / management
1	Design and operational management of existing and proposed recreational waterside and landside activities in a way which avoids disturbance and conflict with the reasons for notification of the Mid-Colne Valley SSSI, including its significant ornithological interest	Sailing activities constrained to a defined central open water area. Activities, sailing and other, constrained to specific times of the year e.g. HOAC will operate at the Site on weekdays between 1 April and 31 September. Large undisturbed areas of islands, open water and marginal habitat dedicated to the designated breeding and wintering assemblages (covering more than one third of the lake) and protected from disturbance (design principle 4). Designated woodland habitat retained and protected from disturbance through screening and access restrictions (design principle 2). The location of the land reclamation was selected at the northern end of the peninsula so as to avoid the south-west corner of the lake, which previous ecological surveys had identified as an important refuge area for waterbirds. The eastern side of the peninsula (including the lagoon and open water) was also avoided, to retain this area for feeding herons; this area also acts as a sheltered refuge area for waterbirds. Therefore, the northern end of the peninsula was considered to be the area with lowest ecological value surrounding the peninsula
2	Avoidance of terrestrial habitat loss (including woodland)	Reclamation of land for new facility; development of hardstanding maximised; no loss of woodland. The main principle driving the design of the Site was the requirement for no direct net loss of existing woodland

Design Principle		How delivered through design / phasing / management
		habitat, as requested by Natural England in early consultation. Therefore, land reclamation was designed into the scheme early on, to provide a sufficiently large area of hardstanding upon which to develop the main facility building, thus avoiding direct loss of woodland.
2 and 3	Enhancement of retained habitat (including open water)	All retained habitats to receive management and planting to increase biodiversity.
2	Creation of new habitat of value for nature conservation	Area of hardstanding utilised to create grassland, mosaic habitat for invertebrates, new areas of scrub.
3	Quality improvements to water environment	See Table 4.3. Bathymetric variability improved. Measures to enhance water quality and climate change resilience as mitigation for loss of open water. Increased variability of lake bathymetry: more deeper areas, and more islands and associated shallows. Increase in aquatic macrophytes, emergent planting beds and reedbeds. Pumps for circulation of water in enclosed areas. Monitoring and future intervention such as solar powered water aeration and excavation of deeper channels.
4	Increase the amount and quality of habitat of potential value to breeding and wintering birds	Increased island area, see Table 5.2, new floating islands and reedbeds. Refuge areas will increase breeding value of existing habitat. Also see 2,3, 5
4	Screened areas to act as refuges from visual disturbance from land-based activities e.g. camping, general people movement.	Existing open water refuge areas improved and new refuge areas created with physical barriers and visual screening provided by islands, floating islands and reedbeds.
4	Increased nesting opportunities	Increased island area, new floating islands and reedbeds, see Table 5.2. Tern rafts, nest baskets and boxes, kingfisher tunnels, sand martin bank.
5	Enhancement of food webs	Increased macrophyte coverage within lake - strengthens all food webs within lake ecosystem. Providing for plant eaters and increasing macro-invertebrate populations to feed fish and birds. Artificial reef for fish and fish refuge - increased fish population for piscivores.

Design Principle		How delivered through design / phasing / management
6	Address existing and future threats to the value of the SSSI	See Table 4.4- addressed through 3, 4, 5 above, and through improved site security, control of access and effective long-term management.

The sections below provide more detail on the above.

5.1 DESIGN OF IN-LAKE INTERVENTIONS

In-lake mitigation for potential construction and operational disturbance to the SSSI designated wintering and breeding waterbird assemblages is the most important aspect of the design of the Proposed Development (design principle 1 as set out in Table 5.1 above).

The design of each feature and the underlying rationale has been described in more detail below.

Implementation of the designed features has been carefully planned and timed to minimise the impacts of the installation / creation works - the phasing is described in Section 5.2.

Summary of Interventions

Table 5.2 summarises the habitat loss and compensation that will occur through the delivery of the Proposed Development.

Table 5.2 Summary of interventions

Feature/Habitat	Loss (m2)	Creation (m2)	Net Area (m2)
Open Water	16,114	2,158	-13,956*
Solid Islands	2,412	4,307	+1,895
Floating Reedbeds	0	1,325m2	+1,325m2
Tern Rafts	0	4 tern rafts	+4 tern rafts
Aquatic Planted Coir Mattresses	0	10,791	+10,791
Concrete Caisson aquatic and emergent planting	0	8,540	8,540

* Significant enhancement of the remaining standing open water will mean that although a loss of area (quantitative) will occur, the qualitative value of the remaining area will adequately compensate the loss, see Design Principle 3 in Table 5.1.

Creation of refuge areas

Prior to the main construction works, refuge areas within the lake will be created and existing refuge areas strengthened. These are located along the east side of the lake, in the north and running along the west side to join up with the south-western existing refuge area.

These areas will provide a series of havens which are designed to neutralise the effects of disturbance on waterbirds from increased activity within the lake during dredging, land reclamation, island removal and new island creation activities, as well as future HWSFAC sailing activities.

Eastern refuge

The proposals for the east side of the lake have been designed based on survey data of waterbirds, which showed this area was used more than was expected, and particularly so during and after sailing events. The existing isthmus / chain of islands already provide some visual and physical shelter. Gaps between islands will be infilled with floating reedbeds to increase the shielded nature of this area, and the top end enclosed.

Northern refuge

The north end of the lake has been designed to provide an additional place to waterbirds to retreat to when sailing activities begin at the peninsula. Birds typically swim or fly away from a disturbance in all directions; the wintering bird and disturbance surveys (provided in Appendix 7.6 of the ES) showed that during sailing events birds were concentrated into existing areas shielded by islands to the east and south-west. A refuge area located diagonally opposite the new sailing club at the northern end of the lake will provide a further calm area to retreat to in the opposite direction from the source of disturbance - this will cater to more sensitive species that feel the need to travel greater than 300m away from a disturbance source. This area is also as far from the new HS2 viaduct as possible; this area provides a quiet undisturbed area well away from HS2 that birds can retreat to once the railway becomes operational.

Western sheltered corridor

The northern end of the lake has been connected up to the south-western corner by a corridor formed of floating reedbeds; the north end has very deep water and therefore does not provide significant benthic food resource (algae, plants etc) for waders and dabblers. A shielded corridor along the western edge of the lake, utilising the existing willow trees as part of the corridor, will allow birds to swim from north to south in the lake without being disturbed by sailing or construction activities. This shielded corridor also enhances the protective nature of the western bank, potentially providing benefits to breeding birds in this area.

South-west bird sanctuary

The south-west corner is already a haven for waterbirds, providing a sheltered area with shallow bed for dabbling / wading. Additional islands and floating reedbeds will reduce sightlines between this area and

the central open water area where the planned HOAC sailing activities will occur. The effective visually shielded area will be significantly increased.

There are a number of willow trees emerging from the water in small groups near the peninsula - surveys have found these to be important for breeding ducks and as part of a heronry / cormorant colony. Island 14 will be retained but it lies particularly close to planned sailing areas; new islands and floating reedbeds will be created in a protective semi-circle to reduce disturbance of birds using this area.

Emergent beds are planned for this area; these are underwater planting beds created with concrete caissons filled with soils arising from the removal and reshaping of islands. The beds are designed to be underwater for the majority of the year. The beds will be planted with native emergent plants such as common reed and yellow flag iris, to create additional areas of emergent habitat within the lake.

