Appendix 7.10

BAT SURVEY REPORT (OCTOBER 2023)

Greengage

Brighter strategies
for greener projects

Client: London Borough of Hillingdon

Project: HWSFAC

Report: Broadwater Lake 2023 Bat Survey Report

QUALITY ASSURANCE

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1.0 EXECUTIVE SUMMARY

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon to undertake surveys to inform an ecological impact assessment for bats at 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 report 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 Sailing Club (BSC) facilities at the north end. A canal bridge supports electricity cables that supply the peninsula, and this bridge requires refurbishment as part of the development.

Surveys undertaken in 2021-22 at the Site by Ecology By Design, and radio-tracking monitoring surveys by HS2 in 2019 and 2022 covering the Site and wider area, provided information as to the composition of the bat assemblage utilising the Site for foraging, and allowed the importance of the Site for foraging bats to be assessed. The previous surveys found low to moderate levels of foraging across the entire Site for an assemblage of up to 10 species, and this was corroborated during emergence surveys in 2023. The local bat assemblage is valued at the Borough level and the Site also has Borough level importance for bats.

Previously, due to the absence of detailed development plans and the large size of the Site, an assessment for roosting bats was not undertaken. The HS2 radio-tracking surveys identified a number of bat roosts for four species across the Site, although these did not provide a comprehensive assessment of roost potential for the Site. Therefore, once detailed development plans were available, surveys for roosting bats were undertaken for this assessment. Utilising the information from the 2021-22 surveys and HS2 data, as well as the surveys undertaken for this report, the relative importance of the Site for bats has been established and an impact assessment for bats has been produced.

Ground level tree assessments and building assessments were initially undertaken. These confirmed four low potential buildings at the peninsula and one (the clubhouse) at the BSC, moderate potential within the canal bridge, and the presence of 29 low, moderate and high potential trees within areas potentially affected by development (within the area of direct impacts and adjacent areas liable to be disturbed up to 20m distance).

The ground level tree assessments allowed the likely location of a soprano pipistrelle day roost (HS2 roost E), identified in the HS2 data, to be confidently established within one of several low potential features provided by a group of three willow trees within woodland to the north-east of the peninsula. This is outside the impact area of proposed development. Other HS2 roosts identified through radio-tracking were not positively confirmed either within the footprint of the Proposed Development or within 20m. It is considered they are further away (>20m) from the impact areas of the Site and thus will not be affected directly or indirectly. One HS2 radio-tracked roost (HS2 roost M, a day roost for a Nathusius' pipistrelle) was indicated on an island where the trees (regenerated scrub only 5m tall) are too young to support PRFs. It is considered likely the bat was night-roosting (i.e. perching on a bare branch) and will have moved to a more substantial PRF at or close to dawn (a commonly observed

behaviour of bats). Although the island will be removed as part of the Proposed Development, no impacts to bats are therefore predicted.

The buildings, the bridge and those trees with moderate and high potential were subjected to presence / likely absence surveys comprising dusk emergence surveys, in accordance with best practice guidance[1]. Night vision aids (infrared cameras) were utilised on all but one of the surveys. The surveys confirmed the presence of soprano pipistrelle roosts - two bats were observed day / night roosting within the canal bridge, while three bats were observed day roosting within an adjacent black poplar tree. The black poplar may also be considered a mating roost. The roosts are valued at the Site level (i.e are of low conservation importance) as they support low numbers of a very common and widespread species, and will be only a very small part of a much larger roost resource utilised by the same bats within the locality.

Works to refurbish the canal bridge would destroy the roosts within it. Due to the scale of potential works, the adjacent black poplar and its roosts may also be disturbed or damaged inadvertently. All bats are protected by UK legislation. Where only small numbers of common species are liable to be impacted and the roost has a low conservation value, a Bat Mitigation Class Licence (BMCL) may be used:

- To disturb and capture up to 3 'common or widespread' bat species;
- To damage or destroy up to 3 'low conservation status roosts'; and
- In the case of low or temporary impacts on bats or their roosts.

Recommended mitigation actions to be implemented under the BMCL licence include:

- Two bat boxes placed on nearby trees as rescue boxes and as replacement roosts during the works;
- Timing of works so they are undertaken when bats are most likely to be absent;
- Inspection of the roost features by a licenced ecologist prior to works proceeding / destruction of the bridge roosts;
- Trimming of black poplar branches to reduce the likelihood of damage to the tree and its roosts; and
- Either creation of functionally identical roost features on the underside of the newly repaired bridge, or new roosts created on top of the bridge.

The impact assessment has taken account of design-in 'embedded' mitigation to avoid and minimise potential impacts. A ‘bat sensitive’ lighting strategy has been designed to avoid disturbance to commuting bats, with zero light spill onto retained woodland through the use of bespoke screens / panels. Clearance of trees across the Site has been minimised through the careful placement of roads, pathways and structures such as activity shelters.

There are numerous ecological enhancements proposed for the Site; wildlife-friendly planting will enhance the Site for a range of species and benefit bats by increasing the invertebrate resource at the Site, and bat boxes along footpaths and access roads will increase the roost resource at the Site.

Overall, the design of the Proposed Development and the recommended mitigation above ensures no significant negative effects to bats from construction, and an overall positive effect significant at up to

the Borough level over the long term (at operation) with the provision of additional PRFs and improved foraging resources.

2.0 INTRODUCTION

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon to undertake an assessment of potential bat roosts at 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 assessment 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.

The assessment aims to assess the relative importance of the Site for roosting bats and to confirm the presence/likely-absence of roosting bats.

Surveys undertaken in 2021-22 by Ecology By Design and radio-tracking monitoring surveys by HS2 have already provided sufficient information as to the composition of the bat assemblage utilising the Site for foraging, and allowed the importance of the Site for foraging bats to be assessed.

Potential to support roosting bats was not assessed in 2022 due to the absence of detailed development plans and large size of the Site.

Detailed proposals for the Proposed Development have now been produced allowing the identification of potential impact areas (locations where construction and operational activities are proposed to occur, plus a 20m buffer) - together these comprise the direct and indirect impact areas (shown as Figures A.1-A.3 in Appendix A).

The detailed proposals include a significant amount of embedded mitigation which has been designed to avoid impacts to protected species, including bats. As such, this has informed the scope of the surveys.

2.1 AIMS OF SURVEY

The surveys aimed to:

- Assess the buildings, structures and trees within the Direct and Indirect Impact Areas for their potential to support bat roosts; and
- Find and characterise roosts by observing emergence or re-entry behaviour.

By using a collation of existing data for the area to support the survey, it is possible to determine the presence/likely-absence of roosting bats across the site and in the wider area. This information can then be used to determine the form and extent of any licensing, mitigation, compensation or enhancement that may be appropriate.

2.2 SITE DESCRIPTION

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

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

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

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

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

2.3 PROPOSED DEVELOPMENT

During the construction phase, the following activities have been considered for their potential impacts to bats and their roosts, and have informed the scope of works.

Works at the peninsula will mainly comprise clearance of trees on hardstanding outside of woodland habitat. Many of the best trees will be retained as they have been designed into the Scheme (such as to frame car parking areas and behind new buildings) but with coppicing of some trees to improve their form. Within woodland, existing gaps between trees have been exploited through which the access road and footpath will pass; very few trees will need to be cleared and only minimal trimming back of branches will be required in most instances. A footpath will weave its way through and along the woodland edge (with only limited clearance of low-level branches and scrub and removal of some lumps of concrete), and a pedal go-kart track will utilise part of an existing access track and exploit existing gaps in trees.

At the north end of the peninsula, and adjacent to the island / isthmus projecting north at the tip of the peninsula, land reclamation will occur for 2 months in October and November, including removal of two islands. Following this, the construction of the facilities building, boat shed, car parking spaces, beach and boat storage area will occur with completion anticipated for August 2025. No tree clearance is required for these works however works will occur directly adjacent to retained woodland.

Works to the access road from Moorhall Road to the peninsula will comprise resurfacing of the existing footprint and will not necessitate clearance of vegetation; there will be no change of use and no new lighting. Vegetation directly adjacent to the road is mainly bramble scrub; mature trees / woodland line the adjacent canal but the trees are typically behind fences or along the far side of a ditch.

Works along the access road from the peninsula to the BSC will comprise a limited area of clearance of low overhanging tree branches to facilitate emergency vehicle access. Existing hedges and fences forming the boundary with the adjacent Grand Union Canal along the length of the access road will be repaired and strengthened.

Works at the BSC will comprise demolition of buildings and removal of some concrete hardstanding. No trees are present within the clearance area or within 20m.

The areas and tree groups within which tree clearance or management is proposed are shown in the RSK Arboricultural Impact Assessment (Stage 1 and 2 Arboricultural Impact Assessment Report ref: 2484793 dated 28/09/23 rev 4). These are summarised below in Table 2.1. The area of tree clearance provided is the maximum (i.e. a worst case scenario) and does not consider micro-siting to avoid tree felling or the presence of gaps beneath tree canopies - the final clearance will be much smaller in extent.

