Appendix 7.1

2023 RELEVANT SURVEY RESULTS

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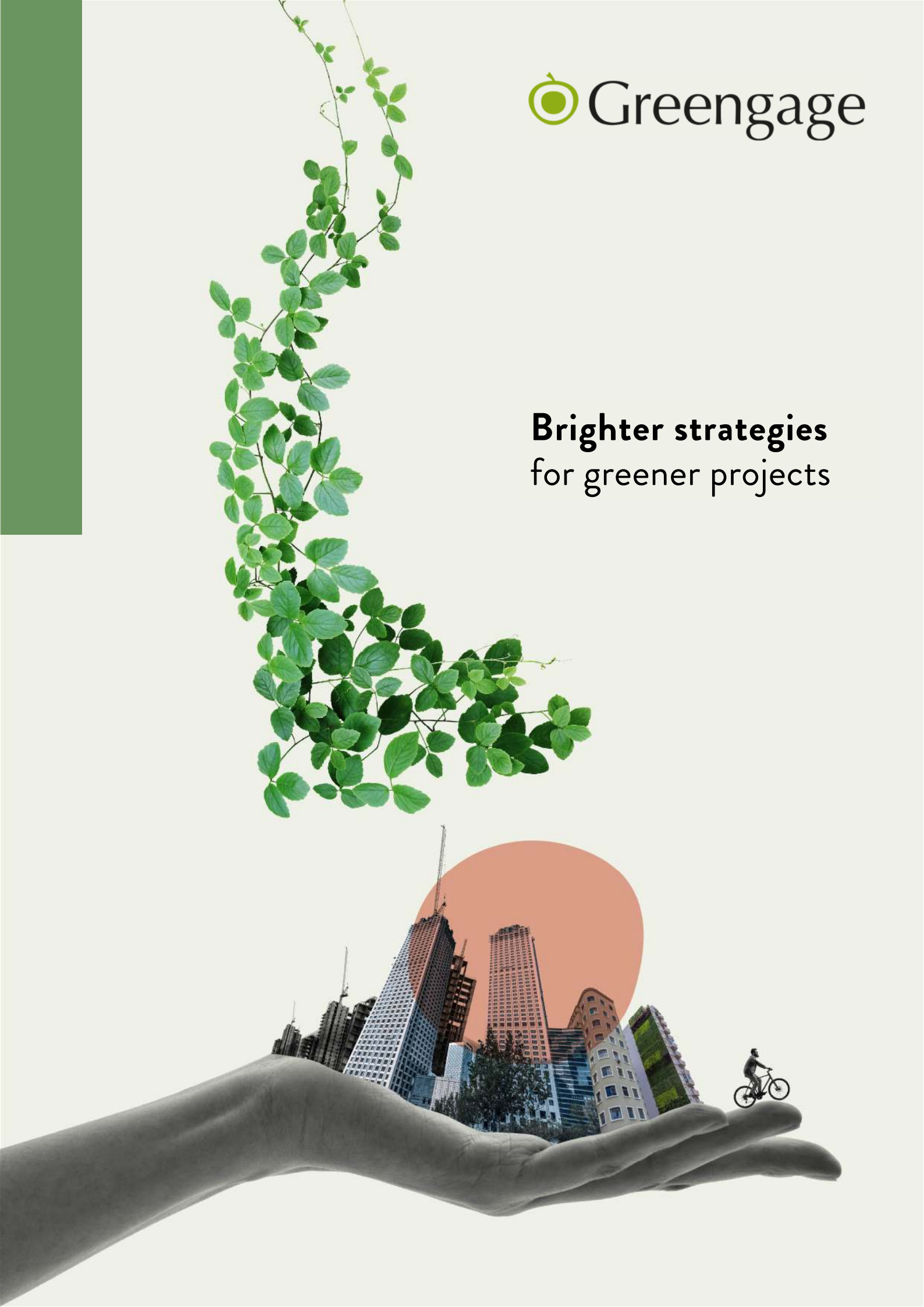

Client: London Borough of Hillingdon

Project: Proposed Hillingdon Water Sports Facility and Activity Centre, Broadwater Lake

Report: Preliminary Ecological Appraisal

QUALITY ASSURANCE

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1.0 EXECUTIVE SUMMARY

Greengage Environmental Ltd was commissioned to undertake a Preliminary Ecological Appraisal (PEA) by London Borough of Hillingdon of a Site known as the proposed Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon. The Site is located at Broadwater Lake, Moorhall Road, Hillingdon. The Site comprises an access road from Moorhall Road, the lake itself with an associated lagoon (south-east corner of the lake), a peninsula at the south-east corner, an existing sailing club at the north end of the lake, parts of the margins of the lake, and islands set within the lake. There are also two discrete land parcels that fall within the same ownership; a hawthorn woodland to the east, and a grassland field to the south.

This PEA has been produced to support a planning submission for the Site which seeks to develop the HWSFAC on the peninsula, with eventual demolition of the current Broadwater Lake Sailing Club facilities at the north end. At the time of the report, detailed proposals for the development had not been finalised and will be developed in consultation with key stakeholders.

This assessment aimed to establish the ecological value of the Site and the potential presence of legally protected species in order to inform appropriate mitigation, compensation and enhancement actions in light of proposed development works.

This PEA follows on from a PEA undertaken by CGO Ecology in August 2021, and incorporates the results of a suite of protected species surveys undertaken in 2021 and 2022 that were recommended within the 2021 PEA. The findings of these surveys, in particular the suite of protected species surveys, have been taken into consideration when making recommendations for further work and mitigation.

The survey area extends to 76 ha and comprises areas of standing open water, broadleaved woodland, wet woodland, tree lines, invasive non-native buddleia scrub, dense scrub, modified grassland, gravel hardstanding, concrete, and buildings. The dominant habitat across the Site was standing open water in the form of Broadwater Lake (60.05 ha). A change from the 2021 PEA is that areas of buddleia scrub developed on hardstanding have been split out from woodland. The buddleia scrub is to be cleared from the Site during February 2023 as an invasive species in London.

The Site itself is designated as a Site of Special Scientific Interest (SSSI) (of national importance) and it is also designated as a Site of Importance for Nature Conservation (SINC) (of Metropolitan importance); it forms part of the Mid-Colne Valley SSSI and SINC. There is also one internationally designated Site, Burnham Beeches Special Area of Conservation (SAC) within 10km. There are a further five statutory designated sites and 16 non-statutory designated sites within 2km of the Site.

Protected species surveys completed in 2021 and 2022 have confirmed the following species to be likely absent from the Site:

- Great Crested Newts (Triturus cristatus);
- Dormouse (Muscardinus avellanarius); and
- Water Vole (Arvicola amphibius).

Data gathered from the desktop study, previous survey work completed on Site and a number of update habitat surveys during autumn and winter 2022 have confirmed that the Site supports or has the potential to support:

- Notable habitats including woodland, standing water bodies, rivers and streams;
- Occasional presence of foraging badger (Meles meles), however with low / no potential for setts;
- Known presence of foraging and commuting bat species (9 species and moderate activity levels);
- Low to moderate potential to support roosting bats in trees and structures across the Site;
- Woodland breeding birds - 18 species breeding of which dunnock and song thrush are Amber-listed, and Cetti's warbler (a Schedule 1 species);
- Wintering birds (lake) with nationally important numbers of pochard (a Red List species) and shoveler (Amber List);
- Breeding birds (lake) - 6 species confirmed breeding including pochard (Red List) and mallard (Amber List);
- Individual grass snakes may occur transiently at the Site however no populations of reptiles were identified;
- Presence of feeding otter (Lutra lutra) with no holts identified;
- Low populations of five species of fish; anecdotal evidence of potential presence of European eel although none identified to date;
- Very minimal presence and very low biodiversity of macrophytes and emergent vegetation;
- Presence of diverse moderate populations of aquatic invertebrates, none scarce / notable;
- Presence of notable terrestrial invertebrates within small individual areas at the peninsula; low potential for stag beetle in woodland habitat at the Site away from the peninsula, and negligible potential at the peninsula.
- Presence of black poplar (notable plant species) in one location along the canal;
- Low potential at the peninsula and high potential elsewhere for hedgehog (Erinaceus europaeus) (a UK BAP species);
- Presence of Schedule 9 invasive non-native species including Japanese knotweed, giant knotweed and signal crayfish. Floating pennywort is present on the River Colne adjacent; and
- Buddleia, classified as invasive within Greater London, is present in dense stands across the peninsula.

Clearance of invasive buddleia is being undertaken at the Site during February 2023; once completed, an update habitat survey will be undertaken to verify the extent of hardstanding.

Further surveys have been recommended and would be undertaken in spring / summer 2023 as follows:

- Within 20m of proposed development, assessment of the potential for roosting bats in trees (surveys already completed for buildings / structures), and emergence and re-entry surveys of suitable features to discover any roosts present in trees and structures;
- Breeding waterbird survey to cover the remainder of the lake and islands, plus further survey of areas around the peninsula;
- Checks for badger setts, otter holts and water vole at the peninsula once buddleia has been cleared; these are considered likely absent. A further check for otter and badger will be made within 3 months of construction commencing if further potential is identified;
- Survey for aquatic and emergent vegetation during the active growing season; and
- Invasive plant survey once buddleia has been cleared and during the growing season.

The need for water-based survey for otter holts and water vole around the perimeter of the lake away from proposed areas of direct impacts would need to be established in discussion with key stakeholders including Natural England.

In accordance with the National Planning Policy Framework (summarised in Appendix C) development proposals should be refused unless significant harm to biodiversity can be avoided or adequately mitigated for. Within a SSSI, development 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.

The overarching goal of the proposed development is to deliver public benefits associated with the HSWFAC 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.

Suggested principles by which this goal would be achieved are set out in Section 6. Engagement with stakeholders would be undertaken to agree the principles and to develop the related objectives. Measurable goals for each objective would be formulated and a monitoring regime designed. Detailed method statements with management prescriptions would then be produced in due course. The information would be presented within a Mitigation Enhancement and Management Plan (MEMP) which would cover a period of 30 years initially, to secure the biodiversity gains.

2.0 INTRODUCTION

Greengage Environmental Ltd was commissioned to undertake a Preliminary Ecological Appraisal (PEA) by London Borough of Hillingdon of a Site known as the proposed Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon. The Site is located at Broadwater Lake, Moorhall Road, Hillingdon.

This PEA has been produced to support a planning submission for the Site which seeks to develop the HWSFAC on the peninsula, with eventual demolition of the current Broadwater Lake Sailing Club facilities at the north end. At the time of the report, detailed proposals for the proposed development had not been finalised.

This assessment aimed to establish the ecological value of the Site and the potential presence of legally protected species in order to inform appropriate mitigation, compensation and enhancement actions in light of proposed development works.

2.1 SITE DESCRIPTION

The assessment area ('the Site') covers an area of approximately 76 hectares (ha) and is approximately centred on National Grid Reference TQ 04396 89593, OS Co-ordinates 504396 , 189593.

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

The Site comprises an access road from Moorhall Road, the lake itself with an associated lagoon (south-east corner of the lake), a peninsula at the south-east corner, an existing sailing club (Broadwater Sailing Club) at the north end of the lake, parts of the margins of the lake, and islands set within the lake. There are also two discrete land parcels that fall within the same ownership; a hawthorn woodland to the east, and a grassland field to the south. The areas of these component parts are set out in Table 2.1 and shown in Appendix A Site Location and Component Areas.

Table 2.1 Component parts of the Site and their areas

Areas in ha of the Site and of its component parts	Approximate Area ha
Main Site - Lake, peninsula, sailing club, access road and lake margins	79.95
Peninsula only	6.38
Lake (water coverage - including lagoon to south-east corner)	58.81
Lagoon only (south-east corner)	1.31
Existing Islands	2.06
Broadwater Sailing club and its gravel parking area and small field adjacent	1.27
North-western grassland area	1.12

Areas in ha of the Site and of its component parts	Approximate Area ha
North river area	0.44
Eastern woodland and access road	3.93
Southern woodland	1.20
Offsite - field to south on Moorhall Road	1.27
Offsite - woodland to east	0.75
Offsite- remaining hardstanding areas	1.44

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

The habitats immediately surrounding the Site primarily comprise the River Colne to the west and north, a large residence / club with gardens to the north, the Grand Union Canal to the east, and woodland, scrub and a mineral processing site to the south. Within the wider area, urban development in the form of South Harefield exists to the east, with further lakes, woodland and open grassland being present to the north, south and west.

2.2 CURRENT SITE USES

Broadwater Sailing Club (BSC) currently operates from a club house and facilities located at the northern end of the lake and accommodates approximately 180 family members. BSC hold sailing regattas on Sundays throughout the year, and an additional six are held on various Saturdays. BSC also use the lake for Wednesday morning and evening events May to August and on *ad hoc* days, one hour after dawn and one hour before dusk, throughout the year.

The Rowing Club uses the lake on *ad hoc* mornings and evenings up to twice a week throughout the year.

The lake is also used for angling by the Gerrards Cross & Uxbridge District Angling Society and British Carp Study Group.

The Site is regularly frequented by individual bird watchers who use the access road and access paths around the Site and through the Wildlife Trust land and sailing club area. Bird ringers undertake biennial surveys at the peninsula (noted onsite February 2023), and bird surveys for the Colne Valley also occur periodically (last published survey 2008; noted onsite November 2022).

The BSC undertake annual habitat management on some of the islands in the lake to clear scrub and trees, to create better ground nesting habitat for waterbirds.

Unauthorised Site uses include occasional poaching of fish, hunting of wildfowl, swimming, camping / rough sleeping, forestry activities, fly tipping, burning of rubbish, etc.

Offsite, the west of Broadwater Lake is managed by Herts and Middlesex Wildlife Trust. This area is currently under the legal possession of HS2 Ltd for construction of the high speed railway line; it will be returned to the Wildlife Trust once construction works are completed.

2.3 PROPOSED DEVELOPMENT

The proposed development strategy for the Site has evolved over the last 18 months as technical and environmental information has become available. The proposals are not yet fixed and will continue to evolve as required, to ensure impacts from the Scheme are either avoided or minimised as far as possible.

Currently, the components of the proposed development include:

- At the peninsula, new buildings will be developed to provide an outdoor centre with workshop for a water sports centre including sailing, rowing and other water sports facilities. Temporary accommodation for seasonal staff will also be provided.
- Land will be reclaimed adjoining the north end of the peninsula to create space for the proposed development, to minimise loss of woodland (a priority habitat).
- The Broadwater Sailing Club will be relocated from the northern part of the lake to the new development. The building, roads and paths in this area will be demolished/removed and concrete crushed and utilised elsewhere onsite for construction.
- Localised dredging of the lake will be required to increase the lake depth in order to facilitate sailing from the launch locations.
- Some of the existing islands within the north of the lake may be removed to facilitate sailing and the materials used to create new more strategically placed islands, and / or to reclaim land to the north of the peninsula.
- Sailing activities as a result of the Broadwater Lake Sailing Club are predicted to continue at their current levels (active all year - regattas on Sundays and some Saturdays, and Open Series Events on Wednesday mornings and afternoons).
- Waterside activities will occur at increased levels during the summer months (01 April to 31 September, Monday to Friday) as a result of the operation of HWSFAC, which provides outdoor educational activities for children and young adults in the borough. Daily waterside activities will include sailing, kayaking, paddleboarding, rafting and canoeing. Sailing will typically comprise 50 boats with 2-3 people per boat, plus at least two safety boats. During the remainder of the year, it is anticipated that per day, individual private members may utilise the facilities, typically for boat repair.
- A rowing club will likely operate from the Site Wednesday mornings potentially all year round. Their activities are likely to comprise 2 boats and 16 people (plus) safety boat and coach. Subject to agreement there may also be activities in the morning and evening on other days.