Reduction of disturbance

The creation of these refuges has been timed to be undertaken at the most appropriate times of the year e.g. the first creation will commence in August, a time when breeding birds have completed breeding and overwintering birds have not yet arrived. Further refuge creation work will commence only after the initial refuges have been created.

Once these refuge areas are in place, they will provide ongoing mitigation for disturbing activities to the assemblages of waterbirds using the lake at different times of the year.

The refuges will allow the remaining construction works for the HWSFAC to proceed without causing significant effects on waterbirds; they will also prevent significant effects from arising as a result of increased sailing activities in the central / north open water area once the HOAC becomes operational.

Enhanced habitat resources

The new solid islands, floating reedbeds and emergent beds will also provide replacement and enhanced roosting, breeding and foraging resources to the birds using the lake. The two islands (approx. 2,400m2) to be removed will be replaced with almost double the area (approximately 4300m2) in more strategic locations and will be shaped to provide greater benefits to nesting birds. Additional tern rafts (four in total) will also be provided. In-lake trees near the peninsula will be incorporated into the land mass, but this will mean a loss of a small number of tree nest sites for ducks. To replace these, willows will be grown on new islands and the remaining willow trees within the lake will have enhanced protection from disturbance.

5.2 IN-LAKE ECOLOGICAL MITIGATION PHASING

The phasing of works within the lake has been carefully planned to avoid, reduce and mitigate adverse impacts / effects to the designated features of the SSSI during construction.

Table 5.3 Ecological mitigation phasing - In-lake works

Stage	Sub-stage	Description of Works
1	A	Deployment of floating reedbeds to create initial protected areas (Aug24)
	B	Deployment of floating reedbeds in accessible locations (Aug24)
2	A	Place caissons (Aug - Sept 2024)
3	A	Cut (remove islands) and reprofile island 2 (Sep24)
	B	Fill caissons (using material from removed islands) (Sep24)
	C	Fill - island formation (using material from removed islands) (Sep24)
4	A	Enabling dredge to clear way for main dredge (Sep24)
	B	Main dredge (Sep24 - Nov24)
	C	Peninsula extension / land reclamation (Sep24 - Nov24)
5	A	Placement of floating reedbeds associated with new islands (likely Feb25 or Sep25-Nov25)

Initially, creation of shielded refuge areas within the lake will begin in August 2024. These initial works are non-intrusive (no dredging or large machinery) and of short duration and therefore minimally disturbing. Ready-prepared floating reedbeds will be brought to the Site on lorries, placed onto the lake at the BSC facility, and then floated into place with small tugboats / powerboats. The reedbeds will create a physical and visual barrier between the central part of the lake (where the main works will occur) and areas of the lake where no works will occur. In some places, reedbeds will infill gaps between existing islands and trees in the lake, to strengthen the existing visual shielding. In other areas, extensive lengths of floating reedbeds will create new shielded areas. These areas will act as refuges for waterbirds both during subsequent construction works and during the operation of the HWSFAC.

In August 2024, caissons will be placed on the lakebed to create the foundations of new islands and hold fill material. Caissons will also be placed to create underwater planting beds, to hold macrophytes and emergent planting. The new islands are being created in strategic locations to further strengthen the refuge areas, and provide locations for new trees to grow. Over the long-term trees will provide additional visual shielding for refuge areas, as well as providing new nest sites and other ecological benefits.

The first disturbing / intrusive stages of construction have been planned to put mitigation into place during September 2024, a time of year when the breeding bird season has finished, and wintering birds will not yet be present. At this time, two islands will be removed from the centre of the lake. The cut materials will be used to fill the caissons for the creation of new islands and emergent planting beds. If necessary, some additional material will be won from locally dredged fine sediment, of which there are localised but limited deposits.

Once the works to create the refuge areas are completed (by end of September 2024), the main in-lake works can then proceed. The installed refuge areas will allow the rest of the construction

programme to proceed within the lake over winter, ensuring that there are no significant effects to wintering birds. In this way, significant effects upon the designated features of the SSSI (assemblages and aggregations of breeding and wintering birds) will be avoided or mitigated.

Dredging within the central sailing area will start near the peninsula, deepening the water, working progressively out into the middle and north. The peninsula land reclamation will be formed; once this is completed the on-land construction works for the main HWSFAC facility will commence.

Further floating reedbeds will be deployed around the newly created solid islands; the scheduling for this will be confirmed in due course. These reedbeds are not necessary for mitigation of construction works but are additional enhancements.

5.3 PROTECTION OF WOODLAND

On land, mitigation is simpler - the SSSI designated woodland habitat will be retained and protected from construction works. Fencing around the woodland will be installed in June 2024 at the start of enabling works, to physically demarcate the woodland from the peninsula access road, and ensure there is no accidental damage to woodland or individual trees at the early stage. Works at this time will mainly comprise setting up of construction compounds and storage of materials for the access road resurfacing. Compounds and materials storage will be located on existing hardstanding away from woodland.

To avoid noise and visual disturbance to breeding woodland birds, a designated feature of the SSSI, prior to the commencement of the bird breeding season (March 2025), a visual and acoustic screen will be installed around the woodland, slightly inset behind the tree line. This has been designed into the Proposed Development, to prevent any significant disturbance of bird species using the woodland for breeding, initially during the more active stages of construction in 2025 and over the long term during operation of the Site.

5.4 CONSTRUCTION PHASING

Table 5.4 below sets out the general construction stages planned.

Table 5.4 Construction Stage Overview

Construction Stage	Start	End
1 – Enabling Works – Site Access Road	Jun-24	Jul-24
2 – Enabling Works – In-lake Works	Jul-24	Nov-24
2.1 – Installation of Ecological Mitigation (In-lake & Peninsula)	Aug-24	Aug-24
2.2 – Island Formation – Preparation for Land Formation	Aug-24	Aug-24
2.3 – Island Formation – Land Reclamation & Dredging	Sep-24	Nov-24
3 – Construction – Main Works and Peninsula	Dec-24	Aug-25
4 – Construction – Canal Bridge	Dec-24	Feb-25
6 – Future Ecological Enhancements	Dec-24	Aug-25

5.5 REMAINING DESIGN PRINCIPLES

The details of the design principles (DP) not covered above are provided in other sections of the MEMP.

Table 5.5 Design Principles in other sections of MEMP

DP	Description	Detailed within
2	All retained habitats to receive management and planting to increase biodiversity	MEMP Volume 2 Parts A B and C
2	Area of hardstanding utilised to create grassland, mosaic habitat for invertebrates, new areas of scrub	MEMP Volume 2 Part A and C
5	Increased macrophyte coverage within lake	MEMP Volume 2 Part A and B
5	Artificial reef for fish and fish refuge - increased fish population for piscivores	MEMP Volume 2 Part A and B
5	Tern rafts, nest baskets and boxes, kingfisher tunnels, sand martin bank	MEMP Volume 2 Part A and B
6	Improved site security, control of access and management	MEMP Volume 2 Part A and B

6.0 MANAGEMENT AND MONITORING

6.1 SSSI MANAGEMENT PLANS

The habitat features of the SSSI that will be managed are set out below along with indicative targets and management measures.