Table 2.1 Arboricultural tree designations and associated clearance areas

Tree Plan Designation	Planned works	Maximum clearance	Notes
G1 - isthmus / island 6 adjacent to reclaimed land	Clearance of trees and shrubs to create activity shelters - natural gaps will be exploited to minimise tree loss.	162m2	Use of desire line for path
G2 - peninsula (north lowland mixed deciduous woodland)	Route of access road to reclaimed land area. Approximately 7 trees / shrubs to be felled.	72m2	Retained tree crown overhanging road. Footpath will exploit natural gaps between trees.
G3 - peninsula (north lowland mixed deciduous woodland)	Route of access road to reclaimed land area - 8 stems of shrubs / trees fall within likely clearance area. Pedal go-kart track - minimal loss of shrubs.	235m2	Eastern extent of tree parcel.
G4 - peninsula (north lowland mixed deciduous woodland)	Pedal go-kart track and footpath - gaps between shrubs and trees to be exploited - minimal loss of shrubs and possibly felling of 1 tree.	136m2	
G5 - north edge of main woodland - (north lowland mixed deciduous woodland)	Footpath through trees and shrubs - natural gaps will be exploited - no tree loss will be	None	

Tree Plan Designation	Planned works	Maximum clearance	Notes
	allowed and minimal trimming / removal of shrubs.		
G5 - south-west corner of main woodland	Footpath and bird hide - gaps will be exploited where possible and minimal trees removed.	TBC	Trees young and dense, growing on hardstanding
G5.1 - activities area on hardstanding	Minimal clearance to facilitate footpath. activities and caving - natural gaps present that can be exploited as well as areas where buddleia dominant.	703m2	Trees growing densely on hardstanding in some areas; other areas choked with buddleia or bare.
G6 - south-west corner of peninsula	Footpath and slight impingement onto access road. Pruning and minimal clearance of live trees to facilitate the plans	87m2	Hardstanding with live and dead thin birch trees (underlying grassland and herbs); habitat / deadwood to be retained in situ and protected
G9	Footpath and activity shelter - gaps to be exploited and no tree felling planned	None	
G9.1	Infilling of ditch and removal of selected trees growing on concrete to facilitate activities.	859m2	
G10	Removal of thin birch and buddleia on concrete to create open activities area and camping area, and construct toilet block	2325m2	Trees have spread-out roots on the surface of the concrete and are liable to fall over once too large
G11	Parking and access road	16m2	
G12	U group removal	7m2	
G26	Boat yard	938m2	
G27	Boat yard	140m2	
G28	Workshop and activity shelter	1068m2	
G31	Access road and parking	321m2 128m2	

Tree Plan Designation	Planned works	Maximum clearance	Notes
		54m2	
G32	Anglers store	96m2	
G33	Category U	34m2	
Individual tree removal - T11, T13, T47, T49, T50, T51, T57-68, T72	B trees - 49, 51	19 trees	
Island 1	Removed - island has scrub (trees <5m tall; have regenerated from previous cutting under management for birds)	1312m2	

During operation, there will be some new lighting installed, and existing and new habitats and trees will be managed for their ecological value. The impacts of indirect disturbance from new lighting have been considered within the Site and up to 20m distance, taking into account designed-in features such as protective barriers and intervening vegetation. The discussion on bats and lighting is set out in Section 5.

3.0 METHODOLOGY

A desk study comprising review of available records and survey results was undertaken, along with a number of site surveys. The methodology is set out below. The surveys were undertaken in accordance with Bat Conservation Trust (BCT) guidelines (BCT, 2016)[1].

3.1 BASELINE INFORMATION

A PEA has been produced for the Site (ref: 552023shFeb23FV01_PEA) as well as an Ecological Impact Assessment (EcIA). Relevant baseline information is included in the sections below.

Desk Study

Local Records Centre

A review of readily available ecological information and other relevant environmental databases (included Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) Website[2]) 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.

HS2

In May 2023 HS2 provided radio-trapping and tracking data for bats from 2019 and 2022. The 2019 data are publicly available while the 2022 data have not yet been published to the public however HS2 have expressly given their consent for its use to inform this assessment. The data was in the form of spreadsheets with co-ordinates - the co-ordinates were used to identify records of relevance to the Site and Proposed Development.

There are slight differences between the datasets provided.

The 2022 survey methodology comprised capture of bats at the Site on the peninsula and at suitable locations in the surrounds; selected bats were fitted with a radio-tag and then tracked using radio-tracking equipment to determine how the bats use the landscape and the location of roosts. The data provides detailed information on the local bat population of direct relevance to the Site, including a species assemblage as well as the breeding status of bats trapped, and the approximate location of roosts that that tagged bats utilised during the tracking period.

2019 HS2 data was also assessed; trapping locations were further south-west away from the Site at Savay Lake, however, two roosts were still identified at the Site and the 2019 bat assemblage data was similar to the HS2 data from 2022.

The HS2 data has been comprehensively reviewed and where relevant incorporated into this assessment.

There are a number of limitations with the HS2 bat radio-tracking data (inherent to the technique and not to the HS2 survey effort) that should be borne in mind:

- Radio-tracking can only find roosts of bats that were tagged, and HS2 only had a licence to tag four species. Other species were not tagged and therefore their roosts are not represented, should they be present.
- The roost locations are approximate. Typically, radio-tracking has an accuracy of between 20 – 100m (or more) depending on the distance of triangulation, although if the night radio-tracking is followed up with daytime searches for day roosts, the exact tree or building can be determined. No survey results of daytime inspections or dusk emergence surveys of the identified roosts were provided by HS2, meaning that identification of the exact roost tree or feature was probably not part of the survey effort (this would be appropriate as the focus of HS2 survey efforts and data capture would not be on roosts located outside of their own red line boundary). Furthermore, although HS2 surveyors had full access to the Site, they would have been constrained from closely locating exact roost trees by the presence of dense buddleia (which was not cleared until February 2023). Therefore, the location of the roosts is assumed to be approximate with a 50m buffer. A map showing the HS2 roosts with a 50m buffer has been provided in Appendix F.
- Accurate characterisation of the roosts was also not undertaken by HS2 (again this requires a dusk emergence survey of the roost to be done), so roost classification is assumed to have been made on a precautionary basis based on the sex and breeding status of the tagged bat. As such, a 'maternity roost' identified by HS2 data may only have been occupied by a single post-lactating female or by a juvenile bat with no signs of breeding late in the maternity season. Therefore, large numbers of bats or a roost of high conservation value cannot be assumed to be / have been present.

Bat Activity Surveys

Bat activity transect surveys and bat fixed point automated surveys were conducted during August-October 2021 and April-July 2022 by Ecology by Design (report dated November 2022) at the peninsula and access road for the Proposed Development. The data was used to inform the baseline in terms of the bat assemblage and the level of bat activity (and likelihood of roosts) at the Site within areas liable to be impacted by the Proposed Development.

3.2 POTENTIAL BAT ROOST ASSESSMENT (PBRA)

Buildings onsite were assessed for bat roost potential during walkover surveys between November 2022 and July 2023.

During the walkover surveys, buildings and structures were assessed externally and internally (where access was available) to identify Potential Roost Features (PRFs) and access points. The building / structure was then assigned an initial classification as to the potential value of roost features.

The value is typified by the likely frequency of use and numbers of bats that may potentially use the feature. This information informs the next steps for survey:

- Low potential: one survey;
- Moderate potential: two surveys; and
- High potential / confirmed roosts: three surveys.

Accessible potential roost features on the small buildings at the peninsula (cracks, crevices, holes) were subject to endoscopic examination on 10/08/23 in order to confirm the assessment of potential. The club house at BSC was not endoscoped; PRFs here were only access points to much larger areas behind extensive cladding and therefore it was considered unlikely that the endoscope could provide useful further information.

3.3 ASSESSMENT OF TREES

Trees within the direct and indirect impact areas were assessed for their potential to support bat roosts; the methodology is set out below. Maps of the area assessed (Figures A.1-A.3) are provided in Appendix A.

Ground Level Tree Assessment (GLTA)

Individual trees were not assessed for PRFs initially due to the presence of dense scrub and absence of detailed development plans at the time of survey. Buddleia was removed in February 2023, allowing better access and visibility for the assessment of trees.

In May 2023 a Ground Level Tree Assessment (GLTA) was undertaken to identify trees with PRFs approximately within 20m of planned development (i.e. within the direct and indirect impact zones).

Trees were inspected from the ground using binoculars and a high-powered torch. PRFs such as cracks, holes, thick-stemmed ivy etc were recorded, and assigned an initial classification as to the potential value of roost features.

The locations of roosts that were identified by HS2 radio-tracking were targeted (where these occurred close to the impact area of the development), to try to locate potential trees in which the recorded roosts could occur.

The value of roost features is typified by the likely frequency of use and numbers of bats that may potentially use the feature. This information informs the next steps for survey, which for trees comprises:

- Low potential: no further surveys required;
- Moderate potential: two presence / absence surveys required; and
- High potential / confirmed roosts: three presence / absence surveys required.

PRF Inspections of Trees

Following the GLTA, a PRF inspection of trees with potential for moderate or high value bat roosts was undertaken on 5th July 2023. A small number of trees with low potential features were also assessed.

Moderate and high potential features on trees were endoscoped to determine the dimensions of access points and associated internal cavities, and to characterise the PRF in terms of its capacity (number of bats it might support) and suitability for different types of roost (maternity, hibernation, summer / day roost etc). Some features assessed as low potential were also endoscoped, to confirm the assessment. Access to the PRFs was gained either from the ground, using a ladder, or using climbing equipment.

This survey type also represents a survey for the presence of bats, where there is confidence that the feature has been fully inspected (i.e that there are no hidden cavities where the endoscope could not access).

Desk-based review

Following the PRF inspections, the trees were then subject to a desk-based review to more accurately determine those which fell within an area that may be impacted by the development, or where no impacts were likely to occur given their location and the designed-in mitigation. This determined which trees should be subjected to emergence surveys.

3.4 PRESENCE / ABSENCE SURVEYS

Per best practice guidance, within the likely impact areas of a development, buildings with potential to support roosts, and trees with moderate or high potential to support roosts should be subjected to presence / likely absence surveys. Emergence surveys are surveys undertaken around sunset to observe any emerging bats; the surveys commence at least 15 minutes prior to sunset in order to observe early emerging bats (light tolerant species) and continue for at least 1.5h after sunset to ensure late emerging light intolerant species are also observed if present.

Emergence surveys were undertaken between May and September 2023. Each survey was undertaken in clear, still and warm conditions with sunset temperatures between 11.9°C and 24.9°C. The dates, timings and weather conditions at the start and end of each survey have been provided in Appendix B.

Surveyors were positioned to view the identified PRFs, or where there were numerous PRFs, vantage points were utilised to gain a full view of the PRFs present.

Surveyors were each equipped with an Echometer Touch Pro bat detector to hear, visualize and record bat calls and identify bats to species level.

Night vision aids were used on the majority of surveys. Canon XA11 cameras mounted with infra-red lamp were used to record footage of the surveys. Where a surveyor reported a bat emergence or bat activity, the footage was reviewed by a suitably qualified bat ecologist to verify the field observations.

3.5 SURVEYORS

The ground level tree assessments were performed by Molly Dailide, a professional ecologist with 10+ years' experience of undertaking assessments for bat roost potential alongside a wide range of other survey competencies.

The PRF inspections using an endoscope were led by Vinnie De'Iacomo who has a Natural England Level 2 Class Licence for bats, a tree climbing qualification and 10+ years experience. Vinnie was assisted by Jaimy Hodgetts, a senior ecologist with 4 years' bat survey experience and a tree climbing qualification.