- Landside activities will be focused to the south of the peninsula, including an open activity area, with high ropes, low ropes, above ground caving, camping, team building exercise areas, archery, pedal carting, zip wire and other woodland based activities. This area will be used from April to September on weekdays only and would be used by a total of up to 100 students per day (in small groups). A total of 7No. open sided, steel framed, covered Activity Shelters will be constructed to support the landside activities.
- Landscaping and ecological enhancement will be implemented across the Site with particular focus on the area to the north of the lake which will be released as part of the relocation of the existing Broadwater Sailing Club.
- New islands will be created in the south-west of the lake, providing visual screening and replacement roosting habitat for both water- and land-dwelling bird species.
- Up to 150 vehicle parking spaces will be provided across the peninsula. Coach parking will be located at the southern extent of the peninsula to minimise large vehicle movements through the Site.
- The proposed development will be accessed from Moorgate Road in the south of the Site. The existing access road will be subject to improvements so that it is brought up to adoptable standards and used by emergency vehicles, refuse trucks, coaches and disabled users as well as cars, cycles and other vehicles. Fencing will be improved for safety and security reasons. On the peninsula, the new access road will be two-way with a parallel pedestrian footpath from the entrance car park to the primary facilities.
- A canal bridge will be upgraded to support the power supply cables for the proposed development, utilising offsite adjacent hardstanding for the access and works compound. It is understood no trees will be required to be felled, and with only minor vegetation clearance.
- If required, two nearby land parcels (a grassland field and a small parcel of hawthorn woodland) separate to the main Site in the same ownership may be enhanced as part of the biodiversity strategy for the Site.

2.4 PREVIOUS PRELIMINARY ECOLOGICAL APPRAISAL

A PEA was undertaken by CGO Ecology Ltd in July 2021 and reported in August 2021 (hereby referred to as 'the 2021 PEA'). The area assessed comprised only the peninsula at the south-east corner of the current red line boundary, and the parallel section of access road (See Appendix A Component Areas for the referenced locations). The 2021 PEA is provided in Appendix B.

The 2021 PEA was undertaken using the JNCC Phase 1 habitat classifications. The key findings and recommendations of this report included:

- The Site lies within the Mid Colne Valley SSSI.
- There were nine other designated Sites (statutory and non-statutory) within 2km of the Site.

- The Site was reported to be dominated by standing water and semi-natural broadleaved woodland with smaller areas of wet woodland, introduced shrub, buildings, hardstanding and amenity grassland. Occurrences of native black poplar (Populus nigra betulifolia) were noted on Site. Invasive plant species, Japanese knotweed and giant knotweed (Fallopia sachalinensis) were also recorded on Site.
- The Site was assessed as having the potential to support:
    - Foraging, commuting and roosting bats;
    - Otter and water vole;
    - Hedgehog;
    - Breeding and overwintering birds;
    - Amphibians, including great crested newts;
    - Reptiles;
    - Fish; and
    - Invertebrates (aquatic and terrestrial).

Recommendations for a suite of further species-specific surveys for the above-mentioned species were made. Opportunities for reduction of impacts from a development were outlined, and recommendations for high level mitigation measures and enhancement were also made.

Based on the recommendations of the 2021 PEA, a number of further protected species and habitat surveys ('phase 2 surveys') were subsequently commissioned during 2021 and 2022. The results of these phase 2 surveys are reported in Section 4. The full reports are provided in Appendix B.

3.0 METHODOLOGY

The PEA was undertaken in accordance with guidance in the UK Habitat Classification System (UKHab)[1] and the Chartered Institute of Ecological and Environmental Management (CIEEM) (2017) Guidelines for Preliminary Ecological Appraisal[2], in accordance with BS42020:2013: Biodiversity[3]. The assessment consisted of:

- Desktop review - a review of Site-specific biological information gained from statutory and non-statutory consultation; and
- A Site survey comprising a protected species scoping assessment and UKHab survey.

In addition, this PEA has been adapted to include review of the 2021 PEA and a number of third-party phase 2 survey reports, the results of which have been incorporated into the findings of this report.

3.1 DESKTOP REVIEW

A review of readily available ecological information and other relevant environmental databases (included Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) Website[4]) was undertaken for the Site and its vicinity. In addition, biological records searches from Greenspace Information for Greater London (GiGL), Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) and also Hertfordshire Environmental Record Centre (HERC) were reviewed to identify the location and citations of local non-statutory designated Sites and presence of records for notable and protected species. This provided the overall ecological context for the Site.

3.2 ON SITE SURVEYS

Habitats

The original 2021 PEA scope was confined to the peninsula and parallel access road (see Appendix B for the full report with habitat map). This PEA verified the assessment at the peninsula and extended it to cover the remainder of the Site (lake margins, sailing club, access road, offsite land parcels).

Greengage attended Site on the 18th November 2022 to undertake a complete Site walkover (encompassing all areas of the Site). Additional visits were completed on 20th December 2022 and 16th January 2023 in order to assess buildings for bat roost potential and examine the underlying ground conditions.

The extent and distribution of different habitats on Site were identified and mapped according to the standard UKHab methodologies, supplemented with target notes describing the dominant botanical species and any features of interest. Any present protected plant species and invasive/non-natives were also noted. A habitat map has been produced to illustrate the results, as shown in Maps 1 - 5 (Appendix A).

The results of the habitat surveys for this PEA and the 2021 PEA have both been incorporated into this report.

Species

This PEA and the 2021 PEA have both included specific assessments to identify the potential value for notable, rare and protected species at Site. This involved identifying potential habitat in terms of refugia, breeding Sites and foraging areas in the context of species known to be present locally and regionally.

For each species, the likelihood of occurrence is ranked as follows:

- Negligible - While presence cannot be absolutely discounted, the Site includes very limited or poor-quality habitat for a particular species. The Site may also be outside the known national range for a species;
- Low - On-Site habitat is poor to moderate quality for a given species, with few or no information about their presence from desk top study. However, presence cannot be discounted due to the national distribution of the species or the nature of on-Site and surrounding habitats;
- Moderate - The on-Site habitats are of moderate quality, providing most or all of the key requirements for a species. Several factors may limit the likelihood of occurrence, habitat severance, habitat disturbance and small habitat area;
- High - On-Site habitat of high quality for given species. Site is within a regional or national stronghold for that particular species with good quality surroundings and good connectivity; and
- Present - Presence confirmed for the survey itself or recent, confirmed records from information gathered through desk top study.

Surveys as detailed below were included for the following species:

Badger (*Meles meles*)

The potential for badger to inhabit or forage within the study area was assessed. Evidence of badger activity includes the identification of setts (a system of underground tunnels and nesting chambers), grubbed up grassland (caused by the animals digging for earthworms, slugs, beetles etc.), badger hairs, paths, latrines and paw prints.

Bat Species (*Chiroptera*)

The Site visit was undertaken in daylight and the evaluation of bat potential comprised an assessment of habitats and buildings to identify features suitable for bat roosts, foraging and commuting. Individual trees were not assessed due to the scale of the Site, presence of dense scrub and absence of detailed development plans at the time of survey.

Great Crested Newt (*Triturus cristatus*)

An assessment was carried out to identify any potential habitats that may support great crested newt (GCN) and other native amphibians on the Site and in the immediate surrounds where accessible. The aquatic and terrestrial habitats required generally include small, still ponds or water bodies suitable for breeding; and woodland or grassland areas where there is optimal invertebrate prey potential.

Reptiles

The potential for reptile species on Site was assessed during the walkover survey. Possible species include grass snake (*Natrix natrix*), smooth snake (*Coronella austriaca*), adder (*Vipera berus*), common and sand lizard (*Lacerta vivipara* and *L. agilis*) and slow worm (*Anguis fragilis*). These native reptile species generally require open areas with low, mixed-height vegetation, such as heathland, rough grassland, and open scrub or, in the case of grass snake, waterbody margins. Suitable well drained and frost-free areas are needed so they can survive the winter.

Dormouse (*Muscardinus avellanarius*)

During the walkover survey the potential for dormouse to be present on Site was assessed. This included observations for suitable habitat such as well-layered woodland, scrub and linking hedgerows, particularly those comprised of species offering suitable food sources such as honeysuckle and hazel, in addition to direct evidence such as characteristically gnawed hazelnuts, chewed ash keys and honeysuckle flowers, or nests.

Water Vole (*Arvicola terrestris*)

Water vole potential was assessed during the walkover survey. The potential is identified by the presence of ditches, rivers, dykes and lakes with holes and runs along the banks. Latrines, footprints or piles of food can also be noted.

Otter (*Lutra lutra*)

Where desktop review or consultation indicates the presence of otter in a river catchment, the presence of water bodies with good cover and potential holt (den) sites would be noted. Spraint, footprints or food remains can also be noted. Surveys typically encompass the Site and adjacent suitable watercourses where accessible.

Birds

During the walkover survey, the potential for breeding, wintering and migratory birds was assessed. In particular, this includes areas of trees, scrub, heathland and wetlands that could support nests for common or notable species.

Invertebrates

As part of the walkover survey the quality of invertebrate habitat and the potential for notable terrestrial and aquatic invertebrate species was considered. In general, there is a wide variety of habitats suitable for invertebrates including wetland areas, heathland, areas of bare sandy soil, ephemeral brownfield vegetation and meadows.

Biodiversity Action Plan priority species/ Species of Principal Importance

Where consultation and desk-study indicates the presence of BAP priority species (Species of Principal Importance) not protected by statute, effort was made to establish the potential for the Site to support these species.

3.3 REVIEW OF PHASE 2 SURVEYS

As a result of the 2021 PEA, a number of protected species surveys were commissioned during 2021 and 2022 focussed on the peninsula, parallel access road and adjacent canal.

The results have been detailed in a series of reports as per Table 2.1 below.

Table 2.1 Surveys undertaken to date and associated reports.

Survey Type	Reports
Badger	November 2022 by Ecology By Design - Further Survey Report
Bat Activity	November 2022 by Ecology By Design - Further Survey Report
Breeding birds - woodland (peninsula)	August 2022 by Greengage - Breeding Bird Survey
Breeding birds - lake (around peninsula)	August 2022 by Greengage - Breeding Bird Survey
Waterbirds - overwintering	Ongoing Winter 2022/23 by Greengage - due for completion March 2023
Great Crested Newt	June 2022 by RSK Biocensus - eDNA Survey
Reptiles	November 2022 by Ecology By Design - Further Survey Report
Dormouse	November 2022 by Ecology By Design - Further Survey Report
Water Vole	November 2022 by Ecology By Design - Further Survey Report
Otter	November 2022 by Ecology By Design - Further Survey Report
Fish	January 2023 by Five Rivers Environmental Contracting Ltd - Broadwater Aquatic Assessment Report
Aquatic invertebrates	January 2023 by Five Rivers Environmental Contracting Ltd - Broadwater Aquatic Assessment Report
Terrestrial Invertebrates	May 2022 by Ecology By Design - Scoping Report September 2022 by Dr Ross Piper - Terrestrial Invertebrate Survey Report

The full reports are provided in Appendix B.

The reports have been reviewed and results incorporated into the Results section of this report (Section 4.3). Only a very brief summary of the results has been presented; for the full text and results, readers are referred to the individual reports.

For further clarification on the geographical extent of this PEA, the 2021 PEA and the phase 2 surveys, please refer to Table 4.3 in Section 4 (Results).

3.4 SURVEYORS

Dr Stephanie Harper has an undergraduate degree (BSc Hons) and a PhD in Environmental Sciences, along with a Natural England Level 1 Class Licence for bats. Stephanie has over 15 years' experience in ecological surveying and assessment.

Mike Harris has a Bachelor's degree in Environmental Biology (BSc Hons), and hold Natural England Protected Species licences for Great Crested Newt and Dormouse; he is a Chartered Environmentalist (CEnv) and Full member of CIEEM. Mike has over 18 years' experience in ecological surveying.

Dr Stephanie Harper undertook the PEA surveys and wrote this report. Mike Harris has reviewed and verified the report. These individuals hereby confirm in writing (see the QA sheet at the front of this report) that the report is in line with the following:

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

3.5 CONSTRAINTS

The 2021 PEA was undertaken by CGO Ecology Ltd at the peninsula, parallel access road and adjacent canal in the optimal period. This survey was updated subsequently by Greengage in 2022-3, with a number of additional visits undertaken during November - January 2023 to cover the entire Site.

Constraints noted in the 2021 PEA were still apparent; namely that dense buddleia scrub prevented access to some areas of the peninsula. This is due for clearance in February 2023 upon which a survey of inaccessible areas will be made (see Section 5 for further recommended surveys).

During the walkover of the entire Site, large areas of the lake margins and banks were inaccessible for detailed inspection due to dense vegetation including scrub and overhanging trees, and steep slopes also made such an inspection unsafe from the bankside. However some shoreline areas could be observed by eye and with binoculars from fishing and viewing platforms placed strategically around the lake. This vantage was not sufficient however to identify or map areas of macrophytic or emergent vegetation within the lake, or identify holts or water vole borrows.

A full botanical survey has not been undertaken in 2022 as the habitat surveys were outside of the optimal time of year. However the surveys were able to verify the results of the 2021 PEA, and it was considered possible to identify the broad terrestrial habitats and make an assessment of presence / potential presence of protected species across the wider Site. No changes to the Site have occurred in the intervening time. The timing of the surveys was also suitable to establish the underlying ground conditions due to the dying back of vegetation.

4.0 RESULTS

4.1 DESKTOP REVIEW

Onsite - Mid-Colne Valley SSSI

There is a Nationally important statutory designation encompassing the Site itself. The Site forms part of the Mid Colne Valley Site of Special Scientific Interest (SSSI) which is a SSSI comprised of multiple individual nature conservation sites. The total area of the SSSI is 147.73 ha of which 72.03 ha is outside of the Site red line boundary.

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

The designation for the Mid-Colne Valley SSSI 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.

Onsite - Mid-Colne Valley SINC (Metropolitan)

London's equivalent of Local wildlife sites, Sites of Importance for Nature Conservation (SINCs) are recognised for the important habitats they support. This is a non-statutory designation, although SINCs are still afforded a high level of protection within the planning system.

In London, SINCs are designated as one of a hierarchy of types:

- Sites of Metropolitan Importance are selected on a London-wide basis.
- Sites of Borough Importance (Grade I and II, with Grade I being of higher importance) are selected from candidates within each borough, so ensuring that borough has some sites identified.
- Sites of Local Importance are the lowest tier of sites, selected to redress any remaining local deficiencies.