Feature	Management Prescription	Management Summary Details
Standing open water	Enhanced water quality in key locations - pumps to circulate water Solar aerators (bubblers) for localised poor water quality conditions	Ensure pumps working and effective to improve DO and temperature parameters. Ensure solar pumps deployed as needed
	Aquatic Invasive / Non-native species	If identified by monitoring, appropriate control measures may be formulated.
Woodland	Management to improve condition	Works to improve structure and biodiversity

The species and assemblages that are the designated features of the SSSI will not be directly managed. Instead, the enhancement measures created during the construction of the Proposed Development will be managed to ensure they:

- Are fit for purpose once installed and remain so over the long term (30 years);
- Planting / habitats develop as intended; and
- Deliver the assumed benefits in the assumed timetable.

Management prescriptions will be aimed to achieve these goals. The monitoring described below will inform the ongoing management.

Detailed management plans will be provided in Volume 2 Parts B-D for the final version of this MEMP; the draft versions have been provided to inform the planning application.

6.2 SSSI MONITORING

Features of the SSSI that will be monitored are set out in Table 6.1, with indicative goals, methods and timings.

Detailed monitoring plans will be provided in Volume 2 Parts B-D for the final version of this MEMP; the draft versions have been provided to inform the planning application.

Table 6.1 Features of SSSI that will be monitored

Feature	Monitoring Goal	Method	Timing
Standing open water	Establish detailed water quality baseline Detection of trends long-term To informed detailed interventions	Common Standards Monitoring Guidance for Freshwater Lakes, JNCC (2015)	Monthly DO, temperature, turbidity, depth, total P Annual Macrophyte & filamentous algae survey, sampling for zooplankton & phytoplankton
Lake condition assessment	Confirm baseline and monitor progress towards improvement goals Detection of trends long-term	Freshwater Biological Association 'Habitat Naturalness Assessment'	Annual reassessment; using data provided by detailed monitoring above
Woodland	Confirm baseline and monitor progress towards improvement goals	DEFRA Metric condition assessment	Annual in June or July
Aggregations of non-breeding birds - variety of wintering species - population of tufted duck	Record assemblage and numbers - no negative change relative to the 2023 baseline	Wintering bird survey non-sailing days	Monthly October to March During construction and operation - annually until 2027 and then bi-annually
	Disturbance effects on species, detection of reduction relative to 2023 baseline	Wintering bird survey on sailing days	Monthly October to March During construction and operation - annually until 2027 and then bi-annually
Aggregations of breeding birds (waterbirds) - variety of species	Record assemblage and numbers - no negative change relative to the 2023 baseline	Breeding bird survey	Monthly March - July During construction and operation - annually until 2027 and then bi-annually

Feature	Monitoring Goal	Method	Timing
Assemblage of breeding birds - mixed: lowland damp grassland, scrub, woodland	Record assemblage and numbers - no negative change relative to the 2023 baseline	Breeding bird survey	Monthly March - July During construction and operation - annually until 2027 and then bi-annually
SSSI designated features - assemblages / aggregations of birds	Provide a measure of intrinsic biodiversity relative to the recorded baseline - to detect any improvement resulting from the enhancement measures provided by the Proposed Development	SSSI condition assessment - calculation of site threshold values for each designated assemblage	Annually until 2027 and then biannually using survey data as detailed above

6.3 NON-SSSI FEATURES

Management and monitoring prescriptions for ecological receptors which do not form part of the designated SSSI are set out in the Draft MEMP Volume 2 Parts A-D.

These are aimed at the operation stage of the development and typically comprise ensuring that features and habitats remain fit for purpose through annual maintenance, and through appropriate monitoring to detect problems at an early stage and allow remedial measures to be implemented.

7.0 CONCLUSION

This report has served to take the reader through the rationale of how the designated features of the Mid-Colne Valley SSSI can be protected and enhanced as part of the proposed HWSFAC development at Broadwater Lake.

The extremely robust and extensive mitigation and enhancement measures that have been designed will protect the intrinsic value of the SSSI and additionally provide resilience for potential stress and changes arising as a result of climate change.

The enhancements along with planned ongoing management have great potential to increase the biodiversity value of the SSSI over the next 10-20 years. The proposed monitoring programme will allow the detection of potential threats such as the arrival of new invasive non-native species, or identify longer term trends in water temperature variability and dissolved oxygen content, allowing design and implementation of intervention measures early enough to prevent significant harm to the SSSI. The monitoring will also identify if alterations need to be made to the operational activities. For example, if bird activity significantly decreases remedial action can be discussed and agreed with the relevant stakeholders.

As such, the Proposed Development is considered to deliver a higher value and more resilient SSSI in the long term, maintaining the Site in a favourable status with enhanced biodiversity value, which should in turn improve the bird assemblages. It allows the Proposed Development and its associated benefits to be delivered without significant harm to biodiversity and for LBH to meet its duty not only to avoid damage to SSSIs but to further their conservation and enhancement.

LBH would be custodian of the SSSI and are committed to the long-term management of the Site, working in partnership with Natural England and other stakeholders.

APPENDIX A LEGISLATION AND POLICY

A.1 LEGISLATION

Current key legislation relating to ecology includes The Environment Act[4] Wildlife and Countryside Act 1981 (as amended)[5]; The Conservation of Habitats and Species Regulations 2019 ('Habitats & Species Regulations')[6], The Countryside and Rights of Way Act 2000 (CRoW Act)[7], and The Natural Environment and Rural Communities Act, 2006[8].

The Environment Act, 2021

The Environment Act is made up of two thematic halves, the first provides the legal framework for environmental governance, whilst the second half makes provision for improvement of the environment. This includes measures on waste and resource efficiency, air quality and environmental recall, water, nature and biodiversity, and conservation covenants. Part 5 of the act relates to water, and includes provisions relating to sewage, water abstraction, and priority substances.

Biodiversity Net Gain

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

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

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

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

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats[9] (the 'Bern Convention') and the Birds Directive and EU Habitats Directive are implemented in Great Britain.

The Countryside and Rights of Way Act 2000

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

The Natural Environment and Rural Communities Act 2006

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

Section 41 of the Natural Environment and Rural Communities Act requires the Secretary of State to publish a list of species of flora and fauna and habitats considered to be of principal importance for the purpose of conserving biodiversity. The list, a result of the most comprehensive analysis ever undertaken in the UK, currently contains 1,149 species, including for example, hedgehog (Erinaceus europaeus), and 65 habitats that were listed as priorities for conservation action under the now defunct UK Biodiversity Action Plan[10] (UK BAP). Despite the devolution of the UK BAP and succession of the UK Post-2010 Biodiversity Framework[11] (and Biodiversity 2020 strategy[12] in England), as a response to the Convention on Biological Diversity's (CBD's) Strategic Plan for Biodiversity 2011-2020[13] and EU Biodiversity Strategy (EUBS)[14], this list (now referred to as the list of Species and Habitats of Principal Importance in England) will be used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 41 of the Natural Environment and Rural Communities Act 2006 'to have regard' to the conservation of biodiversity in England, when carrying out their normal functions.

Biodiversity Action Plans

Non-statutory Biodiversity Action Plans (BAPs) have been prepared on a local and regional scale throughout the UK over the past 15 years. Such plans provide a mechanism for implementing the government's broad strategy for conserving and enhancing the most endangered ('priority') habitats and species in the UK for the next 20 years. As described above the UK BAP was succeeded in England by Biodiversity 2020 although the list of priority habitats and species remains valid as the list of Species of Principal Importance for Nature Conservation (included in the NERC Act 2006 detailed above).