The majority of bat emergence surveys were led by Stephanie Harper. She has 20+ years of bat survey experience and a Natural England Level 1 class licence for bats. Stephanie also undertook a number of the initial surveys comprising ground level tree inspections and building assessments.

Dean Martin also led one emergence survey at the Site. Dean has 15+ years' experience and a Natural England Level 2 Class Licence for bats.

Bill Haines also led one emergence survey at the Site. He is an ecologist with over 25 years' experience in undertaking professional ornithological surveys and 10+ years experience in surveying for bats. He is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

The surveys assistants were:

- Matthew Cameron: an ecologist with a degree in Zoology (BSc Hons) and with one season of bat survey experience; in addition to which he is an experienced birder (10+ years) and competent botanist.
- Jeremy Palmer: experienced bat surveyor with 5+ seasons of experience; he has a Diploma in Ecological Consultancy from University of Wales Aberystwyth and works as an Ecology Data Manager for major UK infrastructure projects;
- Margaret Bedingham: experienced bat surveyor with 5+ seasons of experience;
- David Palmer: bat surveyor with 2 seasons of experience;
- Robert Palmer: assistant ecologist with one season of bat survey experience. He has received 8h of onsite training by a senior ecologist and was supervised during the survey by the lead ecologist Stephanie Harper;
- Remy St John-Reid: ecologist with four years of bat survey experience. She has a Certificate in Ecology & Conservation Biology from Exeter University and is currently undertaking a part-time BSc in Environmental Science with the Open University. She has a total of eight years working in conservation volunteering and practical habitat management and one year experience of ecological consultancy.
- Arthur Owens: undergraduate ecologist with <2 weeks bat survey experience - he received preparatory training prior to attending Site and was supported and supervised during the surveys by an experienced second (Matthew Cameron).

All assistants with 1 season of experience or less were supported and monitored by the survey lead during the surveys.

3.6 AUTHORS

Stephanie Harper has a BSc (Hons) and PhD in Environmental Sciences, and a Natural England Level 1 class licence for bats. She has 15 years' experience in ecological survey and consultancy.

Mike Harris has a Bachelor's degree in Environmental Biology (BSc Hons), a Natural England Great Crested Newt Licence and Dormouse Licence, is a Chartered Environmentalist (CEnv) and Full member of CIEEM. Mike has over 20 years' experience in ecological surveying and has undertaken and managed numerous ecological surveys and assessments.

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

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

3.7 LIMITATIONS / COMMENTS

Potential Bat Roost Assessments - Buildings

The peninsula buildings were found at different times throughout the survey season, being hidden by dense unmanaged vegetation and abandoned for several years. The last to be found was the pumphouse which was discovered around the end of July 2023.

The majority of the buildings were fully accessed and inspected both inside and out (although at different times; originally the storage shed was secured but later in the season this was unlocked and left ajar). The exception was the electricity sub-station which has remained secured and access was not gained to the interior.

Ground level tree assessments

It was not possible to closely assess trees on islands for their bat roost potential due to potential disturbance to birds, therefore an assessment was made from at least 10-20m distance on a boat. However, the trees were typically fairly young regrowth from fallen willows and mostly very scrubby with thin dense growth; features suitable for bats are typically absent. It was therefore possible to make a confident assessment of the trees.

All trees within the direct and indirect impact areas on land (where foot access was possible) have been assessed.

PRF Inspections of Trees

It was not possible to endoscope a few trees for health and safety reasons; such reasons include the tree dangerously overhanging a watercourse or road, extensive deadwood which may cause a fall, etc. This affected trees T13, T14 and T21 and has been indicated in the table of results in Appendix D.

Emergence surveys

There were no significant limitations to the bat surveys. The surveys were undertaken at a suitable time of year and in suitable weather conditions.

4.0 RESULTS

4.1 DESK STUDY

Data search

The data search returned records of nine species of bat within 2km: 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, with the latest submitted records dated 2020. Barbastelle was recorded on Tilehouse Lane 1300m away in 2017.

Previous Surveys

HS2

The HS2 radio-tracking surveys onsite and in the surrounds within 2km caught a range of bat species: the most commonly occurring species was soprano pipistrelle, along with common pipistrelle, Nathusius's pipistrelle, brown long-eared, Daubenton's and Natterer's. Serotine, noctule, Leisler's and barbastelle were also recorded to occur occasionally.

Onsite Bat Activity Surveys 2021-22

The 2021 transect surveys onsite 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.

Summary of bat assemblage

The desk study information, combined with the data from the 2021-22 bat activity surveys undertaken onsite, and the information from the HS2 radio-tracking surveys confirmed that the local bat population comprises at least ten species of bat. The most commonly occurring species as reported during surveys undertaken for the Site and for HS2 was soprano pipistrelle (Pipistrellus pygmaeus), along with common pipistrelle (P. pipistrellus), Nathusius's pipistrelle (P. nathusii), brown long-eared (Plecotus auritus), Daubenton's (Myotis daubentonii) and Natterer's (M. nattereri). Serotine

(Eptesicus serotinus), noctule (Nyctalus noctula), Leisler's bat (N. leisleri) and barbastelle (Barbastella barbastellus) occur occasionally.

The following additional species may also be present: whiskered bat (M. mystacinus) and Brandt's bat (M. brandtii).

This is a moderately diverse bat assemblage and given the occasional presence of barbastelle, the bat assemblage is valued at the Borough level.

Summary of bat activity

The woodland fringes around the shores of the Site, woodland edges on the peninsula and isthmus, islands on the lake, the access road along the eastern edge of the Site and the narrow access track corridors running through the Site, provide good commuting and foraging habitat for bats.

The HS2 radio-tracking data recorded locational fixes in all these locations, confirming that the radio-tracked bats used the terrestrial habitats for foraging and commuting. The water of the lake has also been shown by radio-tracking to be used by commuting bats, although the extent to which foraging occurs over water will depend on the species; certain species are known to forage over water, particularly soprano pipistrelle, Nathusius' pipistrelle and Daubenton's bat.

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 Site is considered to have Borough importance for foraging bats.

Bat Roosts

Activity Surveys

The bat activity surveys in 2021-22 at the peninsula and access road recorded bat calls close to emergence and re-entry times for bats to and from their roosts on multiple occasions. 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;
- Noctule / serotine / Leisler (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.

HS2 roosts

HS2 radio-tracking surveys recorded 14 roosts onsite; these are shown as Figure F.1 in Appendix F. The locations cannot be considered to be accurate (this is a limitation of the technique) and it is reasonable to assume that the true roost location may vary by 20-100m. A 50m buffer has been indicated.

The roosts were for four bat species (soprano pipistrelle, Nathusius', Daubenton's and Natterer's) and included summer / day roosts, night roosts or feeding perches (locations where a bat paused / rested for 20mins or so during the night) and maternity roosts.

Limitations with the radio-tracking data mean that 'maternity roosts' may include features that would only support individual bats or low numbers of bats.

The co-ordinates of a Nathusius's pipistrelle day roost (HS2 roost M) are given on an island where there are no potential bat roost features, as the limited area of trees (regenerated scrub) on the island is too young to support PRFs. The precision of radio-tracking can be variable and signal may bounce from the water or clutter, causing inaccuracy of the identified location. This roost could be a bat box present another island to the north which is the closest PRF on an island, or in trees to the south or east. Equally the bat may have been perching on a branch (with no PRF) during the night or close to dawn, and then moved just before dawn to a roost - such behaviour is frequently recorded with radio-tracking survey techniques (where bats are tracked during the day as well as at night).

The tagged bats were found to use multiple roosts across the wider area, of which the Site provided only a small proportion.

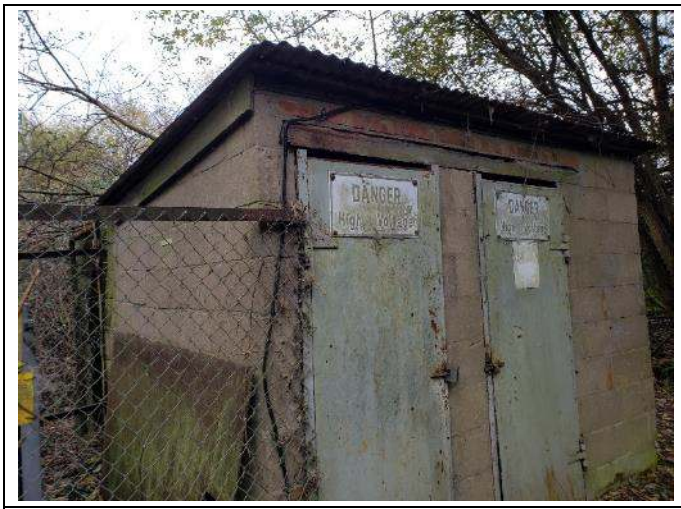
4.2 PBRA OF BUILDINGS AND STRUCTURES

The detailed results of the PBRA are shown in Table 4.1.

A brief summary is provided below.

- At the peninsula, there were four small breezeblock-built buildings with plywood and steel profile panel flat roofs, supporting a range of features with low bat roost potential. Two (fisherman workshop and storage shed) were set beneath a willow tree at the woodland edge, the pumphouse was at the edge of the southern lake inlet adjacent to trees, and the electrical substation was located on hardstanding and surrounded by self-set buddleia;
- The Broadwater Sailing Club single storey building had low potential for roosting bats beneath wooden cladding and in vents and holes in the façade;
- A canal bridge that carries cables to the Site was of steel construction sat atop brick plinths. There were cracks in the brick plinths, gaps between the steel structure and brick plinths, and rot holes in the corrugated steel panelling underneath the bridge, providing moderate potential to support bat roosts.

Table 4.1 Potential Roost Features identified within buildings and structures at the Site

	Electrical sub-station - single skin breezeblock walls and metal panel roof. Crack to rear breezeblock wall. Ventilation gaps above doors lack cobwebs. Sub-station is live with audible humming. Internally the building would be draughty with a lack of thermal insulation; there would be a likely absence of sheltered cavities internally as space occupied by cables / transformers. **Low potential.**
	Electrical sub-station - gap beneath barge board. **Low potential.**
	Fisherman's storage shed. Gap between single-skin breezeblock walls and metal panelled roof all around building. **Low potential.** Roof damaged by fallen branches / tree likely with holes.