The Site itself, as well as the adjacent lakes and active mineral works to the south of the Site are covered by a section / parcel of the Mid-Colne Valley SINC. This is a multi-site designation, formed of several parcels and which is of Metropolitan importance.

The Site and the extent of the SINC designation is shown in Appendix A Mid-Colne Valley SSSI and SINC. Frays Farm Meadows and Denham Lock Wood are both SSSIs and are components of the Mid-Colne Valley SINC however it should be noted these are greater than 2km from the Site.

The full designation is provided below although the Site is only mentioned indirectly:

This section of the Colne Valley includes a diverse range of high-quality habitats. Several waterways include the Frays River, from which 53 species of aquatic and wetland plants have been recorded. The unimproved wet pastures of Frays Farm Meadows (a Site of Special Scientific Interest and Local Nature Reserve managed by the London Wildlife Trust and Hillingdon Natural History Society) support a very rich flora, including locally uncommon species such as marsh-marigold (Caltha palustris) and ragged-robin (Lychnis flos-cuculi). The invertebrate fauna includes the locally declining glow-worm (Lampyris noctiluca). The meadows support wintering waders such as snipe, as well as a population of harvest mice. The adjacent Denham Lock Wood (also Site of Special Scientific Interest) is one of few wet alder-willow woods in London, and supports a rich fen flora including the very localised small teasel (Dipsacus pilosus). Invertebrates here include the nationally

rare species Desmoulin's whorl snail (Vertigo moulinsiana) and the balsam carpet moth. The extensive flooded gravel pits are very important for breeding and wintering waterfowl, and also for passage migrants. Several of the gravel pits are part of a third Site of Special Scientific Interest. The Site is important for its population of the specially-protected water vole and there are also recent reports of otters in the vicinity.

Offsite Statutory Designations

The following figures show the location of statutory designations relative to the Site, and are included in Appendix A:

- NNRs within 10km;
- NNRs within 2km;
- SSSIs within 10km;
- SSSIs within 2km; and
- LNRs within 2km.

The closest international statutory designated Site, Burnham Beeches Special Area of Conservation (SAC) and National Nature Reserve (NNR), lies 8.9km away. The Site does not fall within the 5.6km buffer zone around the SAC whereby impacts from development are required to be considered.

Within 2km there are four sites with SSSI statutory designation (of which one is also an NNR), and four Local Nature Reserves (LNR). These sites are of national and regional / borough importance respectively. Table 4.1 below gives the locations and descriptions of these sites.

Table 4.1 Statutory Designated Sites within Search Radius

Site Name	Approximate Location	Description
Harefield Pit SSSI	214m NE	Designated for its geological interest only.
Old Park Wood SSSI	874m N	Ancient woodland, "some of the most floristically rich ancient woods in Greater London". Has a good variety of birds particularly in winter (bats not mentioned).
Ruislip Woods SSSI and National Nature Reserve (NNR)	1445m E	Designated for its ancient semi-natural woodland, invertebrates, and includes mention of its diverse range of breeding birds characteristic of woodland habitat and being particularly suitable for less common breeding species such as woodcock and hawfinch (bats not mentioned).
Old Rectory Meadows SSSI	1690m SW	Grassland of botanical interest. "Base-rich and poor marsh, wet alluvial meadows and water meadows with grazed wet and damp meadows, as well as alder carr woodland" on calcareous gley soils.

Site Name	Approximate Location	Description
Denham Lock Wood SSSI	2090m S	Part of the Mid-Colne Valley SSSI designation: wet alder-willow woods supporting a rich fen flora including the very localised small teasel (Dipsacus pilosus). Invertebrates here include the nationally rare species Desmoulin's whorl snail (Vertigo moulinsiana) and the balsam carpet moth.
Northmoor Hill Wood Local Nature Reserve (LNR)	282m W	Ancient woodland (birds and bats not mentioned in the designation).
Denham Country Park LNR	939m S	River, wetland, meadow and woodland habitats (birds and bats not mentioned)
Denham Quarry Park LNR	945m S	Wet meadows (bats and birds not mentioned)
Frays Valley LNR	1.25km south	**71.84ha m**ulti-parcel designation **incorporating two SSSI: Frays Farm Meadows and Denham Lock Woods (see individual citation above). Wetland and grassland habitats, ancient woodland indicator plants, wildfowl (birds).**

Within 10km there are several additional SSSI sites however only four have mention of wintering or woodland birds, or bats, mentioned in their designation (birds and bats are highly mobile species that therefore may be using the Site or vice versa). These are:

- Sarratt Bottom SSSI - alluvial meadow designated for damp species rich neutral grassland, that supports a variety of wetland birds and wide range of invertebrates;
- Hodgemoor Wood SSSI – ancient and semi-natural broadleaf woodland supporting many woodland bird species;
- Whippendell Wood SSSI – ancient woodland with mention of a diverse woodland bird community; and
- Black Park SSSI – variety of habitats including woodland and heathland, with mention of a wide variety of breeding and wintering birds.

Offsite Non-statutory Designations

In addition to the onsite SINC, the following SINCs are within 2km: London's Canals, Ruislip Woods and Poor's Field, Old Park Wood, Mid Colne Valley, Coppermill Down, Harefield Chalk Pit, Harefield Churchyard and Wood, Shepherd's Hill Woods and Fields, Dew's Dell, Newyears Green, Medipark Site,

The Dairy Farm Harefield, Knightscote Farm Ponds, Harefield Green Pond, Breakspear House Wood, Harefield Hospital Ponds and the Old Orchard. These are shown in Appendix A: SINCs within 2km.

The closest / most relevant SINCs are detailed in Table 4.2 below.

Table 4.2 Non-statutory nature designations within 2km - closest / most relevant.

Non-Statutory		
London Canals SINC (Metropolitan)	Adjacent site to the east	London's canals provide a home for many fish and aquatic plants, and are a great way to enjoy the natural world in some of the city's most built-up areas.
Copper Mill SINC (Metropolitan)	60m north-east	The only natural chalk grassland in north London, with an excellent range of wild flowers.
Harefield Chalk Pit SINC (Borough Grade II)	200m north-east	Oak woodland which has developed in an old chalk pit.
Harefield Churchyard and Wood SINC (Borough Grade II)	500m east	A picturesque 14th century parish church and cemetery.
Dews Dell SINC (Borough Grade II)	1.2km southeast	An old quarry with great wildlife potential.

Offsite - Undesignated Nature Conservation Sites

The Broadwater Lake Nature Reserve is present adjacent to the western edge of Broadwater Lake, managed by Herts and Middlesex Wildlife Trust. The nature reserve is formed of the land between the banks of the River Colne and the banks of Broadwater Lake, and has a walkway through this area with a small number of viewing platforms onto the lake. The Reserve is currently under the legal possession of HS2 Ltd for construction of the high speed railway line; it will be returned to the Wildlife Trust once construction works are completed.

UK Biodiversity Action Plan

UK Biodiversity Action Plans (BAPs) have been developed which set priorities for nationally important habitats and species. To support the BAPs, Species/Habitat Statements (otherwise known as Species/Habitat Action Plans) were produced that provide an overview of the status of the species and set out the broad policies that can be developed to conserve them. A list of priority species of conservation importance was also developed.

The UK BAP was succeeded in 2012 by the UK-Post 2012 Biodiversity Framework which informed the creation of the Biodiversity 2020 strategy; England's contribution towards the UK's commitments under the United Nations Convention of Biological Diversity.

Despite this, the UK BAP priority species lists and conservation objectives still remain valid through integration with local BAPs (which remain valid), and in the form of the Habitats and Species of Principle Importance list (as required under section 41 of the Natural Environment and Rural Communities (NERC) Act).

The following UK BAP priority habitats were present at Site or in the immediate vicinity:

- Deciduous woodland (on Site and in immediate vicinity); and
- River Colne - a Chalk River.

MAGIC indicatively shows some of the Site as Open Mosaic Habitat (due to its previously developed land usage) however this mapping is not based on detailed surveys. Surveys have not identified this habitat being present at the Site or in its immediate surrounds (see section 4.2 for further discussion).

London BAP

Local Biodiversity Action Plans (LBAPs) ensure that national action plans (the UK BAP/Biodiversity 2020) are translated into effective action at the local level and establish targets and actions for locally characteristic species and habitats.

The London Biodiversity Partnership wrote the London Biodiversity Action Plan (BAP) for important habitats and species within the Greater London area. The London BAP lists four priority habitats and 11 Habitat Action Plans (HAP). Those of relevance comprise:

- Parks and Urban Green Spaces HAP;
- Rivers and Streams HAP;
- Standing Water HAP; and
- Woodland HAP.

In addition, there are other important habitats listed within the London BAP although no HAP is in place for these. Built structures is one such habitat whereby developers are encouraged to design for biodiversity and install features beneficial for wildlife.

There are 214 priority species and eight Species Action Plans (SAPs) listed within the London BAP. There are many species listed on the BAP which are priority species and are of conservation concern. Species of relevance with SAPs comprise:

- Bats SAP;
- Black poplar SAP;
- House sparrow SAP;
- Stag beetle SAP;
- Grey Heron SAP;
- Otter SAP.

London Borough of Hillingdon does not have an active Biodiversity Action Plan and so the London BAP applies in this situation.

Species Records

The information provided in the 2022 biological data search from GiGL, BMERC and HERC identified records of a number of protected and BAP priority species within the 2km search radius of the Site. Table 4.2 provides a brief summary of the most relevant records.

Table 4.2 Records of protected, rare or notable species within 2km

Species	Legally protected	Principal importance	Other notable	Relevant records within 2km
Badger	✓	-	-	Seven records dating from 2014, closest 350m from Site, latest 2020. These were all recorded 'dead on road'.
Bats	✓	✓	-	Common pipistrelle (Pipistrellus pipistrellus), soprano pipistrelle (Pipistrellus pygmaeus), Daubenton's (Myotis daubentonii) Leisler's (Nyctalus leisleri), serotine (Eptesicus serotinus) noctule (Nyctalus noctula), Nathusius (Myotis nathusii), brown long-eared (Plecotus auritus) and barbastelle (Barbastella barbastellus). The closest record was a soprano pipistrelle on Broadwater Lake. Latest records 2020. Barbastelle recorded on Tilehouse Lane 1300m away in 2017.
Woodland Birds	✓	House sparrow and peregrine are London BAP species.	✓	A variety of rare, notable and protected birds recorded including linnet (51 records since 2014, latest 2018) and woodcock (recorded once 1550m west in 2011). Cuckoo was recorded 4 times in 2018, within 750m. Greater spotted woodpecker recorded 750m from Site in 2018. 72 records of house martin, latest from 2018. Birds of prey recorded occasionally in the area including sparrowhawk, red kite, hobby, merlin, peregrine falcon, barn owl, short eared owl.

Species	Legally protected	Principal importance	Other notable	Relevant records within 2km
Water Birds	✓	Grey heron is a London BAP species.	✓	A range of birds utilising freshwater habitats have been recorded including kingfisher recorded 375 times, closest and latest 174m west in 2017. Little egret and reed bunting recorded 174m west in 2017. Grasshopper warbler recorded 525m southeast in 2016.
Amphibians	✓	✓	-	Great crested newt 4 records, the nearest being located 1532m north of Site in 2014. Latest records dated 2019. Common toad 3 records 1532m north, latest 2018, and 1 common frog record, located from 828m south in 2014.
Reptiles	✓	✓	-	One record of slow worm (Anguis fragilis) in 2019 and one record of grass snake (Natrix helvetica) in 2013, both within 2km of Site.
Hazel dormouse	✓	✓	-	No records within 2km.
Water vole (Arvicola amphibious)	✓	✓	✓	Six records since 2019, latest 650m from Site in 2021.
Otter (Lutra lutra)	✓	✓	✓	Four records in 2019, closest within 250m.
Fish	-	✓	✓	One record of Barbel (Barbus barbus) 354m northwest of Site in 1997. Other records of fish within 2km included bullhead, European eel and brook lamprey although these dated back to 1960s.
Macro-invertebrates (aquatic)	-	-	✓	See aquatic invertebrate report (Appendix B).
Terrestrial Invertebrates	-	✓	✓	Numerous protected and nationally notable species recorded within 2km. Common darter recorded 1969m north in 2019. Stag beetle recorded 463m northeast in 1999, latest record 2017.

Species	Legally protected	Principal importance	Other notable	Relevant records within 2km
				Small heath recorded once 1778m southeast in 2014. Other records include Essex skipper, white admiral, purple hairstreak, small copper, brown hairstreak. Large number of moths recorded within 2km.
Protected Plant Species	✓	✓	✓	Relatively few species recorded considering the Site setting; majority are greater than 1km from Site. Bluebell 10 records from 844m northeast. Individual records from 1984 and 1995 of coralroot bittercress and fringed waterlily at Broadwater Lake HMWT Nature Reserve.
Hedgehog (UK BAP)	-	✓	-	27 records from 449m east, latest record 2021.
Harvest Mouse (UK BAP)	-	✓	-	1 record in desk study 740m distant from 1963. A small population is mentioned within designation Frays Farm Meadows SSSI (>2km distant from the site).
Invasive / non-native species - terrestrial	-	-	-	19 plant species including Japanese knotweed 5 records one onsite dating from 1984 latest 2017, rhododendron 6 records from 1000m distant, few flowered garlic 2 records along Grand Union canal closest 750m distant, 1 record Montbrecia 950m distant. 2 animal species - American mink (Vison vison) recorded at Colne Valley Gravel Pits; latest record 2008. Ring necked parakeet (72 records).
Invasive / non-native species - aquatic				Floating pennywort 5 records from 540m west latest 2015. New Zealand pygmyweed 4 records latest 2012; Nuttall's waterweed (Elodea nuttalii) 1 record from 2010. Curly waterweed 2 records from 1980. Zebra mussel 1 record from 1993.

The species listed above are primarily those known to be in the area that may be impacted by any proposals at the Site, or that stand to benefit as a consequence of potential ecological enhancements at the Site and inform Site-specific mitigation and enhancement recommendations (described in section 6).

4.2 DETAILED DESCRIPTION OF SITE: HABITATS

For ease of reference, the Site is split into the peninsula (the location of the proposed buildings), the lake itself, the islands, the access road, the lake margins, and the sailing club. There are also two offsite areas in the same ownership, the field to the south accessed from Moorhall Road and a woodland to the east (see Appendix A Component Areas).

The habitats across the Site have been categorised according to the UKHab criteria. The data for each section of the Site is presented below. Please refer to Baseline Habitat Maps 1 - 5 (included in Appendix A) for detailed mapping of the habitats.

Peninsula

The peninsula habitats are shown on Baseline Habitat Map 3 in Appendix A. The previous uses of this area have strongly influenced the habitats that have developed. The peninsula was utilised as a quarry until the 1970s with gravel processing and washing areas, a silt lagoon, roads, a sub-station, tank rooms and plant rooms, a workshop, a weighbridge and other concrete and breezeblock structures. The peninsula is almost entirely artificial, appearing to have been quarried and then reformed of quarry wastes, with only small areas of natural ground remaining (mainly access routes) which were not quarried. Some built structures have been demolished leaving demolition rubble, while others remain in a dilapidated state. Natural habitats have colonised the majority of the previously bare substrates over the intervening years, although some areas remain relatively bare / sparsely colonised.