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

A.2 PLANNING POLICY

National

National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2021[15] 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.

Paragraph 153 requires that plans take a proactive approach to mitigating and adapting to climate change, whilst taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes.

Paragraphs 159-168 provide a base for the consideration of flood risk in determining planning applications. It is required that developments do not increase flood risk elsewhere, and that any proposals in areas at risk of flooding are accompanied by an FRA.

Paragraph 168 details that major developments should incorporate SuDS, unless clear evidence shows this would be inappropriate. Systems used should take account of advice from the LLFA, have proposed minimum operational standards, maintenance in place and where possible provide multifunctional benefits.

Paragraph 174 notes how planning policies and decisions should contribute and enhance the natural and local environment. This includes preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. It also notes that development should where possible, improve local conditions such as water quality, taking into account relevant information such as river basin management plans (RBMPs).

Paragraph 179 details that plans should protect and enhance biodiversity and geodiversity, including promoting the conservation, restoration and enhancement of priority habitats and ecological networks. They should also identify and pursue opportunities for securing measurable net gains for biodiversity.

National Planning Practice Guidance (NPPG)

Climate Change 2014 (Updated 2019)

This guidance advises how mitigation and adaptation measures can be identified; it also sets out the need to consider any vulnerability of a development to climate change risk over its whole lifetime.

Natural Environment 2016 (Updated 2019)

This guidance details how biodiversity should be taken in account, how it can be protected, compensated for and enhanced. It also provides details on how planning can safeguard soils.

Regional

The London Plan[16]

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[17]

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.
- Relevant policies associated water are:
- Relevant Core Policies within the Local Plan include:
- Policy EM1: Climate Change Adaptation and Mitigation
- Policy EM3: Blue Ribbon Network
- Policy EM6: Flood Risk Management

Policy EM8: Land, Water, Air and Noise

APPENDIX B FIGURES

Figure B.1 SSSI units and Site red line boundary

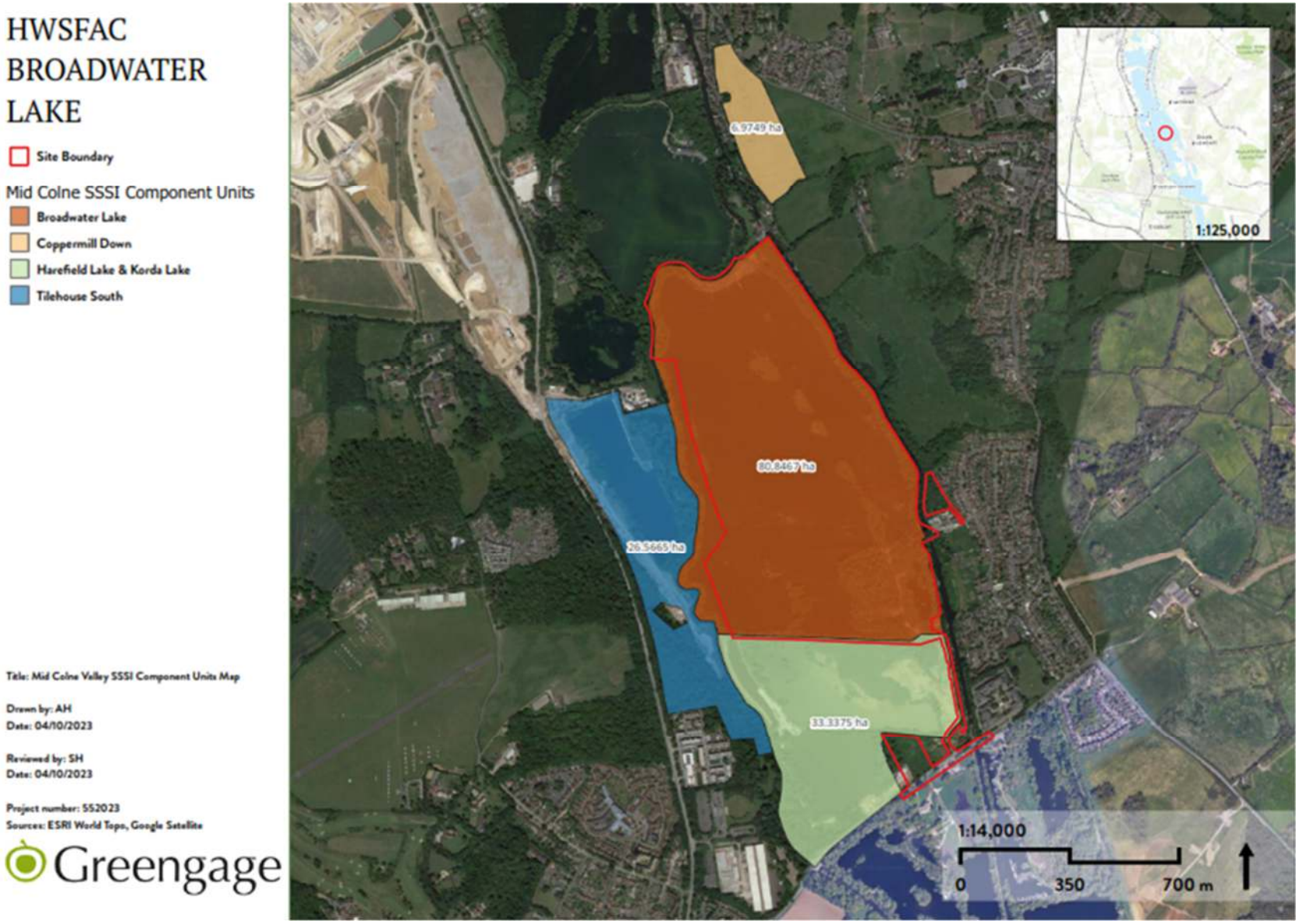


Figure B.2 Annotated map of Site: islands (or collections of islands) have been numbered clockwise from NE and the 'tern rafts' have been given letters.

Figure B.3 Lake ecological mitigation plan

Bathymetric survey Key

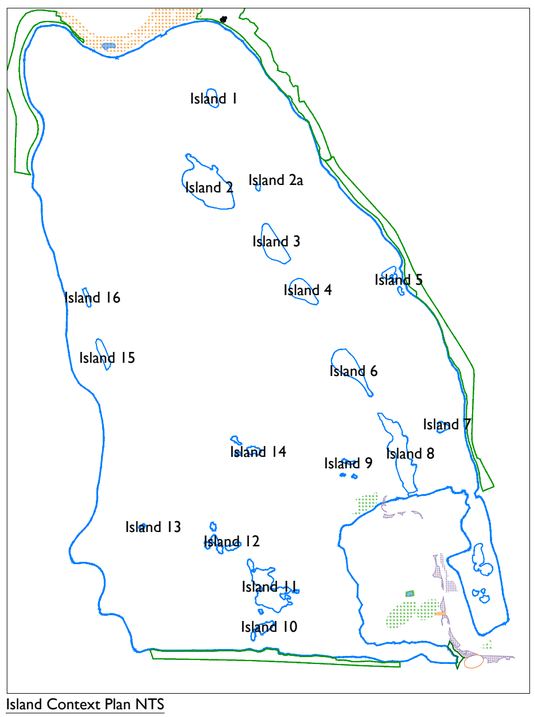
Lake bed level	Winter water depth	Summer water depth
36.5m	0.96m	0.64m
36.0m	1.46m	1.14m
35.5m	1.96m	1.64m
<35.5m	>1.96m	>1.64m

