PROVIDING TRUSTED ECOLOGICAL ADVICE

GREGGS BAKERY SITE AND No 2 GOULD ROAD, TWICKENHAM, TW2 6RT

SCHEME 2 – INDUSTRIAL-LED

2022 BAT ACTIVITY SURVEY REPORT

Version 3.0

Project	Prepared & Checked by	Approved by	Client	Status	Date
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		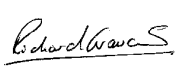			

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1 Summary

Introduction

Following recommendations in the initial 'Greggs Bakery, Twickenham 2018 Extended Phase 1 Habitat Survey 2018 Report[1]', and subsequent Bat Survey 2019 Report[2] and Updated Phase 1 Habitat 2022 Report[3], Richard Graves Associates Ltd was instructed by London Square Developments Limited, to undertake a suite of bat surveys for the 'Greggs Bakery Site' in Twickenham, London (hereafter referred to as 'the Site') to provide updated information to support a planning application for a proposed new, industrial-led, development.

This report has been updated to include the results from the August 2022 Bat Surveys.

Development Description

The proposed development will comprise the demolition of existing buildings (with retention of a single dwelling) and redevelopment of the site to provide up to 97 residential units and 883 sq.m industrial floorspace (Use Class E) with associated hard and soft landscaping, car parking and highways works and other associated works.

Surveys conducted

A suite of bat surveys was undertaken throughout April, May and August 2022 to further inform the surveys already conducted in June, July, and September 2019. The surveys were undertaken by experienced licensed surveyors. The surveys comprised:

- Bat Exit and Re-Entry Surveys for the buildings on-site considered to have bat roost potential;
- Automatic detector recording sessions conducted at a variety of locations across the Site; and
- A thermal imaging system was used to detect heat signatures from any emerging bats, in order to aid detection of bats within the buildings on-site and within key habitats.

Survey Findings

- At least six bat species were recorded in 2022 foraging on / near and commuting over the Site: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Leisler's *Nyctalus leisleri,* noctule *Nyctalus noctula*, Nathusius' pipistrelle *Pipistrellus nathusii,* Daubenton's bat *Myotis daubentonii*, plus an undetermined *Myotis* species.
- With the exception of Daubenton's bat, all of these bat species were previously recorded during the 2019 bat surveys.
- Two species recorded in 2019 were not recorded in 2022: brown long-eared *Plecotus auritus* and Natterer's bat *Myotis nattereri.*
- Therefore, collectively for the 2019 and 2022 surveys combined, eight bat species have been recorded on / near to the Site, plus an undetermined *Myotis* species.
- In the 2022 surveys, soprano pipistrelles bats were the most frequently recorded bat species (accounting for over 67% of the calls recorded during the manual bat surveys and 54% of the calls on the automatic detector surveys).

[1] Richard Graves (2019) Greggs Bakery / Twickenham - 2018 Extended Phase 1 Habitat Survey Report Version 4.0

[2] Richard Graves (2019) Greggs Bakery / Twickenham - 2019 Bat Activity Survey Report

[3] Richard Graves (2022) Greggs Bakery / Twickenham – Residential Scheme, 2022 Extended Phase 1 Habitat Survey Report Version 9.0

- The vast majority (98.6% of the bat calls recorded on the manual detectors and 98.2% recorded on the automatic detectors) of the bat activity observed during the 2022 surveys, was recorded along or near to the River Crane, along the southern bank (adjacent to the northern site boundary).
- Bat activity over the Site itself was relatively limited in comparison to that recorded along the river (1.4% of the bat calls recorded on the manual detectors and 1.8% recorded on the automatic detectors).
- As was the case in 2019, no bats, of any species, were observed exiting or re-entering any of the buildings on-site.
- Based on the emergence times recorded during the 2022 surveys, at least four species of bat: common pipistrelle, soprano pipistrelle, noctule, Daubenton's bat, plus an undetermined *Myotis* species, are likely to be roosting near the Site.