The 2021 PEA was undertaken in summer when vegetation is at its densest, preventing full access to all areas and also preventing a visual assessment of the underlying substrate. The buddleia had developed further and by November 2022 inaccessible areas had enlarged. In 2021 and again in 2022 for the update survey it was very difficult to distinguish the woodland habitat from the very dense and tall stands of buddleia scrub.

Detailed examination of historic aerial photography and historic mapping was undertaken in order to inform the 2022 surveys and ensure the most relevant ecological baseline was correctly established for the Site.

The surveys in November and December 2022 found that much more of the substrate was visible as vegetation died back through autumn into winter. These surveys in conjunction with the information from historic maps and photographs found that large margins of the areas classified as woodland in the 2021 PEA were in fact dense buddleia scrub overlying gravel hardstanding, growing next to and penetrating into the woodland. As buddleia is an invasive species in London and the Site is a SSSI, removal of all the buddleia at the peninsula is planned for February 2023.

For the purposes of this PEA therefore, existing buddleia scrub over gravel hardstanding has been classified as artificial ground; unsealed surface (gravel hardstanding). The buddleia must be removed (regardless of any development) and there are no trees within the dense buddleia stands where these abut the woodland. This explains why the area of woodland mapped in the 2021 PEA has been significantly reduced for this assessment, in order to accurately characterise the ecological baseline for the assessment.

The detailed habitat descriptions are provided below.

u1c - Artificial unsealed surface (gravel) with secondary codes 11, 17, 164

This habitat was formed of gravel and rocky quarry wastes and a gravel access road. Much of this habitat was covered with a blanket of mosses (secondary code 164), with ruderal / ephemeral plants (17) occurring either sparsely spread across the gravel, or in discrete areas too small to map individually under the UKHab typology. There were scattered birch (Betula pendula) trees (11) which were mainly saplings although some were >5m tall and therefore considered to be young trees. The low density of plants in this habitat was due to very low levels of organic matter in the substrate, as a result of its artificial nature.

w1d - Wet woodland (willow and alder carr)

This habitat of willows (Salix spp.) and alder (Alnus glutinosa) has developed on an area of former silt lagoon. The trees appeared to be c. 50 years old and trees were larger than those across the rest of the peninsula, likely indicating a higher percentage of organic matter in the substrate. Areas of standing water were present beneath the trees; this distinguishes this habitat from other woodland types at the Site. The wet woodland was very dark, with a closed canopy and being encroached with buddleia preventing good access, and at the time of survey much natural light was prevented from entering this woodland. As a result of limited access, standing water and low light levels, no ground flora was observed (November 2022).

In April 2022 three areas of standing water in this woodland were assessed as ponds for GCN potential. At the time of the update survey in November 2022, the wet area had grown to cover the majority (if not all) of the wet woodland floor. Under the UKHab classification this standing water is not mapped separately from the overlying dominant habitat type.

w1f - Lowland mixed deciduous woodland

On the peninsula, much of this woodland was less than 50 years old and very sparse. It was species-poor and comprises mainly birch (Betula pendula) and alder. Willows occurred on the shorelines. It had a very sparse and species-poor ground flora comprising of dominant nettle (Urtica dioica) with occasional bramble (Rubus fruticosus agg.), cleavers (Galium aparine) ivy (Hedera helix) and buttercup (Ranunculus sp.), being quite choked with buddleia in most places and with very hard and organic-poor substrate.

Along areas of remaining natural ground at the peninsula and south 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 has been kept from encroaching along a pathway running through this area.

Mixed scrub with introduced shrub

There was a small discrete area of this habitat near the entrance to the peninsula, this formed the separation between an entry way and an exit to the Site when the Site previously had a one-way system in place. Shrub species included hawthorn (Crataegus monogyna), dog rose (Rosa canina), hazel, birch, elder (Sambucus nigra) along with the ubiquitous buddleia. Understorey herbs and grasses were also present, and this area appeared to have natural soils present.

u1b5 Buildings

Three small flat roof structures with concrete walls and corrugated roof panels. Two (a sub-station for the former quarry, and a materials storage shed for the former angling society onsite) were sealed shut and one was open on one side (this was previously a workshop for an angling society).

u1b Artificial sealed surface (concrete) h3h 1160

At the entrance to the peninsula, a small section of the access road is reinforced concrete with a concrete weighbridge adjacent. Mixed scrub (h3h) and introduced buddleia shrub (1160) were present growing in cracks.

Lake

A specific survey for macrophytes and emergent vegetation was not undertaken. From the land, the lake edges were very difficult to view for survey, being largely inaccessible other than via fishing and viewing platforms, and with overhanging willow trees extending out over the lake and covering the edges in many places. Yellow flag iris (Iris pseudacorus) was present along the northern shore of the peninsula. The surveys for fish and macro-invertebrates were undertaken from the waterside via boat and habitat suitable to support fish was recorded incidentally (where this was encountered as part of the surveys). Occasional beds of branched bur-reed (Sparganium erectum) and limited presence of submerged macrophytes (Elodea sp.) were recorded; it was reported that marginal/emergent vegetation was poor and the littoral zone also appeared to be very homogenous.

Islands

The islands were not accessible to ascertain the species present; instead an assessment of the broad habitat type habitat was made using binoculars.

w1f - Lowland mixed deciduous woodland

A number of islands were well wooded with mature trees; the species present appeared to be dominated by willow with native broadleaved shrubs and trees occupying the landmass. The islands are assumed to be natural ground remaining from quarrying activities and as such will likely have soils present, allowing

more natural plant assemblages to grow. As such, although occupying a small area, a woodland habitat type has been ascribed. Examination of historic aerial photography shows that these islands have been continuously wooded for over 20 years.

g4 -Modified grassland

Four islands have been cleared of woodland in the past ten years and are reportedly cleared annually by members of the sailing club in order to a) enhance the provision of the lake for roosting waterfowl and b) remove barriers to the wind, in order to create a less turbulent air flow for sailing. The main habitat observed from the shores of the lake appeared to be modified grassland. This grassland will likely be very similar to that at the sailing club, being under grazing pressure from waterfowl, regularly well-trodden, and organically enriched from bird guano. As such only a low species diversity of common grasses and ruderals would be expected to occur.

Access Road

u1b Artificial sealed surface (concrete)

The road running along the edge of the lake from the entrance from Moorhall Road to the entry to the peninsula was constructed from concrete.

u1c - Artificial unvegetated unsealed surface

The access road from the gate at the peninsula up to the sailing club was formed of gravel hardstanding.

w1f - Lowland mixed deciduous woodland

This habitat is present to each side of the access road, along the edge of the adjacent canal and along the edge of the lake with a typical native woodland understorey of mixed scrub, herbs and grasses. Species included oaks (Quercus spp.), willows, poplar (Populus spp.) with alder, birch and hazel, and understorey of bramble, nettles (Urtica dioica), ivy (Hedera helix). A black poplar was recorded by the 2021 PEA between the canal and the access road (see Appendix A Habitat Map 3). The trees were noticeably larger specimens than anywhere else onsite, and in very good condition for mature trees. The level of public access along the canal and access road will have ensured trees were managed for safety with damaged or dead branches removed pre-emptively, and therefore no significant standing deadwood was noted.

Lake edges (west and south of Site)

w1g6 - Line of Trees

Trees comprising mainly willows with oak and sycamore were growing along the banks of the river and the lake, with scrub beneath. A slim pathway had been cut through the habitat.

g4 -Modified grassland

Where bankside lines of trees did not encroach onto the pathway around the lake, the dominant habitat comprised modified grassland.

Broadwater Sailing Club

g4 -Modified grassland

The main habitat of the sailing club area was modified grassland (8sp per m^2 or less). Where boats and trailers are stored, the grassland was longer and not grazed or mown, allowing the species density to be sufficiently characterised. Near the water's edge, the grass was worn through footfall and from being grazed by waterfowl. There were numerous ruderal / ephemeral plants through the sward (typical common species abound including broad-leaved plantain, chickweed, nettle). Bare areas occurred near the water edge where more traffic occurred.

w1g6 - Line of Trees

A line of trees (mainly willow) occurred at the west end of the sailing club area where access to the water is not required. Old pontoons were stored in the water here. Small areas of emergent vegetation had developed around the pontoon; access was unsafe (beyond the tree line) and therefore the species were not determined.

ub1 - Developed Land; sealed surface

A slim roadway through the Site and the main boat slipway were both constructed of concrete.

u1c - artificial unvegetated unsealed surface

The main car parking area at the entrance to the sailing club was formed of gravel hardstanding. Gravel hardstanding had also been created at the water's edge by the main slipway to provide secure footing for areas of frequent footfall when landing boats.

w1f - Lowland mixed deciduous woodland

This woodland (as described above along the access road) lined the river edge to the rear of the sailing club, although a pathway has been cut through it.

Offsite - field to south on Moorhall Road

G3c - Other neutral grassland

The land parcel was surveyed in November 2022; the underlying soil appeared to be peaty / organic-rich, and approximately 6 - 8 species per m^2 were apparent at the time. The land was inundated in parts. It is reported to be managed through grazing. On a precautionary basis, assuming further species would become apparent during the active growing season, this grassland has been classified as other neutral grassland.

Ub1 - Developed land; sealed surface

Part of the land parcel was being utilised as a compound for HS2 at the time of survey and comprised asphalt hardstanding. It is understood that HS2 will reinstate the field to grassland once works are completed.

Offsite - woodland to the east

w1f - Lowland mixed deciduous woodland

This woodland was dominated by hawthorn with areas of dense hawthorn scrub, with occasional dog rose, birch, alder, bramble and understorey of tall ruderals including nettles.

U1b - Developed land; sealed surface

The entrance to the land parcel comprised concrete hardstanding.

Priority Habitat Present at the Site

The following priority habitats (Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006) were identified at the Site:

- Woodland: w1d, w1f woodlands;
- Standing water bodies: Pond, Lake; and
- Rivers and streams: River Colne.

In addition the following are London BAP habitats:

- Urban greenspace;
- Rivers and Streams
- Standing Water
- Woodland (all types identified).

Open Mosaic Habitat Assessment

The Site was not considered to have any areas meeting the UK BAP criteria of open mosaic habitat on previously developed land. The best individual area within the peninsula (centred on TQ 04718 89112) that closest meets the criteria fails mainly on size but also on other factors, and hence has been classified as u1c under UKHab. The assessment criteria are set out below:

1. Individual suitable areas on site are at least 0.25ha - the best and largest open area was too small at 0.17 ha as buddleia encroachment and birch trees have reduced the area - fail Criterion 1;
2. The peninsula has a known history of disturbance - it was previously utilised as a mineral processing area and is largely comprised of made ground - pass Criterion 2;
3. Some vegetation is present comprising early successional communities - the best area has scattered ruderal / ephemeral plants including the annual indicator common centaury (Centaurium erythrea) and areas of mosses. However it was noted during the phase 2 invertebrate survey that the association of ruderal and ephemeral plants on the hardstanding were very species-poor which is atypical for open mosaic habitat - pass Criterion 3 on a precautionary basis;
4. Contains unvegetated, loose bare substrate and pools may be present - the ground was considered to be generally too hard (not friable enough) to meet this criterion - fail Criterion 4;

5. The site shows spatial variation, forming a mosaic of one or more of the early successional communities plus bare substrate, within 0.25 ha - fails Criterion 5 due to the small size of the suitable area (0.17ha) although the best area does have a mosaic of bare ground with mosses and annuals (ruderal / ephemeral plants under the UKHab classification).

4.3 DETAILED DESCRIPTION OF SITE: SPECIES

As well as this PEA and the 2021 PEA, a number of protected species surveys have been completed for the Site in 2021 and 2022 (see Appendix B), although several of these were focussed only on the peninsula and access road parallel. The geographic extent of the surveys is detailed in Table 4.3 below. Key findings are collated on a figure provided in Appendix A Peninsula Surveys.

Table 4.3 Geographic extent of surveys completed to date.

Receptor	Where surveys completed	Comment on survey extent
Badgers - foraging	Whole Site	
Badgers - setts	Whole Site except areas made inaccessible by scrub	
Bats - foraging - potential	Whole Site	
Bats - foraging - bat transect and static detector surveys	Peninsula and access road parallel to peninsula	Peninsula will be most affected by proposed development. The completed surveys have characterised the local bat assemblage.
Bats - roosting	Potential Roost Appraisal - Buildings onsite (peninsula and sailing club)	Further survey required (see section 5).
Woodland breeding birds	Peninsula and wooded surrounds where visible	Peninsula will be most affected by proposed development; impacts may be avoided elsewhere.
Breeding birds (lake)	Lake as far as could be seen from peninsula including adjacent islands	
Wintering birds (lake)	Whole Site	
Great Crested Newts	Lagoon and ponds on peninsula	No breeding habitat present elsewhere onsite.
Reptiles	Peninsula	Peninsula will be most affected by proposed development;

Receptor	Where surveys completed	Comment on survey extent
		impacts may be avoided elsewhere.
Hazel dormouse	Peninsula and access road parallel to peninsula	Peninsula has most suitable habitats for this species; surveys sufficient to characterise whole of Site.
Water vole	Peninsula and access road parallel to peninsula	Whole Site surveyed in November 2022 (PEA)
Otter	Peninsula and access road parallel to peninsula and adjacent canal (100m beyond red line boundary north and south); sailing club	Whole Site surveyed in November 2022 (PEA)
Fish	Whole Site	
Aquatic invertebrates	Whole Site	
Desmoulin's Whorl Snail	Peninsula - Invertebrate surveys covered both terrestrial and aquatic habitats.	Extensive emergent fluctuating beds at lake margins not found to be present anywhere at the Site (key habitat for this species).
Terrestrial invertebrates	Peninsula	Peninsula has most suitable habitats; other Site areas unlikely to support notable assemblages.
Aquatic Plants	Lake (but surveys completed outside optimal season)	Aquatic and emergent habitats characterised during aquatic surveys in October 2022.
Terrestrial Plants	Peninsula and access road parallel to peninsula	Peninsula will be most affected by proposed development; impacts may be avoided elsewhere.
Invasive Non-Native Species	Areas made inaccessible by scrub not accessed. Peninsula - optimal season Whole Site - November 2022	Lake margins surveyed during November 2022 when some plants may not be visible.
Other BAP species - hedgehog	Whole Site	

The results of the phase 2 surveys have been incorporated into the detailed descriptions of the Site for each species below, in order to bring all the available data together into one place for ease of understanding.

Badger

There are low numbers of badger records within 2km (individual badgers killed on the road), and no setts reported.

The lake margins, grassland and woodland adjacent to Broadwater Sailing Club, and northern part of the peninsula are suitable to support foraging badger.

A single latrine was recorded in the woodlands in the north of the peninsula during surveys in 2022 by Ecology By Design. No further evidence of badger has been recorded anywhere on Site, although areas of the woodland at the peninsula could not be accessed during the surveys due to the heavy encroachment of buddleia.