Note:
1. Calculations are based on an average winter/summer water level provided by the surveyor (refer dwg 32578BWLS-01-05)
2. Minimum 2m water depth is preferable for sailing and water activities to minimise algal blooms in summer
3. It was not possible to carry out a survey around the islands, but it is assumed that the water level is less than half a meter

Key (Lake)

Site red line boundary

1. Visual / refuge habitat provided by string of 5m x 2m modular prefabricated floating reed bed rafts to protect water for bird refuge. Monitoring to establish whether infill of protected water with reeds is required.
2. String of 5m x 2m modular prefabricated floating reed bed rafts to create discrete open water channel along western margin. To be kept open with periodic maintenance
3. Extend existing jetty for emergency access (remove adjacent jetties)
4. Keep existing entrance to Broadwater Lake Sailing Club for emergency access & retain track to jetty
5. Remove existing structures :
   - Include two parallel hedgerows 10m apart to create a sheltered grassland 'ride' for bats to forage and commute along (running east-west) and providing a sheltered area for nesting birds, mammals, otter couches etc
   - create a series of inviting mounds of varied orientation, shade and openness with aim for badger setts
   - grassland creation and enhancement in open areas to increase wildflowers
   - include small pond if possible (away from gas main)
   - care to be taken in this area with minimal digging due to the existing underground gas main
6. Anglers' WC to be connected to existing waste water in the location of the Broadwater Sailing Club
7. Floating reedbeds creating bays for young fish and sheltered angling stations.
8. Secure site boundary with Grand Union Canal using a bespoke fence sensitively located amongst existing trees, mindful of root protection zones and augmented with thorned native planting species depending on light conditions. Sections will include fence panel sections, thorny shrub planting, wire fences and trellises, to infill the open areas and strengthen more permeable vegetation. Repair and replace derelict hedgerows with laying / dry hedging techniques dependent on condition and light levels. This approaches retains habitat connectivity and desirable existing light levels
9. Enhance ground flora along the lake margin where reeds aren't proposed. Inland from here include areas of enhanced terrestrial ground flora. Enhancement of ground flora with biodiverse species (both sun loving and shade loving) for invertebrates, bats and birds. Installation of bat and bird boxes on trees in this area. Keep the access road mostly as a dark corridor for wildlife movement, with at least the one sunny spot.
10. Reprofile sediments area to required 2m depth for sailing with turbidity curtain to limit water quality effects until sediment settled
11. Diversify existing habitats on island with perimeter emergent vegetation
12. Number Not in Use
13. Enhance shallows as nursery habitat for coarse fish with artificial reefs
14. Dense barrier vegetation to visually screen eastern shore of islands and the reclaimed land from the north. Wind modeling of the lake and agreement of a minimum distance of natural wind trajectory from jetties should be agreed with sailing club
15. Maintain habitat connectivity with refurbishments or replacement of bridge over canal. Otter spraint was found beneath suggesting it is a landmark used by otters. Implement a watching brief during construction to ensure there is no harm to otters. No mitigation or enhancement for otters is needed or recommended.
16. Bat boxes on trees - here and throughout for maximum benefit
17. Bales of Christmas trees to keep out predatory fish. Monitor water flow and potentially enhance connectivity if climate change adversely reduces water levels.
18. Currently there are mature willows around much of the lagoon edge at the water line (with dense buddleia around and behind) and there are areas of high ground with unsafe steep slopes down to the water edge. High areas to be lowered to approximately 2m above water level and steep slopes reprofiled to 45degrees. Non-native buddleia to be removed and replaced with further willows. A border around the lagoon will be densely planted with native flowering, fruiting and thorny shrubs to prevent visual disturbance or direct human access to the lagoon (discrete viewing will be provided through bird hides). Woven willow panels will be used for instant screening while new planting establishes.
19. Proposed 2 m high thorn hedge to back of car park
20. Restoration to an undisturbed marginal vegetation
21. Break up existing concrete in places for root penetration
22. Main controlled access point for site
23. Existing B category tree group avoided
24. Reclaimed land with scattered native trees to visually break up views of existing building and low fertility dry well drained grass community to boatyards. The seed and plant mix for reclaimed land would only serve to make this area attractive. Although it has low potential to benefit bats (due to lighting), green walls and green roofs if feasible could be installed on buildings for invertebrates and to integrate buildings into the landscape. Judiciously located nectar providing planting would enhance the area although openness is important to minimise potential sheltering of wind for sailing.
25. Number not in use.
26. Up to 10 m wide buffer to prevent access, width will vary depending on existing vegetation, topography, presence of concrete surface, substrate and extent of land available
27. Native fruit trees as orchard / fruit walks within camping and activity area. Create an open mosaic habitat for invertebrates here and elsewhere wherever possible
28. Heron Inlet. Protect and enhance backwater with thorny planting and protective fence as required for the inlet to the south west of the peninsula to remain safe for bird and otter passage. Include some emergent vegetation and some grassland patches going down to the water for water vole and sleeping spots for birds or deer
29. Low key approach to drainage with ditches and filtering attenuation through site. Boatwash to go to foul drainage system
30. Grassland and wildflower enhancement in open areas and alongside paths of activity centre. Sandy patches, gravel and excavated dips to be incorporated
31. Create islands in shallowest parts of the lake to create protective water to the west of the lake. These will include trees and scrub planting
32. Proposed HS2 floating mitigation island
33. Enhance as dabbling areas for birds with submerged coir matresses
34. Deeper channels for water circulation
35. Include tethered habitat rafts with solar panel to power bubbling aerators in areas of semi-enclosed water. Integrated into the masterplan for climate adaptation based on monitoring of the dissolved oxygen levels across the lake over a period of months / years
36. Restrict access to causeway to avoid public safety hazard of quicksand and disturbance to quiet backwater
37. Wildlife pond for invertebrates and dipping activities on north side of cleaving in sun
38. Floating reedbeds provide shelter for water birds
39. Concrete caissons submerged and filled with silt / substrate and planted with vegetation tolerant of submersion such as reeds and willow
40. Species rich amenity grass
41. Zone for assisted natural regeneration
42. Waterpump for circulation
43. Remodel existing island based on:
    a) retain 4 existing trees
    b) create muddy scrape in north of island at same level as the shingle finger the extends north (Summer water levels)
    c) Artificial Sand Marten habitat
44. Proposed islands to protect existing island 14
45. Tern rafts within open water
46. Log piles and brash piles with existing vegetation to encourage wildlife habitation
47. Introduce species rich grass planting on existing gravel
48. Wildlife pond
49. Existing slipway removed, Jetties retained for Wildfowl
50. Proposed scrub planting scattered along grassland
51. Extent of existing vegetation
52. Enhanced ground flora along shoreline
53. Create 3no. shallow scrapes and allow ruderal ephemeral vegetation to colonise
54. Basking banks for reptiles