	Fisherman's storage shed. Initial inspection - gap between steel door and frame affording entry to the interior. (Months later door found unlocked and left open). Strong chemical smell internally (hydrocarbon likely petrol). Roof lined with plywood which was falling in from water damage. Interior draughty and damp lacking thermal stability. Heavy cobwebbing in places, **absence of signs of bats. Negligible potential.**
	Fisherman's storage shed - close up of roof and wall - may provide crevices for individual bats during summer. **Low potential.**
	Fisherman's storage shed - rear view with holes at the top of the wall and drilled through brickwork providing internal access to bats. Crevices provided between roof and walls. **Low potential.**

	Workshop - no door and ivy-covered metal panel roof.
	Workshop - internally very damp. Gap between roof and breezeblock walls. Wooden rafters providing suitable feeding perch for bats. **Absence of signs of use by bats.** **Low potential** - opportunistic summer or night roost only for individual bats.
	Pumphouse - single skin breezeblock walls with steel panel roof and no door. Internally the building was draughty with a lack of thermal insulation. **Absence of signs of use by bats.** **Low potential.**
	Pumphouse - gap between roof panel and walls. May provide crevices for individual bats during summer. **Low potential.**

	Canal bridge. **Low and moderate potential features present** in multiple locations Ivy cover on bridge supports may hide crevices / cracks behind. **Low potential.**
	Canal bridge. View of far side. Ivy cover on bridge supports may hide crevices / cracks behind. **Low potential.**
	Canal bridge - cracks in brickwork of supporting plinths, with cavities behind (unlikely to be dry however). **Low potential.**

	Canal bridge underside - corrugated sheet steel panelling which has corroded to create multiple holes and splits along the joints, exposing the flint ballast above. **Moderate potential.**
	Close up of rotted and split corrugated steel panelling.
	Canal bridge. Gap between bridge and brick plinth. **Moderate potential.**

4.3 ASSESSMENT OF TREES

29 trees were identified during the initial GLTA to have low, moderate or high potential features. Photographs of the trees assessed from the ground (GLTA) are presented in Appendix C.

The combined results of the ground level tree assessments (GLTA) and the endoscopic examinations of the subsequent potential roost features (PRF inspections) are presented in Table D.1 in Appendix D. The table sets out the tree number and the initial assessment of potential it was given from the ground; this is then accompanied by the subsequent results of the endoscopic examinations and the final potential to support bat roosts is provided.

Following the endoscopic assessments and desk-based locational review, four trees (T3, T14, T17 and T21) with moderate potential roost features were identified to be located within the indirect or direct impact area of the development, and where further survey would inform any potential additional mitigation required. These trees were taken forwards and subjected to emergence surveys. The trees are shown in Figure 4.1 below.

The remaining trees had either low or negligible potential (requiring no further surveys), were greater than 20m from potential disturbance (T12, T19, T20), or were located within an area to be fully protected from disturbance during development, surrounded by buffering vegetation, and with designed-in mitigation comprising very low-level lighting (T13, T15).

HS2 roost E was approximately identified to be one of three low potential features within a small group of willows with failed stems and fallen and hung-up branches. None of the features present on the trees had any depth or thermal stability, but could support one bat using the features opportunistically as a summer day roost. The group of trees was greater than 20m from the direct impact area of the development and thus outside the indirect impact area.

Comment

The footprint of the Proposed Development has been tailored to minimise impacts to bats, by maximising development on hardstanding and taking advantage of existing gaps between trees. Nevertheless, the Site has a smaller resource of moderate and high potential roost features than would otherwise be suspected from its size alone and the presence of woodland. This is largely due to the lack of over-mature and veteran trees (which are present only along the canal). The woodland is not old (mostly less than 50 years old and some areas much younger as quarrying was still ongoing in 1986) and has been limited in development by the underlying artificial ground conditions which predominate across the Site.

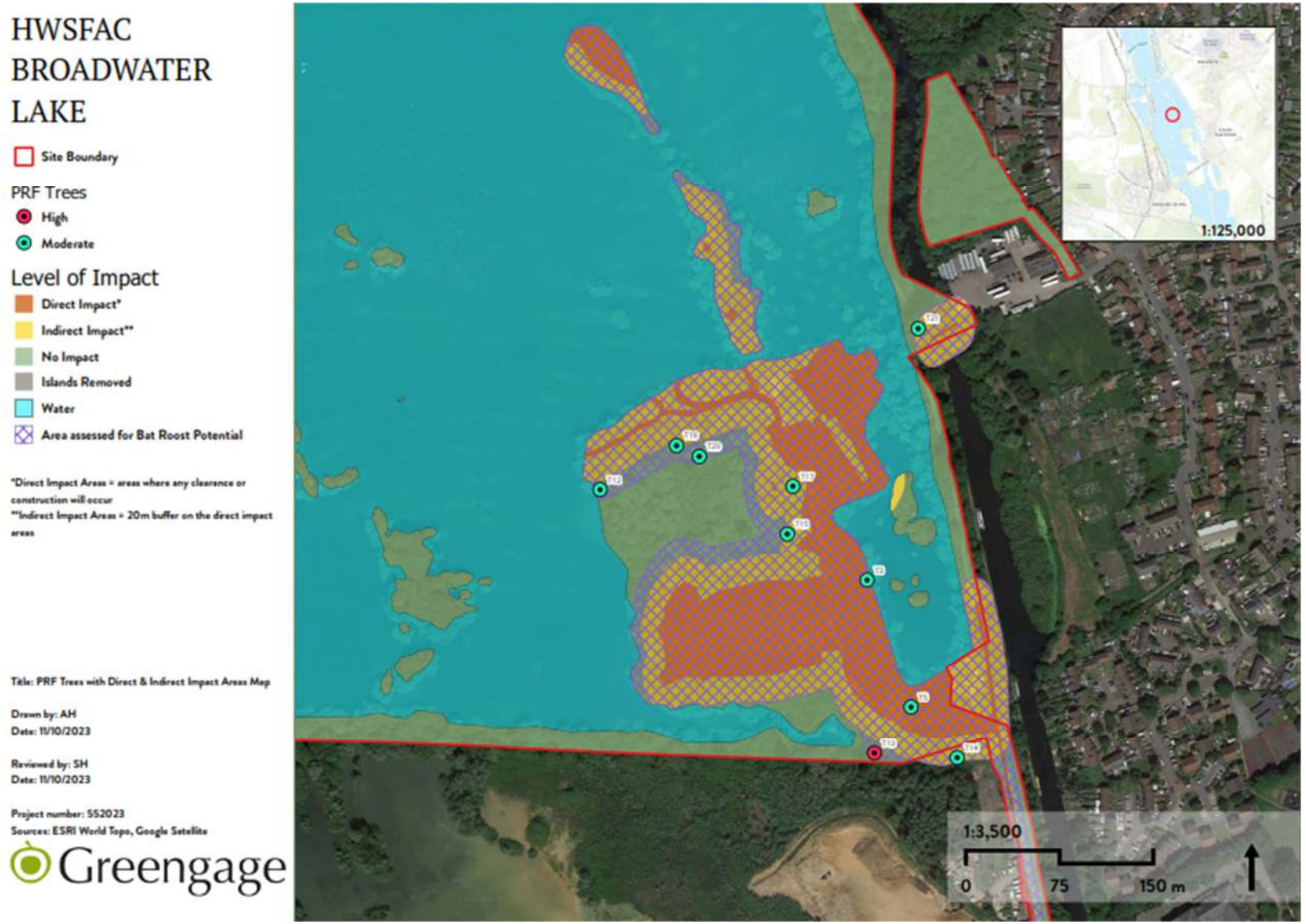


Figure 4.1 Trees with moderate and high potential identified through ground level tree inspections and endoscopic surveys, with direct and indirect impact areas shown.

4.4 EMERGENCE/RE-ENTRY SURVEYS

The results of the emergence surveys are provided in Appendix E. Only two roosts were identified from 17 emergence surveys undertaken; both roosts were located along the Grand Union Canal. Summaries of these roosts and surveys are provided below. A map of the roosts identified is provided as Figure F.2 in Appendix F.

Canal Bridge

The underside of the canal bridge was identified as a night roost and feeding perch for two soprano pipistrelles on 28th July 2023. On this survey a thermal scope was used to make observations alongside two infrared cameras. Sunset was at 20:57 however at 20:41 (just a few minutes after the start time) a bat was observed flying to the bridge underside, then at 20:43 flying off to the far bankside (IR screenshots provided below from two vantage points). A couple of minutes later (around five minutes before sunset) the thermal scope picked out a bat looking out from under the bridge just prior to dusk (without emerging) and then after a few minutes the bat emerged and showed light sampling behaviour by flying to adjacent trees and coming back and re-entering the underside of the bridge at a different location Then two bats emerged from the same (second) location. The repeated behaviour, along with comparison with the infrared footage (following the survey), allowed the positive identification of the bats. the bats did not echolocate when initially emerging and re-entering; however they foraged around the bridge for 45minutes and echolocation calls including social calls and feeding buzzes were recorded during this time, confirming soprano pipistrelle. The thermal scope allowed a great deal of bat behaviour detail to be seen, including one of the bats perching up in an adjacent tree on the far side of the canal to eat a moth.

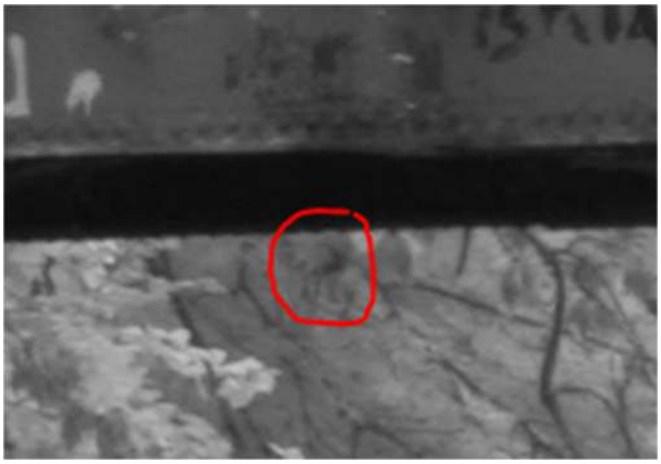
Bat begins to emerge from the bridge at 20:43

Progress of the bat to the far side

Further still of the same bat

Direction of flight

Bat seen emerging from the other side of the bridge (same bat and time)



Close up of flying bat

Black poplar

On 29th August 2023 the black poplar (T21) adjacent to the canal bridge was identified as a day / summer roost with two soprano pipistrelle bats emerging from two locations within the ivy cover at around 6m high on the main trunk. Prior to emerging the bats were social calling for 5 minutes from within their roost positions, and they echolocated upon emergence, allowing the species to be positively identified.