During the November 2022 and January 2023 Site visits, once vegetation had begun to die back it became apparent that there is very little soft natural ground (i.e. soil containing organic matter) at the peninsula. The substrates are mostly formed of gravel and rocks. The former silt lagoon, supporting the wet woodland, is at a lower level and inundated most if not all of the year; wet conditions are unsuitable for badger. Therefore although the surveys were constrained by scrub, setts are considered to be absent from the peninsula.

Other natural areas onsite are low lying with regard to groundwater. This makes badger sett excavation very unlikely across the entire Site.

Given the presence of a latrine in the northern area of the woodland on the peninsula, **foraging badger** presence has been **confirmed**. No further evidence has been found during three Site walkovers in the past 12 - 18 months and so at this stage the presence is assumed to be occasional.

The potential for **badger setts** is considered to be **Low to negligible**, primarily due to the high water table at Site, the risk of flooding from the adjacent river and from changes to groundwater level. This is reinforced by the lack of clear evidence of sett building.

Bats

Foraging

Bat species known to be utilising the Site and wider Colne Valley for foraging and commuting are common pipistrelle (Pipistrellus pipistrellus), soprano pipistrelle (P. pygmaeus), Nathusius's pipistrelle (P. nathusii), brown long-eared bat (Plecotus auritus), Daubenton's bat (Myotis daubentonii) and Natterer's bat (M. nattereri). The following species are recorded within 2km and may also be present: noctule (Nyctalus noctula), whiskered bat (M. mystacinus), Brandt's bat (M. brandtii), barbastelle bat (Barbastella barbastellus), Leisler's bat (N. leisleri), and serotine (Eptesicus serotinus).

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

Bat activity transect surveys and bat fixed point automated surveys were conducted during August-October 2021 and April-July 2022. The results from both survey methodologies suggested moderate bat activity levels are typical for the Site.

The 2021 transect surveys recorded soprano and common pipistrelle, noctule, Daubenton's, Myotis sp,. and Nathusius's pipistrelle, with Leisler's and brown long-eared making single bat passes. The majority of activity was recorded along the water's edge of the western end of the peninsula. The 2022 transect surveys recorded mainly soprano and common pipistrelle, with serotine, Myotis sp., and NSL (noctule / serotine / Leisler's) also observed. Activity levels in 2022 were higher than for 2021, being characterised as moderate, and were evenly spread along the shorelines around the peninsula and access road through the Site.

The static detector surveys corroborated the walked transects; pipistrelles comprised >75% of bat recordings at the peninsula along with a similar species assemblage; serotine was additionally recorded at the Site, at approximately the same activity levels as noctule. 2022 bat activity levels were much higher than 2021.

Confirmed presence of at least nine species (moderate diversity) of foraging bats mainly along shorelines around the peninsula; overall moderate activity levels; dominant species are soprano and common pipistrelle.

Roosting

There are only a small number of Potential Roost Features (PRFs) suitable for roosting bats across the peninsula where the proposed development will occur. The woodland onsite is very young, less than 50 years old (with growth commencing once quarrying activities ceased at the Site) – the trees onsite would therefore be classed as semi-mature. The majority of native woodland tree species will not develop until 70+ years old; the exceptions being birch trees which develop fibrous rot features at 50+ years, and trees that have been wounded, such as through limbs falling (e.g. crack willow), or by extreme weather conditions (e.g. high winds, lightning) or vandalism.

There are no trees within 20m of the proposed development elsewhere onsite which might be disturbed by construction or operational activities.

Buildings onsite were assessed for bat roost potential during surveys between November 2022 and January 2023. There are three small concrete flat roof buildings within the broadleaf woodland on the peninsula, supporting features with low and moderate bat roost potential. The Broadwater Sailing Club single storey building has low potential for roosting bats beneath wooden cladding and in vents and holes in the façade. No other buildings are present at the Site.

A canal bridge that carries cables to the Site is of steel construction sat atop brick plinths. Works to upgrade this bridge are required. There are gaps between the steel structure and bricks that have moderate potential to support bat roosts.

The bat activity surveys in 2021-21 recorded bat calls close to emergence and re-entry times for bats to and from their roosts on multiple occasions and therefore it is likely the Site itself may support bat roosts or at least somewhere very close by. Species recorded close to their emerging/re-entering times included the examples below:

• Soprano pipistrelle regularly recorded close to sunset;

• Common pipistrelle occasionally recorded close to sunset;

• NSL recorded within ten minutes of sunrise on sporadic occasions; and

• Brown long-eared bat recorded occasionally within 40 mins of sunset during April and May.

As such the Site has **low-moderate potential** for roosts within buildings, a bridge and mature trees onsite.

Woodland Birds - Breeding

There are numerous records of woodland birds within 2km. The Site's terrestrial habitats are suitable to support a wide range of breeding birds.

A breeding bird survey of the peninsula was undertaken by Greengage between March and July inclusive 2022. The survey comprised a total of five visits during that period. Woodland species observed during the surveys are presented in the table below, along with breeding status and level of conservation concern.

Table 4.4 Woodland birds present at Site and their protection, conservation and breeding status (Red List, Schedule 1, s41, UK BAP, breeding)

Species	Summary of activity	Status
Green Woodpecker Picus viridis	Heard offsite on 27th March, one calling on 10th April landed in dead trees in carr area	-
Great Spotted Woodpecker Dendrocopus major	Resident breeder. Two drumming and calling foraging and nest prospecting on 17th May	Breeding
Red Kite (Milvus milvus)	One roosting in trees on Site on 27th March	Sch 1
Wood Pigeon Columba palumbus	Resident, Bred successfully. Nesting in large willow in centre of peninsula, max 5 individuals	Breeding
Cuckoo Cuculus canorus	Heard offsite to west in June and July	Red List; s41; UK BAP
Wren Troglodytes troglodytes	Resident, Breed successfully. Widespread across Site and vocal	Breeding
Dunnock Prunella modularis	Resident, Breed successfully. Widespread in areas with undergrowth. Fledglings seen on 12th June	Amber List; s41; Breeding

Species	Summary of activity	Status
Robin Erithacus rubecula	Resident breeder Widespread in peripheral hedgerows, woodland and shelter belts	Breeding
Song Thrush Turdus philomelos	Resident breeder Several across Site on 27th March. Two singing from carr area on 12th June. Four singing across Site on 3rd July	Amber list; s41; UK BAP Breeding
Blackbird Turdus merula	Resident breeder, bred successfully. Mainly around edge of Site	Breeding
Long-tailed Tit Aegithalos caudatus	Resident breeder, bred successfully. Several small flocks at west end in March. Post breeding flock on peninsula on 17th May. Two post breeding family groups on 12th June in mixed flock with great tit blue tit on east edge of Site	Breeding
Great Tit Parus major	Resident breeder, bred successfully. Numerous on all visits with fledglings on 12th June in mixed flock with blue tit and Long-trailed tit on east edge of Site	Breeding
Blue Tit Parus caeruleus	Resident breeder Several pairs prospecting in March-early April. Fledglings on 12th June in mixed flock with great tit and Long-trailed tit on east edge of Site	Breeding
Treecreeper Certhia familiaris	Resident breeder, bred successfully. Pair on tall trees in carr area in March and April. Pair with four fledglings on peninsula on 17th May. Family parties on peninsula and in quicksand area on 12th June.	Breeding
Goldcrest Regulus regulus	Resident likely attempted breeder, noted within offsite garden at entrance to peninsula	Likely breeder
Chiffchaff Phylloscopus collybita	Bred successfully. Three singing on Site on 27th march. Dull individuals likely over-winterers	Breeding
Blackcap Sylvia atricapilla	Summer visitor, Bred successfully. At least 2 singing on Site. A male seen gathering nesting material just off Site to SE on 10th April	Breeding
Garden Warbler Sylvia borin	Summer visitor, likely successful breeder. Four territories on 17th May	Breeding
Cetti's Warbler Cettia cetti	Resident breeder, mainly using land offsite to south (quicksand area)	Sch 1 Breeding

Species	Summary of activity	Status
Magpie Pica pica	One off Site to east	-
Jackdaw Corvus monedula	Four present in March	-
Carrion Crow Corvus corone	Resident breeder. Occasional on tree tops around periphery. Possible nesting in carr wood on 10th April	Breeding
Jay Garrulus glandarius	Pair on Site on 27th March and on 10th April	
Reed warbler	Summer visitor One singing in quicksand area in May -July	-
Robin	Resident breeder Widespread in peripheral hedgerows, woodland and shelter belts	Breeding
Rose-ringed parakeet Psittacus krameri	2 present and likely attempted breeder	Non-native: WCA (1981) Sch 9 LISI Category 4

As such there is a **Confirmed** presence of up to 18 species of breeding woodland birds at the Site. Of particular note are dunnock and song thrush which are Amber listed species, and Cetti's warbler which is a Schedule 1 species. Cuckoo (a Red List species) will parasitise the nests of dunnock and therefore as breeding dunnock is present, the Site has potential to support reproducing cuckoo (although no evidence of cuckoo chick calls was recorded in 2022).

Waterbirds - Breeding

Broadwater Lake is designated as a SSSI in part for its breeding waterbird population.

The Greengage breeding bird survey between March and July inclusive 2022 included the southern end of the lake. Key areas surveyed included the lagoon, the shores of the peninsula, the large island to the west of the peninsula, the east inlet, and closed ponds on the peninsula. Not all waterbirds recorded were breeding; a summary of survey results is presented below with breeding species indicated.

Table 4.5 Waterbirds present at Site and their protection, conservation and breeding status (Red List, Schedule 1, s41, UK BAP, breeding)

Species	Summary of activity	Status
Cormorant Phalacrocorax carbo	Large nesting colony (30+) on island 300m to west of peninsula	Breeding

Species	Summary of activity	Status
Little Egret Egretta garzetta	Six plus in heronry on island 300m to west	
Grey Heron Ardea cinerea	Heronry on island 300m to west of peninsula (6+ individuals)	
Great Crested Grebe Podiceps cristata	Four pairs, one breeding successfully in east inlet of peninsula	Breeding
Little Grebe Tachybaptus ruficollis	Two pairs using lagoon and east inlet of peninsula; up to 6 individuals seen	Attempted breeding
Mute Swan Cygnus olor	Adults (up to 6) but no sign of breeding	
Canada goose Branta canadensis	Max 70 individuals	
Greylag Goose Answer anser	Max 6 individuals	
Egyptian goose Alopochen aegyptiaca	Max 14 individuals	
Mallard Anas platyrhynchus	Successfully breeding at Site, using east inlet, western edge of peninsula, lake west of peninsula. Maximum 11 individuals plus duckling	Amber list Breeding
Shoveler Spatula clypeata	Pair on closed pond on 10th April, plus 6 west of peninsula	Amber list
Gadwall Mareca strepera	Two pairs, using east inlet and lake west of peninsula	Amber list
Wigeon Mareca penelope	Two males west of Site on 27th March. Pair west of Site on 3rd July	Amber list
Tufted Duck Aythya fuligula	Up to 20 individuals, one pair bred successfully	Breeding
Red Crested Pochard Netta rufina	14 individuals seen 27th March. Pair west of Site on 3rd June	
Pochard Aythya ferina	Breeding population, at least 6 individuals, ducklings seen on successive visits	Red list Breeding
Moorhen Gallinula chloropus	Pair nesting in pool at south end of peninsula and using east inlet - attempted to breed	
Coot Fulica atra	Breeding population, nesting on island and inlets	
Oystercatcher Haematopus ostralegus	One flew north just west of Site in May	Amber list

Species	Summary of activity	Status
Kingfisher Alcedo atthis	One pair using alder carr on peninsula, possibly nesting in there. Feeding from shallow water on edge of peninsula	Sch 1
Common tern Sterna hirundo	Up to 6 individuals observed	Amber list
Black-headed gull Chroicocephalus ridibundus	Frequent flocks on water east of island	Amber list
Lesser Black-backed gull Larus fucus	Adult on first island off peninsula on 17th May	
Herring Gull Larus argentatus	4 individuals observed in March only	Red list; s41; UK BAP

Confirmed presence of at least six species of breeding waterbirds; of particular note are breeding pochard which is a Red listed species, and breeding mallard which is an Amber list species.

Waterbirds - Over-Wintering

Broadwater Lake is designated as a SSSI in part for its overwintering waterbird population.

The Greengage breeding bird survey between March and July inclusive 2022 included the southern end of the lake.

A wintering bird survey is in the process of being completed (winter 22/23). A survey of the effects of current disturbance factors at the lake on wintering bird populations is also in the process of being undertaken. The full results will be reported in the ensuing EcIA.

The winter surveys have so far confirmed presence of 12* duck and grebe species, with three goose species and four gull species. Notable records include:

- The count of approximately 292 pochard (Aythya farina) on 8th January 2023 surpassing the 1% UK threshold number of 230 birds for pochard. Broadwater Lake is therefore a site of national importance for wintering pochard. This is a Red List species (also confirmed breeding at the Site).
- The count of circa 315 shoveler (Spatula clypeata) on 24th January 2023 exceeds 1% of the most recent RSPB published winter bird population (19,500). Broadwater Lake is therefore a site of national importance for wintering shoveler. This is an Amber List species.
- Large numbers of tufted duck (Aythya fuligula) exceeding 300 individuals (also confirmed breeding at the Site).
- Winter roosting area for four gull species, mostly arriving from the south and southeast, black-headed gull (Chroicocephalus ridibundus) (2,000++), common gull (Larus canus) (ca. 60), herring gull (Larus argentatus) (40+), and lesser black-backed gull (Larus fuscus) (<10).

*Tufted duck (Aythya fuligula), wigeon (Anas penelope), golden eye (Bucephala clangula), teal (Anas crecca), mallard (Anas platyrhynchus), gadwall (Anas strepera), great crested grebe (Podiceps cristata), little grebe (Tachybaptus ruficollis), smew (Mergus albellus) and goosander (Mergus merganser).

Confirmed presence. Initial headline results suggest that the lake supports wintering bird populations with **importance at the National level** for pochard (a Red List species) and shoveler (Amber List), along with important numbers of gulls.

Great Crested Newt

There are four records of GCN within 2km.

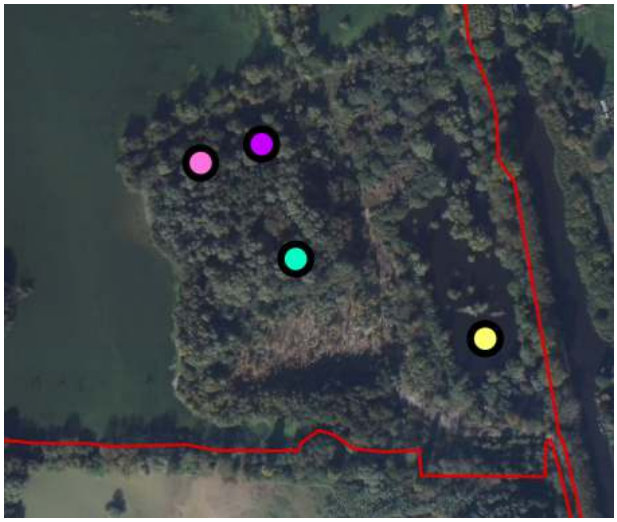
Adjacent to the east and west of the Site are the Grand Union Canal and River Colne - both have fish populations which functionally exclude GCN, and will also act to isolate the site from GCN populations in the wider area. To the south the silt lagoon associated with the mineral processing plant is very turbid and likely also has fish present, and the adjacent land is very disturbed. This would limit suitability for GCN.