Island Context Plan NTS

0 25 50 75 100 150 200 250m

Rev	Amendments	Date	Drwn	Chkd
14	Development of ecological mitigation and enhancement	29.09.23	JR	PO
13	Annotation amended	26.09.23	AH	PO
12	Layout amended	11.09.23	JR	PO
11	Floating reedsbed and island layout amended	24.08.23	JR	PO
10	Updated following comments	22.08.23	DB	PO
09	Updated following comments	16.08.23	DB	PO
08	Updated following workshop on 28.07.23 at LBH, Uxbridge	08.08.23	DB	PO
07	Final QA	22.06.23	JR	PO
06	Amendments to the masterplan	21.06.23	JR	PO
05	Amendments to the masterplan	15.06.23	JR	PO
04	Amendments to the masterplan	30.05.23	JR	PO
03	Amendments to the key	23.03.23	JR	PO
02	Amendments to the key	22.03.23	JR	PO
01	First Issue	16.03.23	TK	PO

Project
HWSFAC

Drawing Title

Ecological Mitigation - Lake

Project No. 2121
Scale @ A1 1:2500
Project Status For planning
Drawing No. HWSFAC-COL-00-XX-DR-L-1010
Revision 14

London 0203 924 9888
Newcastle 0191 24 24 224
York 01904 925 888
colour-udl.com

colour

Figure B.4 UKHab Plans

HWSFAC BROADWATER LAKE

- Site Boundary
- Target Notes

Habitats

- g4 - Modified grassland
- h3h - Mixed scrub
- r1 - Standing open water and canals
- r2 - Rivers and streams
- s - Sparsely vegetated land
- u1b - Developed land; sealed surface
- u1b5 - Buildings
- u1c - Artificial unvegetated; unsealed surface
- w1f - Lowland mixed deciduous woodland

Secondary Codes:
17 - Ruderal/ephemeral

Target Notes:
1 - Oak tree
2 - Oak tree
3 - Conifer tree
4 -Silver Birch
5 - Willow tree
6 - Willow tree

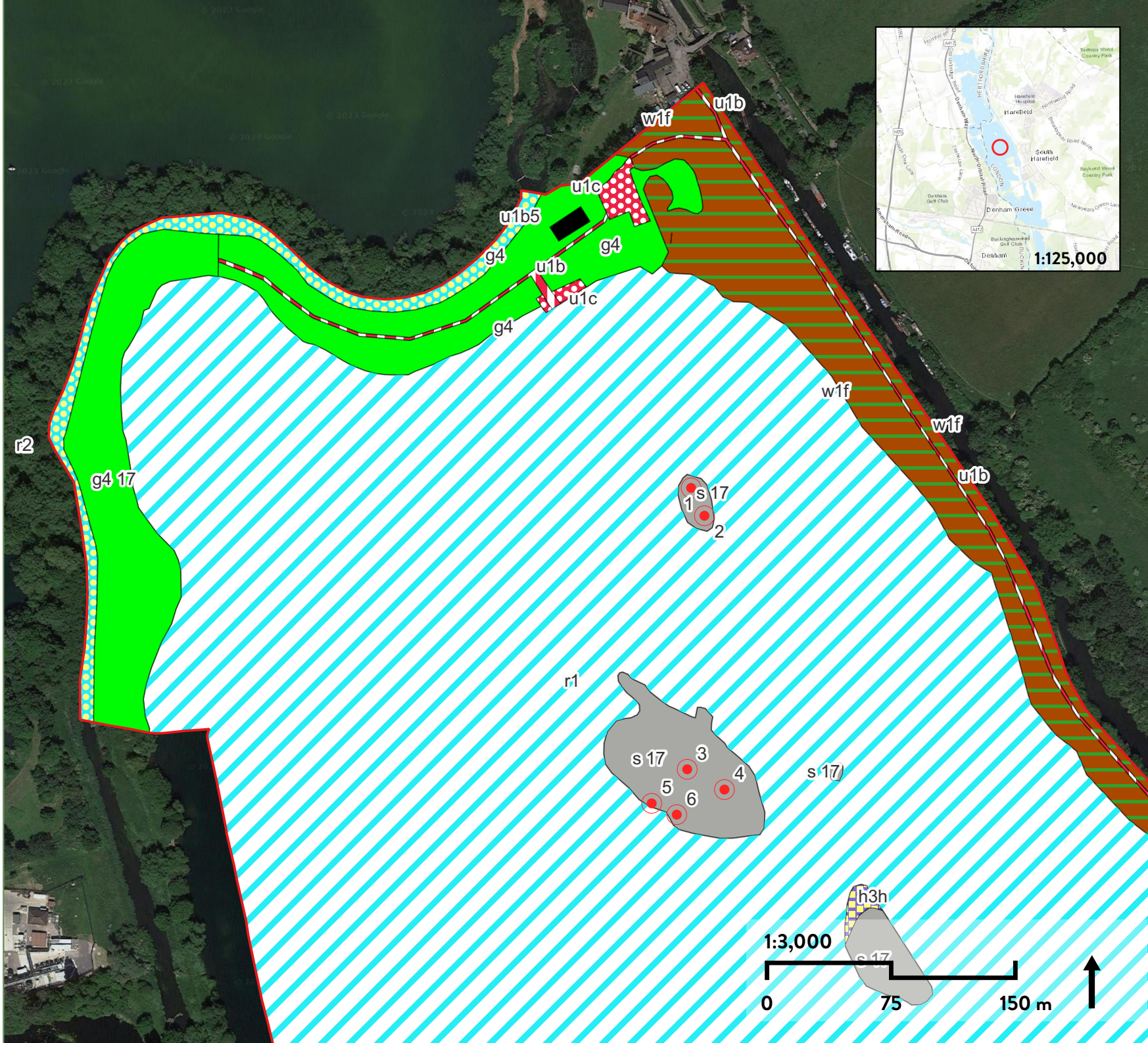
Title: Baseline Habitat Map, Map 1

Drawn by: AH
Date: 02/10/2023

Reviewed by: SH
Date: 02/10/2023

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

Greengage



HWSFAC BROADWATER LAKE

- Site Boundary
- Target Notes

Habitats

- h3h - Mixed scrub
- r1 - Standing open water and canals
- s - Sparsely vegetated land
- u - Urban
- u1b - Developed land; sealed surface
- w1d - Wet woodland
- w1f - Lowland mixed deciduous woodland

Secondary Codes:
17 - Ruderal/ephemeral
1160 - Introduced shrub

Target Notes:
3 - Conifer tree
4 - Silver Birch
5 - Willow tree
6 - Willow tree
7 - Sycamore tree
8 - Extensive Giant knotweed
9 - Cormorant island