Figure 4.2 Location of soprano pipistrelle emergences from canalside black poplar on 29/08/23.

No roosting activity was observed in any other trees or buildings on site.

4.5 ROOST CHARACTERISATION

Additional surveys of the canal bridge and the black poplar were undertaken in order to characterise the use of the roosts but no further instances of roosting were recorded.

As such both roosts are identified to be day / summer roosts for 2-3 soprano pipistrelle bats. The late August roosting behaviour in the black poplar might also be characterised as a mating roost given the season and with three bats observed.

4.6 BAT ACTIVITY DURING SURVEYS

The surveys confirmed low to moderate levels of foraging and commuting bats generally in the survey locations. The predominant species recorded was soprano pipistrelle with on average 75% of registrations; there were also recordings of common pipistrelle, Nathusius's pipistrelle, Daubenton's, noctule, Leisler's, brown long-eared, and Natterer's. A single barbastelle registration was recorded on 24th May 2023. This corroborates activity survey results from 2021-22 and the HS2 radio-tracking results.

5.0 IMPACT ASSESSMENT

The assessment set out below has been made with reference to the updated UK Bat Mitigation Guidelines[3] (CIEEM, 2023) ('the bat mitigation guidelines' and 'guidelines').

5.1 SUMMARY OF ROOSTS IDENTIFIED

Two roosts were identified along the canal within the canal bridge and adjacent ivy-covered black poplar, for low numbers of soprano pipistrelle (three bats or less). These roosts would be affected (directly and indirectly impacted) by proposed refurbishment works for the canal bridge.

HS2 roost M was located on island 3 where the only possible roost location was an area of regenerated scrub that is too young to support PRFs; the bat (a tagged Nathusius' pipistrelle) was likely night-roosting on a bare branch, and therefore bats would not be expected to be encountered during the day. Island 3 will be removed; although bats will be likely absent, a precautionary check by an ecologist is recommended in Section 6.3.

No roosts identified by HS2 radio-tracking were positively located to any of the trees falling within the direct or indirect impact areas of the development. Likely roost trees were noted to be further away outside the impact area and therefore it was beyond the scope of this assessment to survey these trees. It is therefore concluded that these roosts will not be affected by the Proposed Development.

5.2 EVALUATION OF SPECIES AND ROOSTS

Soprano pipistrelle was the only species confirmed roosting at the Site by the surveys in 2023. This species has Site level conservation value, being commonly occurring and widely distributed across the UK (rarity category set out in Table 3.1 of the bat mitigation guidelines).

Day / summer and small mating roosts for common species (including soprano pipistrelle) are assessed as having Site level conservation importance as per Table 3.2 of the guidelines.

Soprano pipistrelle shows a marked preference for riparian and open water foraging habitats - the canal and wider area has an abundance of this habitat. The roosts identified are considered to form a component part of the total roost resource available to crevice dwelling species within the surrounds.

The canal bridge and tree roosts are likely being used by the same bats interchangeably, along with other tree roosts along the canal and access road. The canal bridge appears to provide a location for light sampling and its shelter supports the observed early (pre-sunset) emergence of the soprano pipistrelle which is a light tolerant bat species.

5.3 EMBEDDED MITIGATION

Lighting

The lighting scheme for the development (BSG Lighting Impact Assessment and External Lighting Design project ref: 22-10070 dated 28th July 2023 rev01) has been designed in liaison with the

project ecologist from the start to minimise light spill so that there are no possible lighting impacts to retained trees and vegetation, or to protected species such as bats.

The lighting scheme is in accordance with current best practice guidance namely:

- Bat Conservation Trust and Institute of Lighting Professionals (2023). Guidance Note GN08/23. Bats and artificial lighting at night.[4]

Key points of compliance with best practice are described below. All luminaires will have <2700k colour temperature and be directional and as low level as reasonably possible to achieve the required light levels.

Around the woodland, light spill backwards from access road luminaires has been entirely prevented with bespoke 5m high screens that ensure a dark corridor with 0lux directly behind the lighting columns and to each side. See Figure 5.1 below which is an extract of the 3D lighting model from the lighting scheme for the proposed development.

The footpath along the edge of the access road within the edge of the woodland has been left unlit.

Around the facilities building (on the reclaimed land), high level lighting has been kept to the central area around the road with lower level downlighters at the entrances to buildings; there are also a few 1m high directional bollards lining the part of the access road leading to the water. There are no luminaires near to the retained woodland habitat that forms the north-east edge. No light spill will fall onto open water habitat.

Within the activities area, the only lighting provided is within activities shelters 5, 6 and 7 and at the entrance to the toilet block. Lights within the activities shelters are motion-sensor activated so will only come on at times of use. The entrance lights for the toilet block are downlighters and low luminescence (casting 108 lumens each which is a very dim level of light), allowing children to navigate to the toilets in the dark, but not illuminating the entire area.

Other activities shelters at the site will remain unlit (these will have no electricity supply or other services).

Along the access road at the entrance to the peninsula, away from the woodland where the trees are set further away from the road, additional 5m high screens prevent backwards light spill in some areas; even without the screens, the directional lighting ensures 0.4lux is achieved behind each light which reduces to 0lux before the light reaches retained trees.

For car parking areas in the south-east of the peninsula, bollards 1m high with directional caps ensure light is only projected downwards (see Figure 5.1 along the right-hand side of the image).

The lighting design ensures that no negative effects on bats may occur as a result of the proposed development.

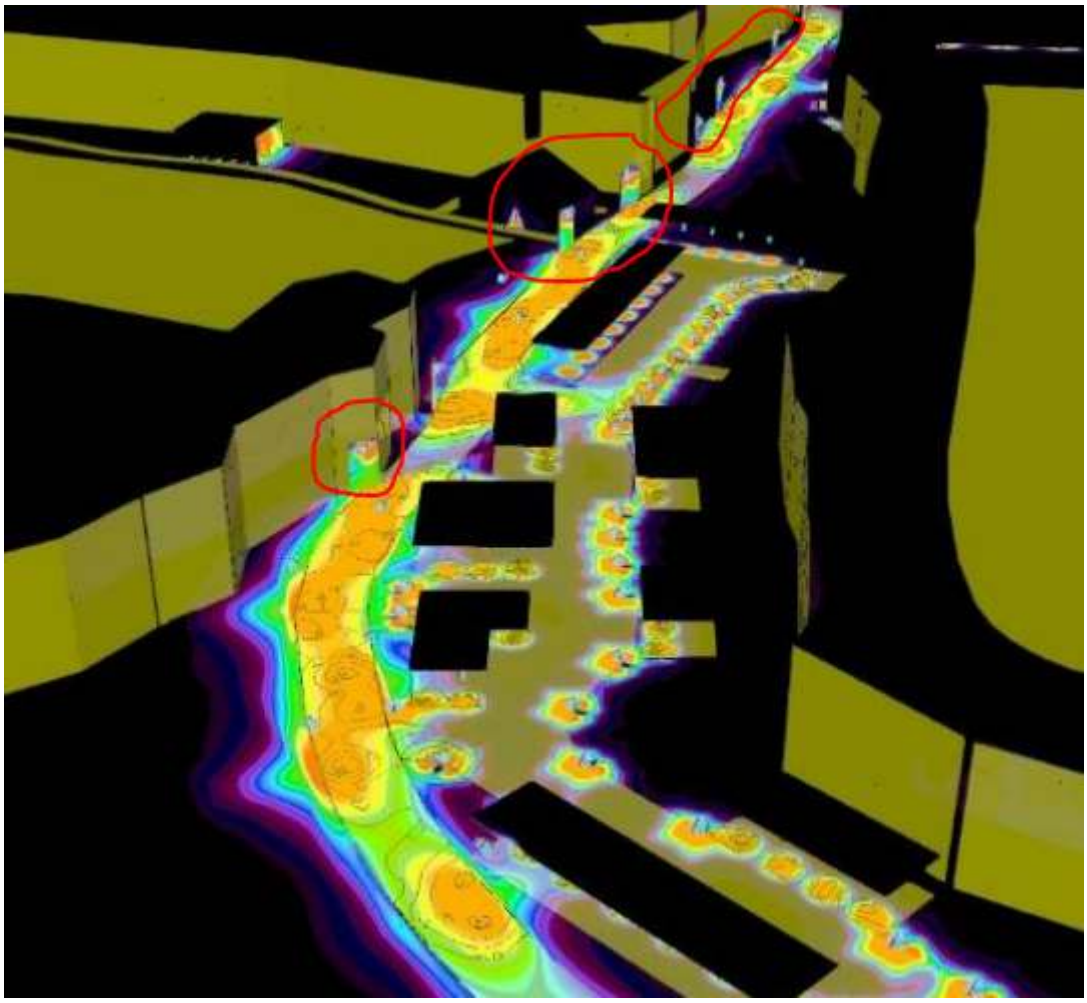


Figure 5.1 *Lighting model extracted from the lighting scheme for the proposed development, showing the access road running south to north with woodland in the top right of the picture. 5m high screens (circled in red) set behind the access road lighting columns prevent any backwards spill of light onto the woodland at the peninsula; directional lighting ensures light points down and only where needed, with spill onto natural habitats being minimised.*

Minimal clearance of vegetation

The nature of the Proposed Development, being an outdoor activities centre, requires an outdoor natural environment to facilitate and enhance the experience of the children. Planned clearance of vegetation has been kept to an absolute minimum and much of the Proposed Development has been designed around retaining trees, including some with poor arboricultural evaluations but with value for biodiversity (e.g. with significant deadwood).

Flexible micrositing

Areas where activities will be undertaken are not set in stone, and there will not be wholesale clearance. Rather, the arena for each specific activity will be determined as part of a dynamic and collaborative decision process on site. The project ecologist will assess the area for each proposed activity (low ropes, bird hide, activities shelters etc) and identify the best site within the approximate location. If vegetation clearance is needed to create the required area, this will be marked out with barrier tape and spray paints. This will then allow the exact size and orientation of the activity area to be verified with the

landscape architect and the operator (HOAC). This will ensure that ecology is the primary driver of the final site layout, with the retention of the best ecological features and best development over the long-term in alignment with the desired management outcomes (variety of tree species, canopy structure etc).