Minimising Impacts & Adding Enhancements

Based on the findings of the 2019 and 2022 bat surveys and the 2018 and 2022 Phase One Habitat Surveys, the following impact avoidance, mitigation and enhancement measures has been / will be undertaken[4,5,6,]

- The implementation of a site-specific, bat targeted, lighting strategy (see accompanying Lighting Reports submitted as part of this application) which will provide a darker, deeper and wider fly / foraging zone along the River Crane than currently exists;
- Creation of a wider natural corridor formed as part of a river walkway to include a river corridor hedgerow and native tree planting;
- Native species planting;
- Biodiverse Green Roof installation;
- Bat box installation;
- Pre-clearance *precautionary* checks for bats in buildings; and
- Good construction practice to protect the off-site habitats, in particular, the River Crane corridor.

Conclusion

If the recommendations of this report, and the updated Phase 1 Habitat Survey Report[3], are undertaken at the appropriate stage, there are no undue constraints, with respect to bats, to the proposed development.

[4] Assael (2022) Greggs Bakery / Twickenham Application 1 - Design and Access Statement April 2022 I A2871 2-10 P51

[5] Desco (2022) London Square Developments Ltd. Former Greggs Bakery Site Twickenham TW2 6RT. External Lighting Assessment - Residential-Led Scheme. Issue No.: 05

[6] Desco (2022) Former Greggs Bakery Site Twickenham TW2 6RT External Lighting Assessment Residential-Led Scheme Supplementary Report: Minimising the Impact of Lighting on Nocturnal Wildlife. Issue No. 5.

2 Introduction

2.1 Instruction

Following recommendations in the initial 'Greggs Bakery, Twickenham 2018 Extended Phase 1 Habitat Survey 2018 Report[1]', and subsequent Bat Survey 2019 Report[2] and Updated Phase 1 Habitat 2022 Report[3], Richard Graves Associates Ltd was instructed by London Square Developments Limited, to undertake a suite of bat surveys for the 'Greggs Bakery Site' in Twickenham, London (hereafter referred to as 'the Site') to provide updated information to support a planning application for a proposed new industrial-led, development.

This report sets out the methods, results and recommendations of the 2022 bat surveys and includes an assessment of the impacts of the proposed development on bats and their habitats. This report has been updated to include the results of the August 2022 Bat Surveys.

2.2 Survey Objectives

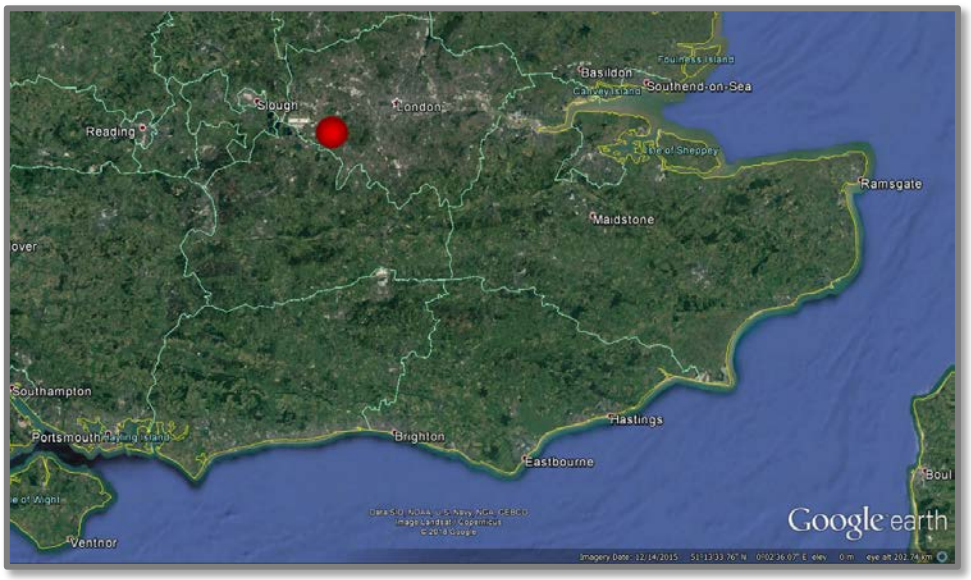
The aim of the bat surveys was to update the 2019 bat survey data, in order to:

- Establish if bats are present on / in close proximity to the Site;
- Gauge the general level of bat activity and bat species present on and in close proximity to the Site;
- Assess what the bats use the Site and surrounding habitats for;
- Establish what the temporal and seasonal distribution of recorded bat activity was on-site;
- Identify any bat roosts on the buildings within the Site at the time of survey;
- If present, characterise the bat roost(s) in terms of species, number, access points, type of bat roost etc;
- Compare the results to the 2019 bat survey findings;
- Assess the potential impacts of the scheme on the local bat population;
- Make recommendations for mitigation of construction / operational impacts; and
- Identify the need for further surveys / or mitigation, where required.