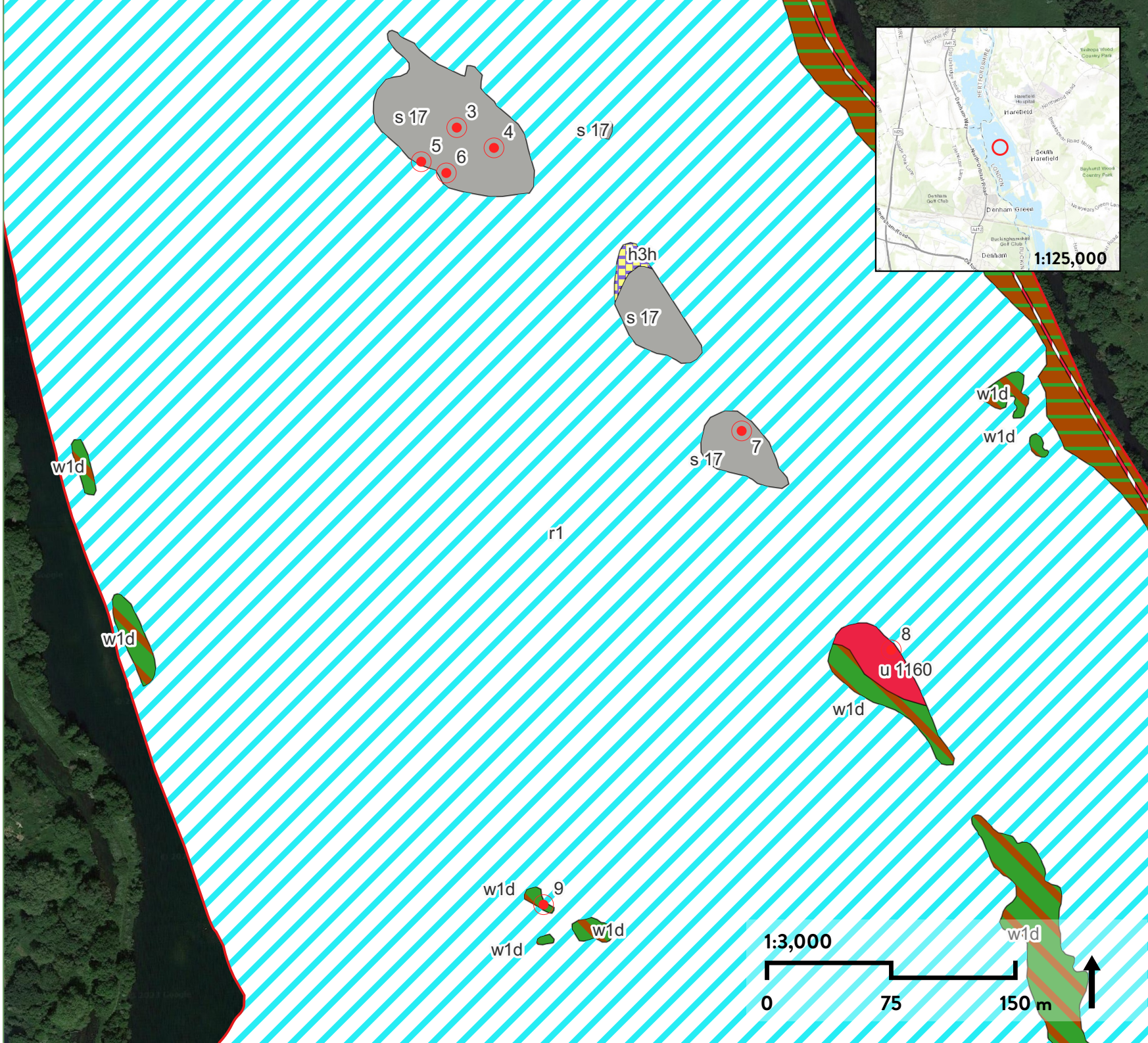
Title: Baseline Habitat Map, Map 2

Drawn by: AH
Date: 02/10/2023

Reviewed by: SH
Date: 02/10/2023

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

Greengage



HWSFAC BROADWATER LAKE

- Site Boundary
- Target Notes

Habitats

- 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

Secondary Codes:
11- Scattered trees
17 - Ruderal/ephemeral
73 - Bare ground
164 - Wet moss lawn
1160 - Introduced shrub

Target Notes:
10 - Japanese knotweed
11 - Black poplar
12 - Giant knotweed
13 - Giant knotweed

Title: Baseline Habitat Map, Map 3

Drawn by: AH
Date: 11/10/2023

Reviewed by: SH
Date: 11/10/2023

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

Greengage

HWSFAC BROADWATER LAKE

- Site Boundary
- Target Notes

Habitats

- g4 - Modified grassland
- h3h - Mixed scrub
- r1 - Standing open water and canals
- u1b - Developed land. sealed surface
- u1b5 - Buildings
- u1c - Artificial unvegetated unsealed surface
- w1f - Lowland mixed deciduous woodland
- w2c - Other coniferous woodland

Secondary Codes:
11- Scattered trees
17 - Ruderal/ephemeral
164 - Wet moss lawn

Target Notes:
12 - Giant knotweed
13 - Giant knotweed

Title: Baseline Habitat Map, Map 4

Drawn by: AH
Date: 11/10/2023

Reviewed by: SH
Date: 11/10/2023

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

Greengage

HWSFAC BROADWATER LAKE

- Site Boundary
- Target Notes

Habitats

- 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

Secondary Codes:
11 - Scattered trees
17 - Ruderal/ephemeral
164 - Wet moss lawns

Target Notes:
9 - Cormorant island
10 - Japanese knotweed
14 - Custer of trees, substrate not visible underneath; Cormorant island
15 - Tern raft
16 - Tern raft
17 - Tern raft
18 - Tern raft