Bespoke design

Activity shelters at the north-east of the reclaimed land at the peninsula will have a bespoke design and construction to suit the environment and ensure no larger / mature trees are required to be felled, although there may be some limited clearance of shrubs and immature young trees with <10cm DBH and no potential roost features. The detailed design may have a more temporary and reversible nature with a stretched canvas canopy with picnic benches and set amongst the trees using tree trunks for supports; the shelters may also be constructed at the edge of the reclaimed land but set partially under the overhanging tree canopy. Impacts to root protection zones will be avoided.

5.4 PREDICTED IMPACTS IN THE ABSENCE OF MITIGATION AND COMPENSATION

Construction Phase

In general, actions taken at the site should follow the mitigation hierarchy:

- Proposals should first avoid impacts through design and approach;
- If not possible then proposals should seek to minimise impacts;
- Next, proposals should incorporate on-site compensatory actions; and
- Failing this, proposals should provide off site compensation for unavoidable residual impacts (offsetting).

Actions for this scheme will therefore first seek to mitigate impacts directly through avoidance (e.g. through changing designs or specifying timing) then compensate for unavoidable impacts (e.g. through provision of alternative roosting space where it is not possible to directly mitigate through avoidance) before seeking to provide enhancements which result in residual net gains.

Works to the canal bridge

Refurbishment of the canal bridge will result in the loss of the day / night roosts provided by the rotted underside of the bridge. Without due care, roosting bats may also be inadvertently killed when the roosts are destroyed. This would comprise a **negative effect significant at the Site level**.

The bridge will either be repaired *in situ*, or removed by crane from its supports to an adjacent former boatyard and repaired. If it is removed for repair, the crane to lift the bridge will require a clear working area which is currently impinged by the branches of the adjacent black poplar. The tree branches and possibly the trunk could be damaged accidentally if the crane arm swings too far. If the roosts were

damaged or destroyed, or one or more soprano pipistrelle bats were killed, this would also result in a **negative effect significant at the Site level**.

Repair works may also disturb the roosts in the black poplar through human presence, noise and vibration, dust creation, lighting or obstruction through scaffolding. Again this would comprise a **negative effect significant at the Site level**.

Works at the peninsula

No bat roosts were identified within trees within the direct and indirect impact areas of the proposed development at the peninsula or isthmus (tree group 1). **No significant effects** arising as a result of the construction of the scheme are therefore predicted.

Measures to protect HS2 roost E (outside the impact zone by 10m) have been recommended in Section 6.2.

Works to remove Island 3

No significant effects are predicted to arise to bats as a result of clearance and island removal, as no PRFs are present.

Works along the access road

No trees with PRFs were identified along the access road. No change of use has been identified along the access road from Moorhall Road to the peninsula and up to the BSC.

Proposed resurfacing works between Moorhall Road and the peninsula will be very short-term and cause temporary disturbance with impacts limited to the direct impact area.

Pruning works will occur to a small group of young healthy trees at the southernmost end of the section of access road leading from the peninsula to the BSC. These have branches growing at low height over the access road and these branches will be cut back to ensure emergency vehicles can safely pass.

The proposed development will improve the current lighting scheme to modern standards and in accordance with best practice, reducing impacts to bats below their current levels. **No significant negative effects have been identified.**

Long term impacts

The embedded mitigation with no loss of woodland, minimal clearance of vegetation and a bat friendly lighting scheme with 0 lux falling onto woodland and open water habitats ensures that **no significant negative effects** (from fragmentation of habitat or isolation of roosts) are predicted to foraging and commuting bats or any bat roosts as a result of the operation of the proposed development.

6.0 MITIGATION STRATEGY

A bespoke approach to mitigation is required for the different potential impacts and significant effects identified in section 5.4 above. These are described below.

All UK bat species are protected by UK legislation (see full context at Appendix FG), under which it is an offence to:

- Deliberately capture, injure or kill a bat;
- Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats;
- Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time); and
- Intentionally or recklessly obstruct access to a bat roost.

A European Protected Species Mitigation (EPSM) licence from Natural England is required to undertake works that would otherwise result in an offence.

Where only small numbers of common species are liable to be impacted and the roost has a low conservation value, a Bat Mitigation Class Licence (BMCL) (formerly known as a bat low impact class licence or BLICL) may also be appropriate. The BMCL can be used:

- To disturb and capture up to 3 'common or widespread' bat species;
- To damage or destroy up to 3 'low conservation status roosts'; and
- In the case of low or temporary impacts on bats or their roosts.

Where roosts are present or suspected to be present, but impacts may be avoided and significant negative effects are unlikely to arise as a result of the proposed works, works may be undertaken under a precautionary Method Statement.

6.1 CANAL BRIDGE REPAIRS

BMCL Licence

A BMCL licence will be required as the proposed refurbishment of the canal bridge will require destruction of the roost. Indirect temporary disturbance to the adjacent black poplar roost is also likely, with accidental damage or destruction also a possibility.

The site should be registered under a BMCL. Mitigation actions will be required, secured through the licence, to minimise the direct impact upon individual bats including timing of works and compensatory roost space, ensuring the conservation status of bats at the site is not impacted. The application form must be submitted by a registered ecological consultant and the site must be registered before works start.

Further details relating to the proposed mitigation approach are set out below and will be included with the BMCL where appropriate.

Timing

As set out in the Bat Mitigation Guidelines, the most common and effective way of avoiding disturbance of a roost is to complete works outside of the time or season when bats are likely to be using the roost. This varies between species and roost types.

The roosts identified are soprano pipistrelle day roosts which are utilised during the summer months. Accordingly, works that will affect the roosts should be undertaken outside of this season (1st September – 1st May).

Care should be taken to reduce general disturbance during the summer months, including timing works in daylight hours when bats are inactive, and keeping noise disturbance to a minimum. No additional artificial lighting should be left on overnight. As such, light, noise and general disturbance through construction activity will be limited to within hours that bats are not active.

Rescue boxes / replacement roost features

Two 2F Schwegler Bat Box[5] (General Purpose) or similar should be erected in close-by mature trees prior to any works commencing. These boxes should be placed approximately 3-5m from the ground facing onto the canal and be accessible for inspection and to place any rescued bats within.

Ecological supervision

Prior to any work commencing, on-site workers should be briefed by an experienced ecologist in an Ecological Clerk of Works (EcoW) role during a 'tool box talk' on the mitigation strategy and legislation relating to bats.

The EcoW should be present during sensitive activities (i.e. works around the identified roost). If bats are encountered during any works, the licence holder should be contacted and a licenced bat handler should capture the bat with thin gloved hands or a hand net, the bat placed into a drawstring cloth bag and then placed into one of the bat boxes hung on adjacent trees.

Injured bats should be immediately taken into care. Details of a local experienced 'bat hospital' should be known by the bat handler and provided to site managers.

A copy of the licence should remain available on site at all times, a summary sheet of guidance should be given to each of the builders and contractors working on the bridge.

Inspections prior to works commencing

All suitable features on the bridge should be checked for roosting bats using an endoscope prior to their destruction, or prior to any disturbing works such as the removal of the bridge from its supports. For features on the underside in the middle and far side of the bridge, access may be gained from a boat directly beneath the bridge. Other features may be accessed on foot and from the top of the bridge.

If any features are considered to require repeated inspections due to works taking more than a few days, to avoid the need to do this the features should be temporarily or permanently destroyed once fully

inspected. This can be achieved by filling cavities with cloth or sponge, and then covering the access point. Repairs to the bridge may then be undertaken without further inspections.

Works methodology

The bridge will either be repaired *in situ*, or removed by crane from its supports to an adjacent former boatyard on the far side of the canal and repaired.

The black poplar is very large and has numerous branches which are in close proximity to the bridge although very few overhang it.

A clear working area should be established within which the works will occur. Above the bridge the clear working zone should be at least 2m high and up to 5m in a radius around the bridge. If a crane is required, this zone may need to be enlarged.

Overhanging tree branches within the established working area should be trimmed back in sections and gently lowered to the ground; these should be left for 24h before being removed. If the branches are ivy covered, this should be stripped back prior to felling and any cavities inspected with an endoscope to ensure no bats are present. The tree and retained ends of branches closest to the works should be marked with barrier tape to make them more visible.

If a crane is required, a bankman should watch the works carefully and provide clear instructions to the crane operator to ensure the tree is not damaged by accident. An experienced crane operator should be used.

If scaffolding for the bridge is required, this should be kept as clear of the black poplar as possible.

Enhancement

The rescue bat boxes provided prior to works commencing will mitigate for loss of the roost. There are good opportunities to enhance the roosting resource for bats as well.

The detailed design of the repaired / refurbished / replacement bridge has not yet been produced. It may be possible to design in crevices for specific use by soprano pipistrelle bats, to be accessed from the underside of the bridge. If the bridge is repaired by welding or replacement of the corrugated steel panelling, long narrow slots could be provided through the new metal underside, allowing the bats access into the flint ballast / fill that lies above. The slots could be provided in the centre of each concave section. This would directly replace the lost roost in a like-for-like manner (and in a very cost effective way) and allow bats to continue to use the bridge for light sampling as observed during the 2023 surveys.

If this is not possible, the top and sides of the bridge provides an opportunity to enhance the roost resource along the canal. There is a central 2m high metal fence partition that has been used to deter pedestrian use of the bridge. Manufactured bat boxes may be secured to this fence, or a bespoke fence constructed with inbuilt cavity and crevice features suitable for a range of bats and able to house larger numbers of bats such as for a maternity roost.

It should be noted that using the thermal scope in the dark, a cat was observed on top of the bridge, a fox was seen at the far side, and a mustelid (likely a mink but possibly a stoat) was seen climbing across the bridge rapidly at height possibly using tree branches to pass the top of the fence. Any bat features provided should be aware of potential predation from mink and cats. The pedestrian barriers should incorporate mammal gaps at the base to allow passage of wildlife across the bridge.

Monitoring

No monitoring is required per the BMCL guidance, as the roosts are of low conservation value and for a common widespread species.