The Site itself contains both terrestrial and aquatic habitats that are suitable to support great crested newts in the form of standing waterbodies, woodland, scrub and modified grassland amongst others. The only small 'ponds' present at the Site are within wet woodland at the peninsula; none were found elsewhere during the November walkover survey.

The confirmed presence of fish in the lake and lagoon (see fish survey results in Appendix B and summarised below) would typically exclude most amphibians except common toad.

A GCN eDNA survey was undertaken by RSK Biocensus in June 2022 (see full report provided in Appendix B). Four bodies of water with potential for GCN were found on Site, including the lagoon. The locations are shown in Figure 4.1 below.

Figure 4.1 Location of ponds assessed for potential to support GCN (taken from RSK Biocensus (June 2022) eDNA Survey).



Three of these water bodies were found to have 'poor' suitability (HSI<0.5), and as such were not analysed further. The fourth water body, the lagoon (yellow spot), was judged to be of 'below average' suitability (HSI 0.52), but still eligible for eDNA analysis. The eDNA analysis of this water body

returned a negative result, meaning that no great crested newt DNA was present at the time of sampling.

Based on these surveys GCN are considered to be **likely absent from the Site**. The November 2022 survey has confirmed that the habitats are unchanged from earlier in the year and as such there is no reason to change the previous conclusion with respect to GCN.

Reptiles

Within 2km of Site there is one record of slow worm (Anguis fragilis) in 2019 and one record of grass snake (Natrix helvetica) in 2013.

The Site contains habitats that are suitable to support reptiles in the form of modified grassland and scrub, amongst others. The 2021 PEA reported good suitability of the peninsula to support transient individual grass snakes.

A reptile presence / likely absence survey was undertaken in 2022 by Ecology By Design at the peninsula. No reptiles were seen or recorded during the survey. The report concluded that a low population of grass snake could be present on Site, based on personal comment from a local landowner about grass snake being seen on Site previously.

Given the above, the potential for the Site to support reptiles, in particular grass snake, cannot be ruled out, although based on the results of the previous survey (nil return) the potential for the Site to support reptiles is at best **Low**.

Dormouse

There are no records of dormouse within 2km.

Habitats on Site are suitable to support dormouse, in particular the areas of woodland and scrub.

A dormouse presence/likely absence survey was completed at the peninsula by Ecology By Design in 2021 and 2022. The survey was completed so that an index of probability score of more than 20 was achieved. No evidence of dormouse was recorded.

Surveys were not completed along the canal, lake margins and River Colne where these lie within the Site boundary, which have linear woodland and tree lines. However these features have less connectivity to large woodland blocks; the woodland at the peninsula is considered to be the best habitat for this species at the Site. As dormouse was not found at the peninsula, and there are no records within 2km, it is considered that dormice are **likely absent** from the Site.

Water Vole

Water vole has been recorded in the surrounding 2km area; it is known to be present at Denham Lock Wood and was officially recorded there last in 2020. The closest record was approximately 800m away but the record dates from 1990; water vole populations have declined steeply since that date due to the presence of mink which has also been recorded within 2km.

Suitable habitats exist on Site for water vole namely the vegetated margins of the lake, although emergent vegetation was notably scarce and bankside vegetation was dominated by overgrown lines of trees. Very limited suitable habitat exists on the peninsula which is mostly too rocky to support water vole and lacks ground flora except along the more natural north-west shoreline, which was fully accessed.

During detailed surveys conducted in 2021 and 2022 at the peninsula, no evidence of water vole was recorded. Some peninsula areas were inaccessible for survey due to dense buddleia scrub although this scrub would not be suitable habitat for water vole.

The walkover survey in November 2022 was undertaken outside the optimal period for detecting water vole. No signs of water vole were observed across the Site (such as lawns, feeding remains, latrines, holes in banks). Grassland areas at the north-west of the Site appeared most suitable. The Broadwater Sailing Club was not suitable being highly disturbed and with grassland managed through mowing, and with a lack of steep slopes next to the water. The western lake banks are steep and covered with dense scrub and overhanging trees therefore it was not possible to survey these areas in detail; the eastern bank was only safely accessible from fishing platforms providing limited viewpoints. Further combined bankside and waterside survey would be required to determine presence or likely-absence of water vole on Broadwater Lake at locations other than the sailing club and peninsula.

Suitable habitat offsite but adjacent including the river and canal has also not been subject to a detailed survey. The river is not slow-flowing reducing its suitability.

Therefore, water vole is considered to be **Absent** from the peninsula. The potential for the wider Site to support water vole is considered to be **Low** due to the recorded presence of mink in the surrounds and the negative survey results at the peninsula.

Otter

Otter has been recorded in the surrounding 2km area.

The key habitats for otter are the lake itself, and the woodland, scrub and grassland areas immediately bordering the lake. Adjacent to Site, the River Colne and Grand Union Canal also provide suitable habitat. The site forms part of an abundant network of suitable habitat within the wider Colne Valley.

Specific otter surveys conducted by Ecology By Design (May and August 2022) recorded potential evidence of otter activity during the August 2022 visit. The evidence included:

- A spraint on the banks of the Grand Union Canal that runs adjacent to the Site;
- A potential spraint within the peninsula on the northern bank of the lake. The spraint was dried out due to the extended warm weather and so confirmation it was otter could not be concluded; and
- The remains of crayfish were also found close to the potential spraint. Otters are known to eat crayfish, although it is noted that other species that could occur at Site are also known to eat crayfish such as gulls and heron.

It is also noted that during the 2021 PEA the remains of several empty valves of swollen river mussel (Unio tumidus) were found in a young birch clearing in the south-west part of the peninsula (see Appendix A Peninsula Surveys for the locations of otter feeding remains). Again, this could be possible evidence of otter activity on Site.

Fish and macro-invertebrate surveys at the Site (see section below) have observed there is a relative lack of habitat for fish with very low populations; this will reduce the likelihood of otter being able to catch fish (its main food item) at the Site. Eels (another preferred food) were not confirmed to be present at the Site. Otters will eat amphibians, crustaceans and waterbirds (e.g. coot, moorhen) within the lake. On land, food for otters at the Site includes small birds, eggs, insects and small mammals.

There is **Confirmed** presence of otter from feeding remains at the Site. No holts have been identified to date, and are considered likely absent from the peninsula, and absent from the sailing club area.

The remainder of the Site has not been subject to a detailed search for holts, as the lake banks are steep and covered with dense vegetation and overhanging trees. Further waterside survey would be required to determine presence of otter holts on Broadwater Lake at locations other than the sailing club and peninsula.

Overall, the potential for holts to be present is considered to be **Low** given the lack of sightings reported by regular lake users, the lack of observations during recent wintering bird surveys covering the entire lake, the relative scarcity of fish and homogeneity of the lake bottom, and the presence of likely better sites with better food resources in the immediate surrounds such as the River Colne and the Grand Union Canal.

Fish

Fish surveys were completed at the lake in October 2022.

Generally, the habitat in Broadwater Lake appeared to be lacking for juvenile fish, with limited areas of macrophytes (a few beds of branched bur-reed noted only). Most of the cover for small fish fry was provided by overhanging branches from large willow trees around the perimeter of the lake. The lack of cover present would resulting in low juvenile survival rates as a result of predation.

A total of five fish species, all native, were recorded during the fish surveys across all methods; these were: pike (Esox Lucius), perch (Perca fluviatilis), tench (Tinca tinca), common carp (Cyprinus carpio) and three-spined stickleback (Gasterostreus aculeatus). The combined abundance of fish was 245 individuals with an estimated biomass of 10,228.56 grams. Perch were the most abundant species present, while pike had the highest biomass. Fish populations appeared to be low and biodiversity is also low with only five species present.

Anecdotal evidence from local anglers reported carp close to 20kg in the lake, and presence of common bream (Abramis brama) and European eel (Anguilla anguilla). However none were caught in the surveys, indicating that if they were present then they would have been in low abundances.

European eel is a priority species under s41 of the NERC Act 2006, listed as critically endangered on the global IUCN Red List of threatened species, and protected in England under specific legislation (The Eels (England and Wales) Regulations 2009).

Confirmed presence of five native species; **potential presence** of one priority species.

Macro-invertebrates (aquatic)

Macro-invertebrate surveys were completed at the lake in October 2022. Macro-invertebrate communities were sampled in three locations; these were found to be relatively diverse and were indicative of moderate water quality. No protected species were found in the samples.

Although there was some submerged macrophytes present (Elodea sp.), overall, the marginal/emergent vegetation was poor and the littoral zone also appeared to be very homogenous. This may potentially limit the diversity of the macro-invertebrate community.

The Site is assessed as having **Low potential** to support notable / protected macro-invertebrates present.

Terrestrial Invertebrates

Peninsula

A Terrestrial Invertebrate Scoping report was issued in May 2022, informed by a desk study and survey comprising sampling of areas including wet and dry woodland, grassland, standing water and swamp areas. The following habitats were identified as having potential to support invertebrate assemblages of conservation significance:

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

The terrestrial invertebrate scoping report described two records of Desmoulin's Whorl Snail within 1km of which one was reported 100m north of the peninsula. The source of the records was one which should not be used for commercial reports. The records were checked and these dated from 1923 prior to the excavation of Broadwater Lake; therefore these records should be disregarded.

A Phase 2 survey was subsequently undertaken at the peninsula, informed by a further desk study. Terrestrial invertebrate fauna were sampled on five occasions between June and September 2022. 447 terrestrial invertebrate species were recorded, of which 10 have some level of national conservation status (a few however have become more widespread and their status would be reviewed). Thirty-nine further moth species are classed as 'Local'.

In general the peninsula was found to be floristically species-poor, indicating poor habitat for terrestrial invertebrates. There was a lack of specimen trees within woodland, few open areas, hard ground and extent of buddleia scrub - these factors were considered to limit the diversity of the invertebrate

populations. The best areas for invertebrates were two open areas with ruderal / ephemeral plants providing flowers as a source of nectar for invertebrates (shown in Appendix A Peninsula Surveys). This habitat was limited to small areas on the peninsula at the edges of its central access road. The survey concluded that these areas have moderate value for terrestrial invertebrates; other areas have low value. No assemblages of high conservation concern were found by the surveys.

Stag beetle was not recorded by the surveys; ground at the peninsula would be too hard for this species to occur.

Desmoulin's Whorl snail was not identified during the surveys; the species requires extensive fluctuating emergent beds at water edges which are absent from the Site.

Remainder of Site

Stag beetle is recorded within 2km; this species is entirely dependent on dead and decaying wood and soft soils. The woodland along the eastern edge of the lake and canal had the most potential for this species at the Site as this area supported the largest and most mature trees, although there was an apparent lack of standing deadwood suitable for saproxylic invertebrates, and the available area is relatively small in extent. There are also mature trees and soft ground along the western banks of the lake and River Colne but this area will be subject to flooding reducing its suitability; the majority of trees overhang the lake whereby falling trees and branches would go into the water rather than onto land and therefore the deadwood resource would be very poor. Very little dead wood was observed.

The peninsula was considered to provide the best habitat for invertebrates at the Site. Other areas across the rest of the Site did not typically have the mosaic of habitats that might support notable invertebrates or diverse assemblages.

Terrestrial invertebrates - Summary

As such at the peninsula there is **Confirmed** presence of notable invertebrates, with assemblages of moderate conservation value characteristic of open areas.

For stag beetle, there is considered to be **Low potential** in woodland habitat at the Site away from the peninsula, and **negligible potential** at the peninsula.

Protected Plant Species

There are relatively few notable, rare or protected plant species records within 2km. Records include bluebell from 1km distant, and individual records from 1984 and 1995 of coralroot bittercress (a rare plant whose distribution is restricted nationally) and fringed waterlily at Broadwater Lake HMWT Nature Reserve (c. 650m distant - the nature reserve includes Korda Lake, Long Pond, the River Colne and the western side of Broadwater Lake).

No specially protected plant species were recorded during the Site walkover or during relevant Phase 2 surveys such as the invertebrate scoping visit in April 2022.

Individual black poplar were recorded at the Site in 2021 (shown in Appendix A Habitat Map 3).

As such there is **Confirmed presence** of black poplar, and **Low potential** to support other notable / protected plant species.

Other BAP Species

Hedgehog

Terrestrial habitats at the Site (including woodland, ruderal / ephemeral, modified grassland, bankside habitats) are suitable for foraging and sheltering hedgehog.

The potential for the Site to support hedgehog is considered **High**. However at the peninsula the potential is **Low** due to the restricted extent of soft ground / natural soil within which to forage.

Harvest Mouse

One very old record (from 1963) within 1km; a small population is present more than 2km distant at Frays Farm Meadows which has an abundance of suitable habitats (wet meadows with long grass and reedbeds).

Hedgerows and woodland edge onsite are suitable for this species; however there is an absence of tussocky grassland and reedbeds which are the preferred habitats for this species; long grass is required for construction of nests. The site's habitats are relatively young having established following intensive disturbance from mineral extraction and processing, and it is likely this species would have been excluded from the site by these activities, and then not migrated back in due to distance of remaining populations and sparsity of suitable habitat.

Considered to be **likely absent** from the Site.

Invasive/Non-native species (INNS)

Terrestrial

There are a low number of records of five invasive non-native species (INNS) listed on Schedule 9 of the Wildlife and Countryside Act within 2km including the terrestrial plants Japanese knotweed, rhododendron, few flowered garlic and Montbrecia.

During the 2021 PEA, Japanese knotweed and giant knotweed were noted onsite (refer to Appendix A Habitat Map 3 for the locations).

Buddleia, a species listed in Category 3 of the London Invasives Species Initiatives (LISI) Species of Concern, was present at the peninsula in dense stands.

Aquatic

There are records of the aquatic invasive species floating pennywort (Hydrocotyle ranunculoides) on the River Colne adjacent to Site.

Floating pennywort was observed on the River Colne adjacent to the Site boundary during the November walkover survey.

Limited presence of submerged macrophytes (Elodea sp.) were recorded within the lake - these are .

While undertaking fish surveys, 210 signal crayfish (Pacifastacus leniusculus) were caught at multiple Sites across Broadwater Lake.

Therefore, invasive non-native species are **confirmed as present** on Site.

4.4 ECOLOGICAL BASELINE

In summary, the sections above have identified a number of ecological receptors to be present or potentially present at the Site or in the near surrounds. These are presented in the table below. Where there is confirmed presence and there is detailed information available (such as a phase 2 survey) such that an assessment of the Site's ecological value[5] for the receptor can be made, this has been provided. Where surveys have only established potential presence, the likelihood of occurrence has been indicated. Species found to be absent or likely-absent have also been listed for clarity.