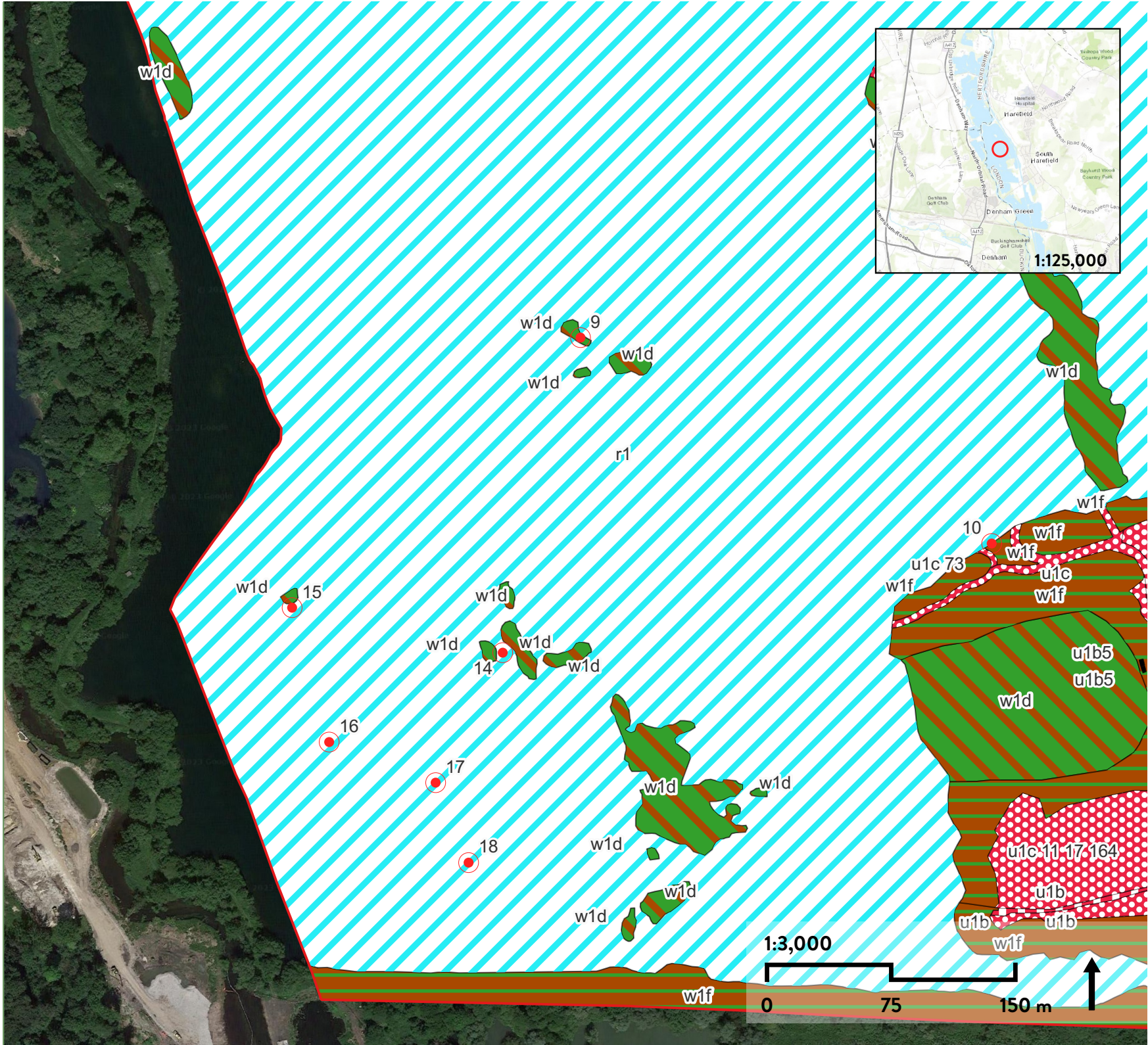
Title: Baseline Habitat Map, Map 5

Drawn by: AH
Date: 02/10/2023

Reviewed by: SH
Date: 02/10/2023

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

Greengage



APPENDIX C LAKE CONDITION ASSESSMENT

The Freshwater Biological Association 'Habitat Naturalness Assessment' is used to assess the condition of lakes. Scores for four attributes (physical, hydrological, chemical, and biological naturalness) are averaged to generate an overall 'habitat naturalness assessment score' which can then be translated into a condition score for use in the DEFRA Biodiversity Metric (see below). There are other elements considered in the lake naturalness assessment, but these are not included when calculating the condition assessment score.

Details of the methodology for assessing naturalness of lakes are available at:

http://priorityhab.wpengine.com/contribute/

The key documents are:

http://priorityhabitats.org/wp-content/uploads/Lake-Naturalness-Assessment-Guidance-3.pdf

http://priorityhabitats.org/wp-content/uploads/Lakes-print-out-naturalness-form-2.pdf

http://priorityhab.wpengine.com/wp-content/uploads/Annex-II-Physical-Naturalness-Photographs.pdf

http://priorityhab.wpengine.com/wp-content/uploads/Annex-II-Physical-Naturalness-Photographs.pdf

http://priorityhab.wpengine.com/wp-content/uploads/Annex-IV-Chemical-Naturalness.pdf

http://priorityhab.wpengine.com/wp-content/uploads/Annex-V-Plant-Functional-Group-pictures.pdf

http://priorityhabitats.org/wp-content/uploads/Annex-VI-Further-Species-Recording-1.pdf

Table C.1 Condition assessment result and associated scores.

Condition Assessment Result	Condition Assessment Score
1 Natural	Good (3)
2	Fairly good (2.5)
3	Moderate (2)
4	Fairly poor (1.5)
5 Least natural	Poor (1)

Table C.2 Broadwater Lake condition assessment

Criterion	Score 1=best 5=worst	Comment	Improvement Target
Physical naturalness	5	Least natural – steep sides, no real natural-type bank habitats just willow trees, only riparian vegetation is at the bottom of the bank in limited locations.	Target for 4 – added islands, changed topography to increase shallowness and depth, greater areas of macrophytes.
Hydrological naturalness	1	The lake is fed from springs arising from the underlying chalk aquifer and is in continuity with groundwater. During flow events, the waters of the River Colne seep through natural gravels into the lake. No other inputs are known or suspected.	No improvement possible.
Chemical naturalness	3	In summer the water is green, with sparse submerged plants in shallow areas only. Plants below 3m depth are dead in summer. Visibility was reduced in August 2023 to the top 50cm.	Target for 2 – aim to reduce nutrient concentrations within the lake and thereby reduce algal content of water to increase clarity. Achieved through higher percentage of macrophytes on floating islands, emergent beds and aquatic planting on coir mattresses. Long term water quality monitoring (temperature, DO, turbidity) to set targets for improvement and monitor progress. Studies of zoo / phytoplankton, manipulation of biofauna over 10+ years. Other measures that may generate improvements are pumps for water circulation of isolated areas, and solar pumps / bubblers for increased dissolved oxygen (DO) during hot summers.
Biological naturalness	2	Scores 1 for plants as only non-native is Elodea. Plants found were Lemna minor, a Potemageton sp, and filamentous	No target set. Eradication of non-natives would be unlikely to be achieved, and an improvement relative to the current score may be

Criterion	Score 1=best 5=worst	Comment	Improvement Target
		algae. These are typical of lower status sites and associated with elevated nutrient concentrations. Scores 2 for non-native fauna, as there are signal crayfish and carp, but they don't appear to cause obvious detrimental signs of impacts to water quality.	impossible. Further surveys and monitoring would be required to reassess the potential for improvements to be made.
Total	12		10
Average	3	**3 = Moderate Condition**	**2.25 = Fairly Good**

REFERENCES

[1] National Planning Policy Framework - Guidance - GOV.UK (www.gov.uk)
[2] Drewitt, A.L., Whitehead, S. and Cohen, S. 2023. Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17 Birds (version 1.2). Joint Nature Conservation Committee, Peterborough.
[3] SSSI details and current condition status: SSSI detail (naturalengland.org.uk)
[4] GOV.UK. (2021). Environment Act 2021. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted
[5] HM Government, (1981); Part I and Part II of Wildlife and Countryside Act (as amended). HMSO
[6] HM Government, (2017); The Conservation of Habitats and Species Regulations 2017. Statutory Instrument 2017 no. 490 Wildlife Countryside. OPSI
[7] HM Government, (2000); The Countryside and Rights of Way Act. HMSO
[8] HM Government, (2006); Natural Environment and Rural Communities Act 2006. HMSO
[9] CEC (Council of the European Communities), (1979); Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 19.IX.1979). EC
[10] UK Biodiversity Action Plan (2007). UKBAP Priority Species and Habitats. http://www.ukbap.org.uk/newprioritylist.aspx
[11] JNCC and Defra (on behalf of the Four Countries' Biodiversity Group) (2012). UK Post-2010 Biodiversity Framework. July 2012. Available from: http://jncc.defra.gov.uk/page-6189
[12] Defra (2011). Biodiversity 2020: A strategy for England's wildlife and ecosystem services
[13] Convention on Biological Diversity (CBD) (2010). Decision X/2 Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets. Available at https://www.cbd.int/decision/cop/?id=12268
[14] European Commission (2012). Our life insurance, our natural capital: an EU biodiversity strategy to 2020. European Parliament resolution of 20 April 2012 (2011/2307(INI)).
[15] GOV.UK. (2021). National Planning Policy Framework. [online] Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2
[16] Greater London Authority (2021) The London Plan: The Spatial Development Strategy for Greater London (GLA)
[17] Greater London Authority (2018). London Environment Strategy 2018. London: Greater London Authority.