6.2 CONSTRUCTION OF ACTIVITY SHELTERS

Precautionary measures should be taken for the construction of the activity shelters, given the proximity of a soprano pipistrelle day roost (>20m distant but within 30-35m - HS2 roost E).

Initially, prior to works commencing, the location of the day roost will be marked out with barrier tape plus a 10m buffer. This area will be protected from disturbance during the works with Heras fencing.

The choice of location for each shelter will be assessed by an ecologist, with chosen locations selected for the presence of natural clearings and suitable surrounding trees. No larger / mature trees will be felled. There may be some limited clearance of shrubs and immature young trees.

Protective planting comprising thorny hedges will be implemented, with barriers such as woven willow fence panels as necessary, to control the movement of children and prevent disturbance of the identified roost location - this will also serve to keep children away from the eastern edge of the isthmus which will be a reserve area for birds.

Following the above recommendations, impacts are very unlikely and no significant negative effects will occur.

6.3 REMOVAL OF ISLAND 3

Although HS2 roost M is considered to be a night roost and therefore bats would not be encountered during the day, a precautionary check of scrub / immature trees by an ecologist will be undertaken prior to works to remove the vegetation and island. No impacts to bats are predicted.

6.4 LAND RECLAMATION AND CONSTRUCTION

Construction works to reclaim land and build the facilities building, boat shed, beach and slipways will occur within 20m of retained woodland (north edge of peninsula and tree group 1 / isthmus). These woodland areas have a small number of low potential PRFs which are unlikely to be used by bats. Therefore no impacts to bats are predicted. However precautionary measures will be taken for breeding woodland birds; if bats were to be present they would be protected by these measures, therefore they are described below.

Works may result in noise, dust and vibration disturbance impacts. Mitigation measures will be set out within a Construction Environment Management Plan (CEMP). Site compounds will be located away from the lake and retained woodland on existing hardstanding. Measures to reduce noise, vibration and dust should be prescribed within the CEMP, including the methodology for any piling, details of plant and dust suppression measures should these be needed.

Following the implementation of the CEMP, no significant negative effects to any ecological receptors are predicted.

6.5 ADDITIONAL ENHANCEMENT

Bats were recorded foraging and commuting across the site at low to moderate levels over the survey period.

As described in section 5.3, a bat-sensitive lighting has been designed into the scheme to avoid any potential impacts of increased lighting levels on foraging and commuting bats.

Enhancements for bats have been set out within a draft Mitigation and Ecological Management Plan and include:

- Enhancements for invertebrates including a greater range of flowering plants and ponds at the peninsula and BSC; this will increase the food resource for foraging bats at the Site;
- Creation of a woodland footpath and glades for improved woodland structure - both will provide new and enhanced foraging opportunities for bats;
- Scrubby mounds and greater flower resource at the BSC which will enhance foraging and commuting for bats in the north of the Site;
- Provision of bat boxes along the access road between the peninsula and BSC; and
- Provision of bat roosting features within habitat panels and fences at the peninsula adjacent to woodland.

6.6 RESIDUAL IMPACT

No significant residual effects are predicted following the completion of works. Significant positive effects at up to the Borough level are anticipated during the operation of the proposed development as a result of the increased roost resource and the enhanced foraging habitat.

7.0 SUMMARY AND CONCLUSIONS

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon to undertake surveys to inform an ecological impact assessment for bats at 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 report 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 Sailing Club (BSC) facilities at the north end. A canal bridge supports electricity cables that supply the peninsula, and this bridge requires refurbishment as part of the development.

Ground level tree assessments allowed the likely location of a HS2 soprano pipistrelle day roost (HS2 roost E) to be confidently established within one of several low potential features provided by a group of three willow trees within woodland to the north-east of the peninsula, outside the impact area of proposed development.

One HS2 radio-tracked roost (HS2 roost M) was indicated on an island (island 3 to be removed as part of the Proposed Development) where the trees (regenerated scrub) are too young to support PRFs; it is considered likely the bat was night-roosting (i.e. perching on a bare branch) and will have moved to a more substantial PRF at or close to dawn (a commonly observed behaviour of bats). Given the absence of PRFs, no impacts to bats are predicted as a result of the removal of the island.

The surveys confirmed the presence of soprano pipistrelle roosts - two bats were observed day / night roosting within the canal bridge, while three bats were observed day roosting within an adjacent black poplar tree. The black poplar may also be considered a mating roost. The roosts are valued at the Site level (i.e are of low conservation importance) as they support low numbers of a very common and widespread species, and will be only a very small part of a much larger roost resource utilised by the same bats within the locality. Recommended mitigation actions to be implemented under a BMCL licence include:

- Two bat boxes placed on nearby trees as rescue boxes and as replacement roosts during the works;
- Timing of works so they are undertaken when bats will be absent;
- Inspection of the roost features by a licenced ecologist prior to works proceeding / destruction of the bridge roosts;
- Trimming of black poplar branches to reduce the likelihood of damage to the tree and its roosts; and
- Either creation of functionally identical roost features on the underside of the newly repaired bridge, or new roosts created / provided on top of the bridge.

There is significant embedded mitigation to avoid and minimise potential impacts. A 'bat sensitive' lighting strategy has been designed to avoid disturbance to commuting bats, with zero light spill onto retained woodland through the use of bespoke screens / panels. Clearance of trees across the Site has been minimised through the placement of roads, pathways and structures such as activity shelters within existing gaps between trees.

There are numerous ecological enhancements proposed for the Site; wildlife-friendly planting will enhance the Site for a range of species and benefit bats by increasing the invertebrate resource at the Site, and bat boxes along footpaths and access roads will increase the roost resource at the Site.

Overall the design of the Proposed Development and the recommended mitigation above ensures no significant negative effects to bats from construction, and an overall positive effect significant at up to the Borough level over the long term (at operation) with the provision of additional PRFs and improved foraging resources.