Receptor	Evaluation
Onsite Statutory and Non-Statutory Designated Sites	Present onsite: Mid-Colne Valley SSSI and SINC SSSI - **National importance** SINC - **Borough importance**
Offsite National Statutory Designated Sites	Present within 2km - four SSSIs (from 430m north-east) and four LNRs (from 700m west) **National and Borough importance**
Offsite Statutory and Non-Statutory Designated Sites	Present - London's Canals adjacent to Site and Copper Mill SINC 60m north-east. **Borough importance**
Priority Habitats	S41 habitats present onsite: Woodland: w1d, w1f woodlands Standing water bodies: Pond, Lake Rivers and streams: River Colne London BAP habitats: Urban greenspace, Rivers and Streams, Standing Water, Woodland. **Borough importance**
Badger	Occasional presence of foraging badger. Setts likely absent. Value at the **Site level** for badgers.
Foraging bats	Assemblage of nine species - valued at the Local level. Site has **Local level importance** to support foraging bats.
Roosting bats	Low to moderate potential identified in buildings and canal bridge. Limited numbers of PRFs likely to be present within trees. **Likely Local level importance** for roosting bats.

Receptor	Evaluation
Woodland breeding birds	Present - 18 species breeding of which dunnock and song thrush are Amber listed species, and Cetti's warbler is a Schedule 1 species. **Borough importance**
Wintering birds (lake)	Present - **National importance** for pochard (a Red List species) and shoveler (Amber List).
Breeding birds (lake)	Present - 6 species breeding of which 2 are Red or Amber List. Further surveys required of the rest of lake to fully assess assemblage and size of populations. **Likely Borough / Regional value**
GCN	**Absent**
Reptiles	None found onsite. Site has **Low potential** to support transient individual grass snake.
Dormouse	**Likely absent** - no records within 2km and none found within the best habitat at the Site (peninsula woodland).
Water Vole	**Likely absent** from the peninsula - a check of previously inaccessible areas would be made once access is improved through clearance of invasive buddleia. However rocky ground conditions suggests the peninsula has negligible suitability for this species. **Absent** from the Broadwater Lake Sailing Club area. **Low potential** to be present elsewhere onsite on lake banks.
Otter	**Present (feeding)**. Holts considered **likely absent** from the peninsula and **absent** from the sailing club area. **Low** potential presence of holts around lake margins beneath overhanging trees. **Local value.**
Fish	5 species present; low populations. Lacustrine habitat is poor for fish generally. Site / Local value
Aquatic macrophytes	Very limited macrophytes observed to be present. Likely Site value
Aquatic invertebrates	Present - diverse moderate populations. None scarce / notable. Local value
Rare / notable terrestrial invertebrates	**Local / District value** at the peninsula - 10 national status species and 39 local value moths - moderately diverse assemblage characteristic of open habitats.

Receptor	Evaluation
	Low potential for stag beetle in woodland habitat at the Site away from the peninsula, and negligible potential at the peninsula. **Absence** of Desmoulin's whorl snail.
Terrestrial plant species (notable / rare / protected)	Present - Black poplar located along access road - Notable **Borough value**
Hedgehog (UK BAP)	Peninsula - Low potential Rest of Site - High potential **Site value**
Harvest Mouse (UK BAP)	**Likely absent**
Terrestrial Invasive/Non-native species	Present: Sch 9 species: Japanese knotweed, giant knotweed. LISI Category 3: buddleia.
Aquatic Invasive/Non-native species	Present: Sch 9 species: Elodea sp., signal crayfish.

Overall the surveys have identified nationally important numbers of wintering birds of two species (initial results), and a breeding bird assemblage of Borough importance. Despite this, upon examining the detailed results of the completed surveys to date, the SSSI is noted to be relatively impoverished ecologically from what might be expected. There is a lack of aquatic and emergent vegetation, likely due to a lack of organic matter and limited availability of soft sediments, and the bed of the lake is very homogeneous (flat and featureless). This reflects its origins as a gravel extraction area. As such, ecological food webs within the lake are poorly supported, with low numbers of macro-invertebrates and low fish populations. Bird species that feed on either aquatic vegetation or fish will therefore occur in lower numbers than might otherwise be possible. The lake is very large which is impressive and therefore its apparently meagre resources still play a role in supporting nationally notable numbers of wintering birds. The lack of extensive areas of emergent vegetation such as reed beds means that birds also have few refuge areas within the lake. The limited availability of island-based nest / roost sites may also limit the numbers of certain species using the Site. Existing disturbance from current site uses have been observed and disturbances occur daily at the Site with differing impacts per species (report not available at the time of writing as surveys ongoing).

The above information suggests that Broadwater Lake could be a much richer ecosystem resource with judicious enhancement and management intervention, supporting larger numbers of waterbirds year-round. This has been taken into consideration in the following sections addressing mitigation and enhancement recommendations.

5.0 RECOMMENDATIONS FOR FURTHER SURVEY

Clearance of invasive buddleia is required at the Site, as part of proper management of a SSSI. The clearance is currently underway (February 2023). An update habitat survey would be completed at the peninsula once the buddleia is cleared to verify the precise extent of underlying hardstanding.

Table 5.1 below presents the potential ecological receptors identified and sets out where further survey is considered to be required. It also presents a justification for instances where further surveys have not been recommended.

The recommended surveys will inform the detailed design of the proposed development along with mitigation and enhancement proposals.

Table 5.1 Requirement for further surveys

Receptors	Presence / potential	Where surveys completed	Further survey required	Justification
Badgers - foraging	Present occasionally on peninsula in areas where there is natural ground.	Whole Site except areas made inaccessible by scrub	No	Use of Site by badger considered to be adequately characterised. No disturbance or likely impacts to lake edges away from development areas. No impacts predicted. CEMP will cover limited mitigation required.
Badgers - setts	Likely absent	Whole Site except areas made inaccessible by scrub and canal	Check of inaccessible areas once buddleia cleared to verify no setts present. Check within 30m of canal bridge to be repaired. Further check within 3 months of construction commencing.	Further surveys are extremely precautionary. Groundwater considered to be too high across entire Site to be suitable for badger setts.
Bats - foraging	Present - moderate activity levels	Peninsula and access road parallel to peninsula	No	Local bat assemblage adequately characterised to allow an assessment of impacts to be made at the peninsula, and inform the enhancement strategy at the Site. Main development area characterised; away from the peninsula, other

Receptors	Presence / potential	Where surveys completed	Further survey required	Justification
				areas will not be subject to changes / uses requiring new lighting.
Bats - roosting	Low to moderate potential	PRA - Buildings and canal bridge onsite	PRA on trees likely to be within 20m of clearance / development once buddleia cleared Emergence / re-entry surveys on trees and buildings / structures as required in Summer 2023	To inform detailed mitigation and licensing requirements.
Woodland breeding birds	Present - 26 sp breeding (48 total)	Peninsula and wooded surrounds where visible	No	Marginal habitat around the remainder of the lake won't be directly disturbed and mostly is inaccessible due to dense scrub along lake edges and shallow depth of water preventing boats approaching the lake edges. Impacts elsewhere can be avoided through timing of any required clearance works, expected to be minimal / none.
Breeding birds (lake)	Present	Lake as far as could be seen from peninsula	Survey of the remainder of the lake and islands, plus further survey of lake around the peninsula. March - June/July 2023	Sufficient site data and published data is available for the lake in order to establish a broad baseline and make an initial assessment of impacts, this will be presented within the EcIA for the Site. The results of the further

Receptors	Presence / potential	Where surveys completed	Further survey required	Justification
				surveys once completed will be fed into this assessment.
Wintering birds (lake)	Present	Whole Site	Ongoing	Due for completion March 2023
Great Crested Newts	Absent	Lagoon and ponds on peninsula	No	No ponds anywhere else. Lake, canal and river have fish which prevents this species from breeding. Considered to be absent from the Site and adjacent surrounds.
Reptiles	Occasional transitional presence by individual grass snakes	Peninsula	No	Other suitable areas are habitats near the sailing club and lake margins away from the access road. Sailing club is unsuitable as has very short grassland, very heavily managed and waterbirds eat the shoreline plants. Its small field has suitable habitat but won't be disturbed by development. Access road too disturbed, margins by lake won't be affected by development.
Dormouse	Likely Absent	Peninsula and access road parallel to peninsula	No	Best habitat onsite surveyed (peninsula). Desk study and survey concludes species to be absent from the entire area. No vegetation

Receptors	Presence / potential	Where surveys completed	Further survey required	Justification
				clearance planned anywhere else to facilitate development except peninsula.
Water vole	Absent at the peninsula and sailing club; Low potential elsewhere	Peninsula and access road parallel to peninsula; sailing club; accessible parts of lake shore	Check of inaccessible areas once buddleia cleared to verify absence at the peninsula.	No other terrestrial areas of lake to be directly disturbed by development works. Surveys considered sufficient for planning and to inform mitigation and enhancement measures. The requirement for further surveys around the rest of the Site away from the peninsula should be discussed with relevant stakeholders.
Otter	Present - feeding No holts identified at peninsula or sailing club Low potential for holts elsewhere	Peninsula and access road parallel to peninsula; sailing club; accessible parts of lake shore	Check of inaccessible areas once buddleia cleared to verify no holts present at the peninsula. Check within 3 months of construction commencing of active development areas.	No other terrestrial areas of lake to be directly disturbed by development works. Sailing will stay in deeper waters away from lake margins. Surveys considered sufficient for planning and to inform mitigation and enhancement measures. The requirement for further surveys around the rest of the Site away from the peninsula should be discussed and agreed with relevant stakeholders.

Receptors	Presence / potential	Where surveys completed	Further survey required	Justification
Fish	5 species present; low populations	Whole Site	No	Surveys completed
Aquatic Plants (emergent / macrophyte)	Very minimal presence	Lake during October 2022	Yes - during growing optimal season (May-Sept)	Lake margins would be comprehensively surveyed for macrophytes.
Aquatic invertebrates	Present; diverse moderate populations. None scarce / notable	Whole Site	No although additional survey would increase certainty in the findings to date (one survey in October with low sampling effort of 3 samples).	Surveys completed are sufficient to inform the baseline and make an assessment of impacts.
Terrestrial invertebrates	10 national status species 39 local value moths	Peninsula	No	Limited suitable habitat elsewhere for notable / rare invertebrates. Stag beetle may occur within woodland along the canal and eastern shore of the lake, but these areas won't be significantly impacted by the proposed development.

Receptors	Presence / potential	Where surveys completed	Further survey required	Justification
Terrestrial Plants - notable / rare / legally protected	Black poplar located along access road	Peninsula and access road parallel to peninsula	No further ecology surveys recommended. Arboricultural survey of access road may identify further black poplar specimens.	Further surveys would be very unlikely to identify notable species. Islands only likely to have common species as under great pressure from feeding / roosting waterbirds. Only common habitats present at sailing club. Other areas of Site will not be disturbed and no habitat to be lost, therefore there would be no impacts if any such plants were present.
Invasive Plant Species	Present - Japanese knotweed and giant knotweed, also buddleia.	Whole Site except areas made inaccessible by scrub	Walkover survey during growing season once buddleia cleared.	To inform a standalone biosecurity management plan as well as biosecurity measures within a CEMP and operational Site management.

6.0 MITIGATION AND ENHANCEMENT

6.1 MITIGATION AND ENHANCEMENT RECOMMENDATIONS

The ecological receptors of note identified within the Site and surrounds represent the ecological baseline for the Site. The potential impacts of the proposed development on the ecological baseline have been considered and high-level mitigation measures identified. The assessment is set out in Table 6.1 below. Opportunities for enhancement are also indicated.

Table 6.1 Ecological baseline and relevant high-level mitigation and enhancement measures

Receptor	Comments
SSSI of National importance SINC of Metropolitan Importance	Both the Site's designations relate mainly to its avian occupants: stating its "diversity of breeding woodland and wetland birds, and for the numbers of wintering wildfowl" Construction and operational stage impacts would be addressed through an overarching Mitigation Enhancement and Management Plan (MEMP), designed in consultation with stakeholders. This would also incorporate enhancements for the Site. See Section 6.
Present within 2km - four SSSIs (from 430m north-east) and four LNRs (from 700m west)	The Site lies within the Impact Risk Zone of the SSSIs however the nature of proposed development at the Site (temporary residential / outdoor activities) is not a category of land use that requires consultation with Natural England. The closest SSSI is designated for its geological interest rather than for its biodiversity. No direct or indirect impacts are considered likely to occur to these Sites due to their distance and lack of connectivity with the Site.
Present - London's Canals adjacent to Site and Copper Mill SINC 60m north-east - Regional / Borough importance	The adjacent Grand Union Canal is hydrologically separate from the Site and also separates the Site from the Copper Mill SINC. No direct impacts are anticipated. Indirect impacts may comprise dust, noise, vibration from construction activities. These would be managed through a Construction Environment Management Plan (CEMP).
Notable / Priority / Rare Terrestrial Habitats S41 habitats onsite: Woodland: w1d, w1f woodlands Standing water bodies: Pond, Lake Rivers and streams: River Colne	The River Colne is sufficiently distant from the proposed development that no significant impacts are anticipated. Construction impacts to terrestrial priority habitats may comprise dust or runoff. Impacts to the lake would be temporary and comprise disturbance of sediment with increases in turbidity, affecting water quality. These would be managed with method statements contained within a CEMP. Loss of woodland would be minimised or avoided altogether; the use of reclaimed land and existing hardstanding / land colonised by invasive buddleia would be maximised.

Receptor	Comments
London BAP habitats: Urban greenspace, Rivers and Streams, Standing Water, Woodland.	Like for like replacement of any lost habitats would be required and enhancement of retained habitat is recommended. The proposed development will actively increase the availability of greenspace to the Borough residents.
Badger	Foraging badger may occur occasionally onsite during construction. Any impacts would be managed through measures contained within a CEMP. Setts currently absent and considered unlikely to occur however a check for setts within 3 months of works commencing will inform any further mitigation measures required. Habitat creation (grassland, hedgerows, fruiting and flowering shrubs) at the Broadwater Sailing Club would benefit this species.
Foraging bats	The Site forms part of a landscape-wide network of suitable foraging sites for the local bat assemblage. No severance impacts would be likely to occur from the proposed development. New lighting would be designed in accordance with best practice and there would be no lighting directed onto the lake or woodland habitat, to ensure no loss of foraging habitat. Foraging bats would benefit from flowering nectar-rich planting that attracts invertebrates, this would be provided along pathways / rides and within woodland glades at the Site and Broadwater Sailing Club. Night-flowering scented climbing plants such as honeysuckle and star jasmine may also be valuable for foraging bats around the activity centre.
Roosting bats	Survey of any PRFs within 20m of proposed development would be undertaken in summer 2023. Should roosts be affected by the proposals, a protected species licence would be sought once planning permission is gained, and mitigation provided per the licence requirements (typically comprising sensitive timing of works, protection of retained roosts during construction, and provision of compensatory bat boxes for any lost roosts on suitable trees). Development would be designed to minimise loss of trees at the Site, and replace any lost moderate or high PRFs (1:1 ratio for high potential features, 1:2 for moderate potential features). Additional roost features would be incorporated into suitable new buildings at the Site and bat boxes provided on mature trees within woodland, around the lake and along the canal.
Woodland breeding birds	Direct impacts to breeding woodland birds from construction may be avoided through sensitive timing of any required clearance works, and

Receptor	Comments
	replacement of any lost suitable habitat. Loss of woodland would be minimised. Indirect impacts may comprise increased disturbance from construction such as noise, dust and vibration, these would be managed through a CEMP. Enhancement measures would comprise increasing the physical structure and biodiversity of existing woodland at the Site, such as by creating clearings and planting additional tree species. Native fruiting and flowering shrubs, scrub and understorey herbs would be planted in bands along woodland edges. Creation of a walkway lined with native fruit trees around the activity centre would provide benefits for woodland bird species in the long term, providing nest sites and harbouring large invertebrate communities (food for birds) as the trees age. Introducing hedgerows onto Site would also create beneficial nesting and foraging habitat for several bird species. To create further nesting sites, generalist bird boxes can be installed on mature trees around the lake.
Wintering birds (lake)	Without mitigation, significant disturbance impacts from construction during the winter months may occur. Construction affecting the lake would be carefully timed to avoid or minimise adverse impacts. Replacement islands for roosting birds would be created prior to loss of any existing islands. Construction on the peninsula along the water edge would be visually and acoustically screened to avoid visual and noise disturbance of the wintering bird populations. Operation of the outdoor activity centre would be during the summer months, thus entirely avoiding indirect disturbance impacts to wintering birds. The Broadwater Sailing Club would continue to operate all year at the Site however their activities and the resultant disturbance are not expected to increase above current levels. The proposed development will aim to limit public access to the south-west and northwest corner of the lake, reducing disturbance below current levels. Enhancement for wintering birds would comprise creation of areas of emergent planting including reedbeds as shelter and foraging habitat. More visually screened areas of the lake will be created, providing a refuge for birds while boats are using the lake. Feeding grounds may also be enhanced through creation of aquatic and emergent planting and

Receptor	Comments
	through enhancements to benefit fish that will increase food for piscivores.
Breeding birds (lake)	Without mitigation, significant disturbance impacts from construction activities within the lake, such as localised dredging works and land reclamation, may occur during the breeding bird season. Construction affecting the lake would be carefully planned and timed to avoid or minimise adverse impacts. Replacement habitat in the form of islands or floating pontoons would be provided within the south-west corner of the lake prior to loss of any breeding bird habitat. New breeding sites would be created as part of the proposed development, with some new islands planted with trees for screening and tree roosting, and some planted with grassland or bare surface for nesting / roosting. This will enhance the provision for breeding waterbirds at the Site. Measures to significantly increase the food provision within the lake for key bird species would be achieved through underwater and emergent habitat creation to support a wider range of plants, macro-invertebrates and fish. This would support and enhance lacustrine ecosystem food webs, raising the carrying capacity of the lake and thereby increasing the size of breeding bird populations over the medium to long-term.
Reptiles	No evidence of reptiles was recorded on the peninsula during reptile presence / likely absence surveys on Site. However, *pers comm* from a local landowner suggests that grass snake have occurred on Site previously. Precautionary measures during Site clearance would be taken, such as a watching brief, detailed within a CEMP. To enhance the site for reptiles, dense grassy areas, scrub and hedgerows should be created along with small ponds and hibernacula, to encourage breeding and egg laying on site. Road verges and woodland edges should be left to grow, creating a thick habitat for reptiles to use. This habitat would be especially valuable with the addition of large rocks and wood piles with clear view of the sun for reptiles to bask in.
Water Vole	Species considered likely absent from the peninsula and sailing club, with low potential elsewhere (species likely absent given records of mink). No direct or indirect impacts would be likely to occur. Enhancement for this species may involve control of mink, allowing the species to migrate into the area. Further enhancement for water vole may comprise increasing the native bank-side floral species diversity; tall

Receptor	Comments
	grasses, rosebay willowherbs, water mint, nettles and emergent rushes may all be of use to water vole.
Otter	Otters are sensitive to noise and other disturbance; they are likely to be deterred from using the peninsula while it is under construction or while in operation (during the summer months). Management of the wider Site would aim to reduce human disturbance along the edges of the lake. Mitigation and enhancement measures would include creation of wildflower meadow with hedges at the current Broadwater Sailing Club facility; this will create sheltered terrestrial areas for couches and feeding, and will replace the habitat lost at the peninsula. Creation of emergent vegetation such as reedbeds will provide shelter and couches if undisturbed. Enhancements that benefit the resident fish population will increase the food resource for otter.
Fish	During construction, noise and reduced dissolved oxygen as a result of disturbed sediment may potentially temporarily impact fish populations. These impacts would be managed through a CEMP. No other significant impacts likely to arise as a result of the proposed development. Biodiversity enhancement measures may target fish, for example creation of spawning ground and sheltered nursery areas. Fish will also benefit from an increase in macrophytes and emergent vegetation, as these would provide shelter, food and increase the numbers of prey animals such as invertebrates. Coir rolls or pallets may be used to introduce new vegetation, including around jetties and pontoons.
Aquatic invertebrates	Construction impacts from dredging and strategic removal of islands, and creation of new islands, will disturb sediment. In the absence of mitigation, this would temporarily impact water quality (potential increased turbidity, reduced dissolved oxygen, release of contaminants stored within sediments). These impacts would be carefully managed through a CEMP. No impacts are predicted from the operation of the proposed development. General biodiversity enhancements within the lake such as areas of aquatic and emergent planting may benefit this taxonomic group.
Terrestrial invertebrates	The most valuable habitat at the Site for invertebrates was found to be a small area of flower-rich woodland edge at the peninsula. The best area would be retained and protected during construction. Woodland edges and glades created through woodland management may be planted with scrub and understorey herbs to enhance the nectar resource for

Receptor	Comments
	invertebrates. Deadwood would be retained onsite. Some of the brownfield materials onsite (rocks / concrete gravel / sand) would be used to create an area with rocks / bare ground, friable substrates, flower-rich grassland, deadwood, scrub and water sources. At least one wildlife pond would be created. Biodiverse roofs with solar panels would be provided on new single-storey structures and may also be created on steel frameworks covering bin stores and skips. Swales between boat washing areas and the lake will stop any grey water contaminating the waterbody, and may enhance biodiversity through planting with ephemeral plant species for use by invertebrates.
Aquatic macrophytes	Very limited aquatic and emergent vegetation is present at the lake; the littoral zone is very homogeneous. Creation of new areas of aquatic and emergent vegetation would be undertaken as part of food web enhancements for fish and breeding birds. This will dramatically increase the number of species and area covered by macrophytes and emergent vegetation at the Site.
Black poplar	Black poplar to be identified / marked and protected from disturbance during development works.
Other BAP species - Hedgehog	General measures to protect small animals from harm during construction will be detailed within a CEMP. This will include placing ramps within excavations or covering them overnight, and capping off pipework. Hedgehog highways should be implemented by creating gaps into any fences to maintain connectivity for the species.
Terrestrial Invasive / Non-native species	Invasive plant species would be appropriately managed and ideally eradicated prior to any development commencing on Site. Buddleia is planned to be cleared from the Site in February 2023. A CEMP will ensure invasive plants are not spread during construction.
Aquatic Invasive / Non-native species	A CEMP for aquatic works would be required to prevent the spread of INNS. Control measures may be targeted as part of ongoing management of the proposed development, to be detailed within the EMMP.

Detailed avoidance, protection, mitigation and compensation measures will be confirmed in the subsequent EcIA which will be produced as part of an Environmental Statement for the proposed development.

6.2 MITIGATION ENHANCEMENT AND MANAGEMENT STRATEGY

The site forms part of a designated SSSI. In accordance with the National Planning Policy Framework (summarised in Appendix C) development proposals should be refused unless significant harm to biodiversity can be avoided or adequately mitigated for. Within a SSSI, development 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.

The overarching goal of the proposed development is to bring deliver public benefits associated with the HSWFAC 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.

The development proposals are at an early stage and the detailed ecological mitigation and enhancement strategy will be developed in consultation with Natural England and other key stakeholders.

The initial suggested principles that would inform the creation of a detailed Mitigation Enhancement and Management Plan (MEMP) are set out below:

- 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;
- Avoidance of terrestrial habitat loss, with enhancement of retained habitat and creation of new habitat of value for nature conservation;
- Increase the amount and quality of lacustrine habitat of potential value to breeding and wintering birds, providing screened areas to act as refuges from visual disturbance, and with increased nesting opportunities;
- Enhancement of food webs within the SSSI, with the ultimate goal of supporting increased numbers and diversity of breeding and wintering birds; and
- 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.

Once the principles and detailed objectives have been agreed with stakeholders, measurable goals for each objective would be formulated and a monitoring regime designed. Detailed method statements with management prescriptions would then be produced in due course. The information would be presented within a MEMP which would cover a period of 30 years initially, to secure the biodiversity gains.

7.0 SUMMARY & CONCLUSION

Greengage Environmental Ltd was commissioned to undertake a Preliminary Ecological Appraisal (PEA) by London Borough of Hillingdon of a Site known as the proposed Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon. The Site is located at Broadwater Lake, Moorhall Road, Hillingdon.

A suite of previous surveys has been undertaken, including a 2021 PEA and protected species surveys. The results have been incorporated into this assessment.

Value for a number of notable and protected species and habitats has been identified at the Site. Recommendations have been made for further survey where necessary.

High level mitigation, compensation and enhancement measures are described to enable legislative and policy compliance (see context at Appendix C).

The proposed development will be subject to an Environmental Impact Assessment. A full assessment of impacts will be made and further detail on avoidance, mitigation, compensation and enhancement will be set out within an Ecological Impact Assessment (EcIA).

Consultation with stakeholders should be undertaken to agree the mitigation, enhancement and management strategy for the Site.

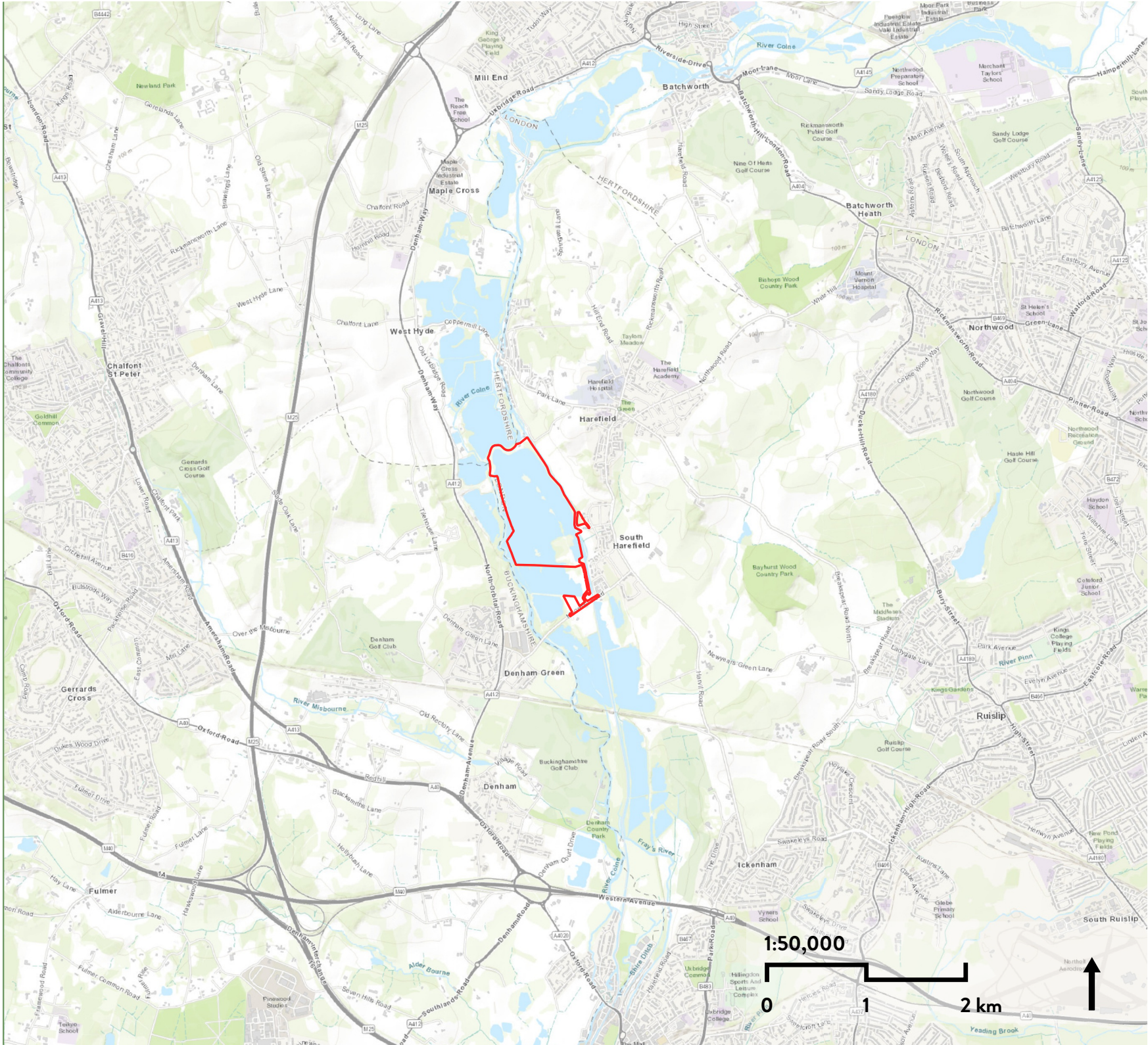
Once finalised, key actions would be included within MEMP and CEMP documents for the Site which could be secured through planning condition.

APPENDIX A MAPS

- Site Location
- Component Areas of the Site
- Mid-Colne Valley SSSI and SINC
- NNRs within 10km
- NNRs within 2km
- SSSIs within 10km
- SSSIs within 2km
- LNRs within 2km
- SINCs within 2km
- Baseline Habitat Map 1: Sailing Club / North end of Site
- Baseline Habitat Map 2: East side / Access Road
- Baseline Habitat Map 3: Peninsula and south of lake
- Baseline Habitat Map 4: Moorhall Road Entrance to Site
- Baseline Habitat Map 5: South-west corner of the Site
- Peninsula surveys - key information (badger, otter, water vole, GCN, terrestrial invertebrates)

HWSFAC BROADWATER LAKE

Site Boundary



Title: Site Location

Drawn by: JT
Date: 14/02/2023

Reviewed by: SH
Date: 14/02/2023

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

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HWSFAC BROADWATER LAKE

- Red Line Boundary

Component Areas

- Lake
- Lagoon
- Peninsula
- Existing Islands
- Broadwater Sailing Club Parking Area & Adjacent field
- NW Grassland Area
- River
- Eastern Woodland & Access Road
- Southern Woodland
- Offsite - Field to South on Moorhall Road
- Offsite - Woodland to East
- Offsite- Remaining Hardstanding Areas

Title: Site Baseline Component Areas

Drawn by: AH
Date: 18/09/2023

Reviewed by: SH
Date: 18/09/2023

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

Greengage