APPENDIX A DIRECT AND INDIRECT IMPACT AREAS AT THE SITE

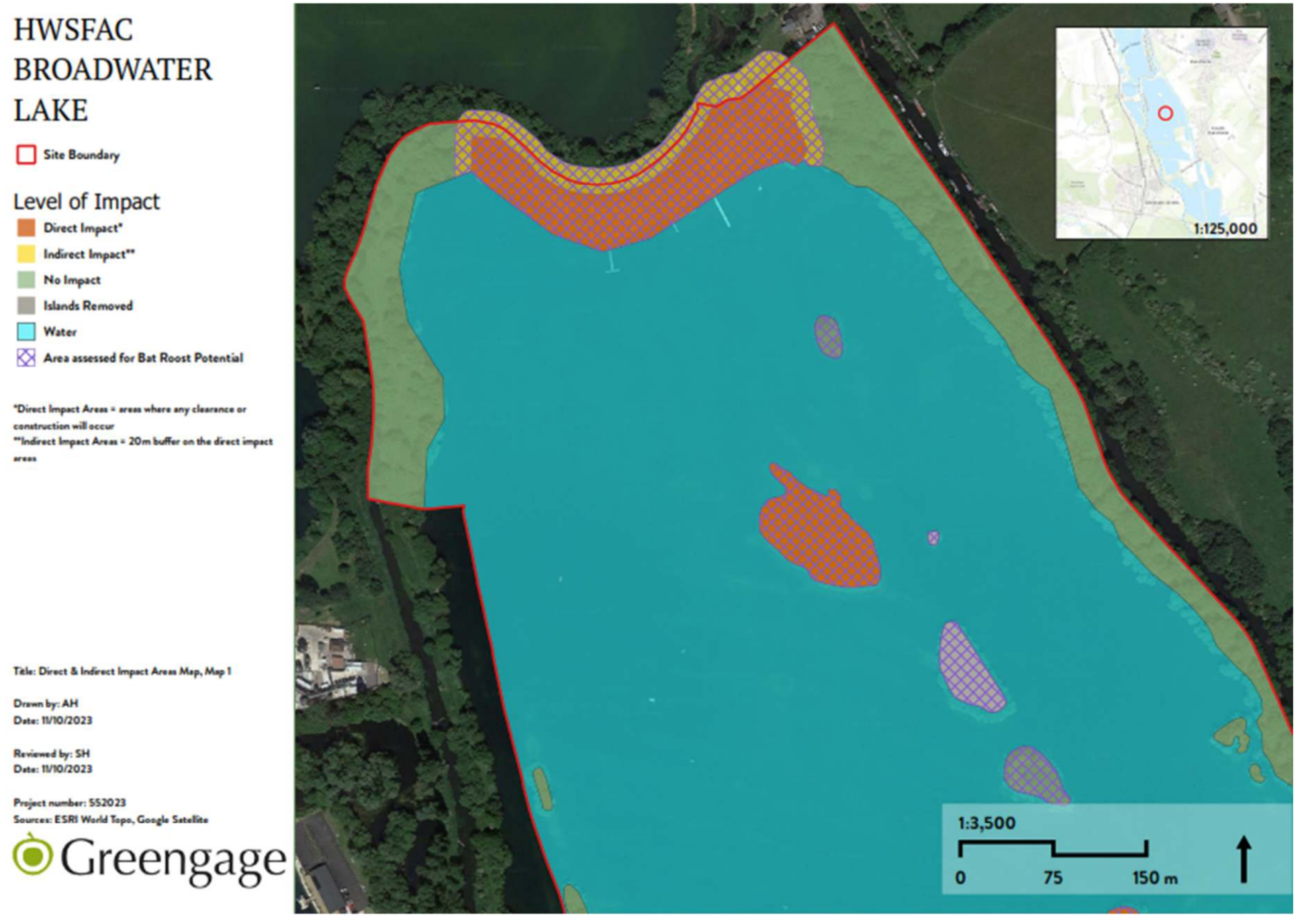


Figure A.1 Map 1 direct and indirect impact areas

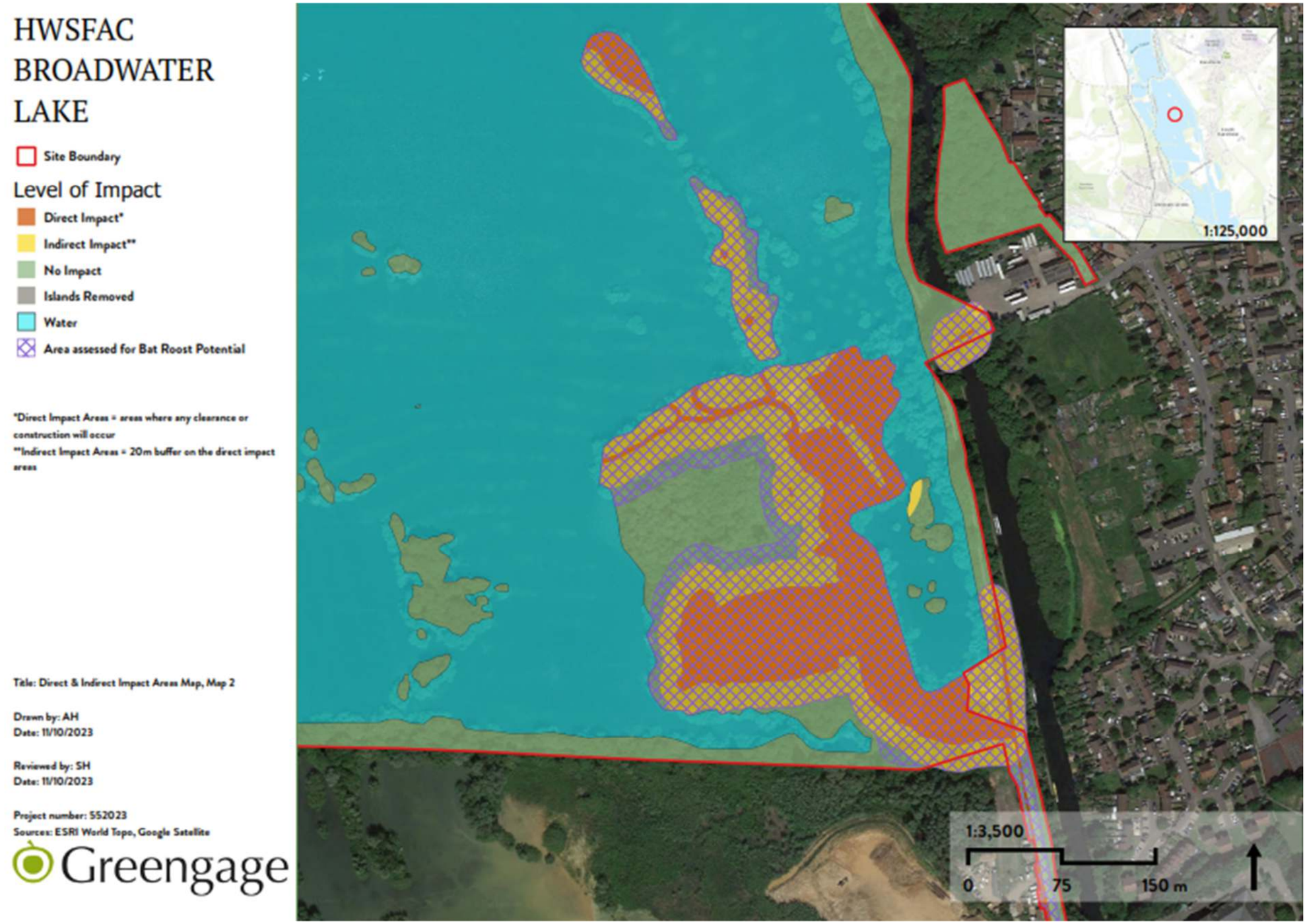


Figure A.2 Map 2 direct and indirect impact areas

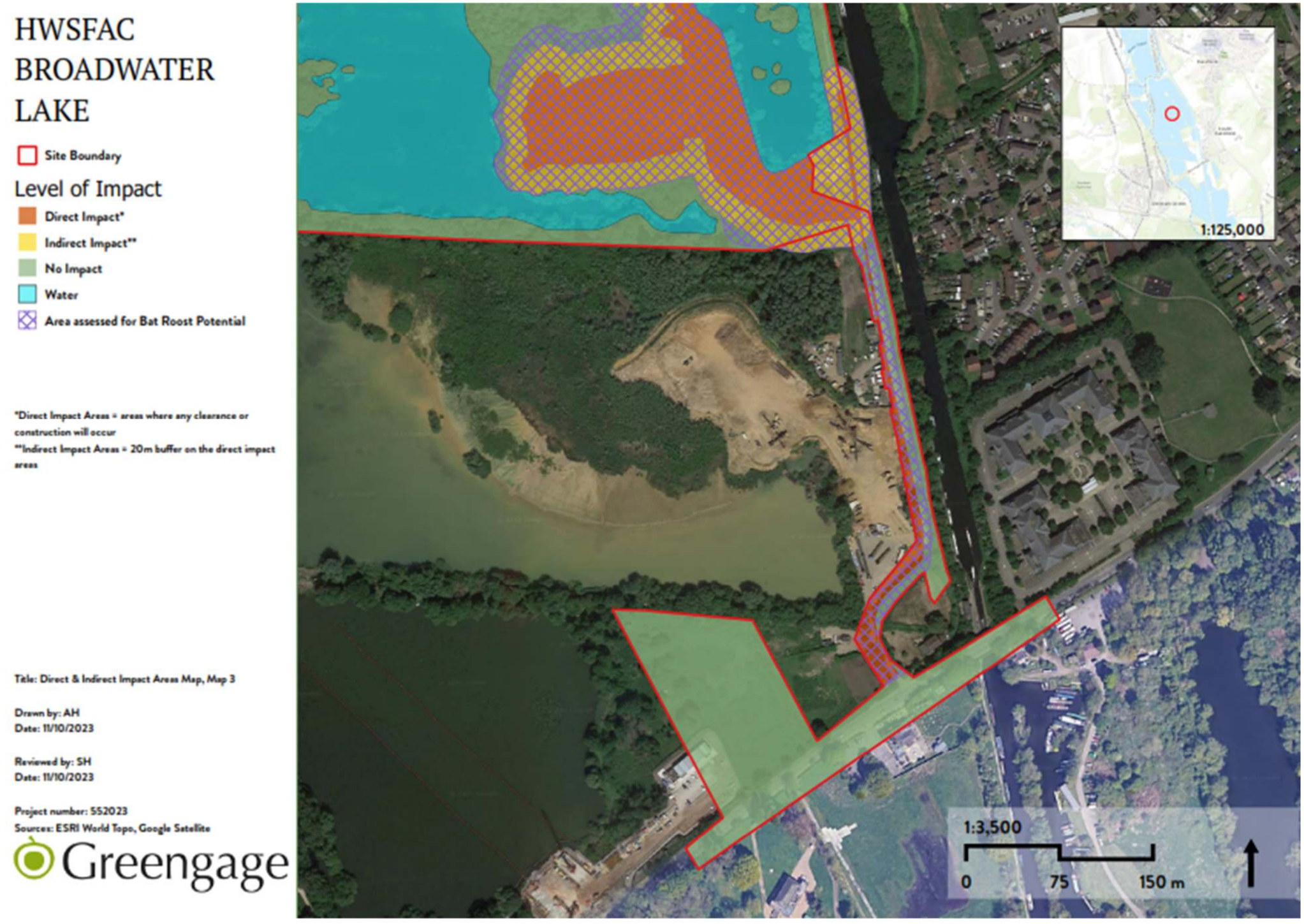


Figure A.3 Map 3 direct and indirect impact areas

APPENDIX B SURVEY WEATHER DATA

Table B.1 Weather at the start and end of the emergence surveys

Date & Sunset Time	Start Time	End time	Rain Start	Rain End	Clouds Start (Okta)	Clouds End (Okta)	Wind Speed Start (km/h)	Wind Speed End (km/h)	Temp Start (oC)	Temp End (oC)	Comment
24/05/2023 20:59	20:41	22:29	0	0	0	0	2.0	2.0	16.7	13.7	No rain
05/06/2023 21:13	20:55	22:43	0	0	6	6	4.0	4.0	13.0	11.9	No rain
19/07/2023 21:09	20:50	22:39	0	0	6	3	2.0	2.0	18.3	16.4	No rain
28/07/2023 20:57	20:38	22:27	0	0	3	8	4.0	4.0	18.1	17.6	No rain
09/08/2023 20:38	20:17	22:30	0	0	2	1	2.0	2.0	20.2	18.0	No rain
10/08/2023 20:36	20:15	22:06	0	0	2	6	3.0	3.0	21.5	19.0	No rain
11/08/2023 20:34	20:13	22:04	0	0	6	0	3.0	3.0	19.6	18.0	No rain
29/08/2023 19:57	19:35	21:27	2	0	8	8	3.0	2.0	15.0	14.8	Light rain for less than 10minutes at start of survey
30/08/2023 19:55	19:33	21:25	0	0	0	6	3.0	3.0	16.6	14.4	No rain
15/09/2023 19:18	16:55	20:48	0	0	0	0	2.0	2.0	24.9	18.6	No rain

APPENDIX C PHOTOS OF TREES FROM GLTA

Table C.1 Photographs of trees assessed for bat potential from the ground.

T1 - Willow sp – semi-mature multi-stemmed

T1 - Small hazard beam 1m south. **Low potential**

T2 Willow sp – semi-mature multi-stemmed

T2 Small hazard beam 2.5m west **Low potential.**

T3 - Willow – mature with 3 main stems

T3 - Deadwood leading into potential cavities x2 at 6m west. Knothole x2 at 5m west. **Moderate potential**

T4 Willow – mature, collapsed at base

T4 Cavity into large collapsed stem. Split in additional twisted, collapsed stem – both at ground level south-west facing. **Moderate potential** (reduced to negligible upon endoscoping)

T5 Willow sp – mature multi-stem, newly collapsed

Cavity at base with loose bark on limbs. **Low potential**

T6 Ash - mature Bird box attached to tree. **Moderate potential**

T7 Horse chestnut - mature Bird box attached to tree. Moderate potential

T8 Silver birch – semi-mature Bird box attached to tree. **Moderate potential**

T9 Willow sp – mature, multi-stemmed by lake shore Knothole 4m west, woodpecker hole 5m west. **Moderate potential**

T10 Alder – young or stem part of larger mature tree

T10 Trunk cavity in dead heartwood 2m south. **Moderate potential**

T11 Willow sp – mature tree leaning over water

T11 Small hazard beam 2m south-west. **Negligible potential.**

T12 Willow sp – mature with two main stems

T12 Dead heartwood with potential cavity 6m west. **Moderate potential**