2.3 Site Location and Setting

The Greggs Bakery Site covers approx. 1.16 hectares (ha)[4], centred at Ordnance Survey (OS) grid reference: TQ 15321 73342, and is located in the London Borough of Richmond upon Thames in Southwest London. The Site is situated in a largely residential neighbourhood. Immediately north of the Site is the River Crane and the railway line and to the south of the Site are a number of light industrial buildings (Figure 1).

Figure 1: Site location indicated by red marker © Google Earth 2023



The Site is located between two residential terraced streets, Crane Road and Norcutt Road. To the north it wraps around Crane Road and to the south it borders Edwin Road. (Figure 2).

Figure 1. Aerial Mapping indicating the Greggs Bakery Site (outlined in red) © Google Earth 2023

2.4 Brief Description of Proposed Development

The proposed development will comprise ''*Demolition of existing buildings (with retention of a single dwelling) and redevelopment of the site to provide up to 97 residential units and 883 sq.m industrial floorspace (Use Class E) with associated hard and soft landscaping, car parking and highways works and other associated works*' [7].

[7] DP9 Greggs, Twickenham – Cribs Sheet 23.03.2022

2.5 Report Structure

Following this introduction, the report is structured as follows:

- Chapter 3: provides a summary of the pre-existing bat survey information;
- Chapter 4: provides details of the relevant legislation and licencing requirements pertaining to bats;
- Chapter 5: details the survey methods employed to gather and analysis the bat data;
- Chapter 6: presents the findings of the Bat Activity Survey results;
- Chapter 7: presents the findings of the Automated Detector Survey results;
- Chapter 8: presents the findings of the Thermal Imaging Survey Results;
- Chapter 9: provides data interpretation and recommendations based on the survey findings; and
- Chapter 10: includes an assessment of ecological impacts with respect to bats.
- Chapter 11: presents the report's conclusion.

3 Pre-Existing Survey Information

3.1 Introduction

This section summaries the pre-existing survey information associated with the Site, namely:

- Pre-existing bat surveys conducted along the local river system;
- Pre-existing bat surveys conducted on-site undertaken in 2019[2];
- Bat records from Greenspace Information for Greater London (GiGL);
- Protected Species Licence information from the Multi-Agency Geographic Information for the Countryside (MAGIC); and
- Preliminary Bat Roost Assessment findings for the buildings on-site, undertaken 2022 Updated Extended Phase 1 Habitat Survey[3].

3.2 Pre-existing Off-Site Bat Activity Surveys

Bat Survey Reports for surveys conducted within the Crane Valley were accessed from the Friends of the River Crane Environment (FORCE) website[8]. Five bat survey reports, dated 2014, 2015, 2016, 2020 and 2021 were reviewed. A summary of their findings is presented below.

2014: Bat surveys were undertaken in 2014 by Furesfen on behalf of the Friends of the River Crane Environment (FORCE)[9] The survey area included a 500m stretch of the River Crane corridor centred at TQ 156 735. The survey finding were summarised as follows:

- *"At least six and possibly seven bat species were recorded during the surveys: Common and Soprano Pipistrelle, Noctule and Leisler's bat, Daubenton's and possibly Natterer's as well as Brown Long-eared bats.*
- *No bats were recorded emerging from structures or trees.*
- *The spread of bat registrations and the early emergence times are suggestive of the presence of a colony of Soprano Pipistrelles within the study area.*
- *The activity recorded on the static bat detector, indicated the importance of the corridor for bat commuting and foraging purposes.*
- *Whilst no bats were recorded emerging from the trees during the survey, it is likely that both the Nyctalus (Noctule and Leisler's) and Myotis (Daubenton's and Natterer's bat) species were using trees for roosting. Brown Long-eared bats may be roosting in trees or historic buildings to the east of the corridor.*[9]

2015: Bat surveys were undertaken in 2015 by Furesfen on behalf of FORCE and The London Borough of Richmond Parks Department[10]. The survey area comprised a 1,500m stretch of the Duke of Northumberland River centred at TQ 151 739. The survey findings were summarised as follows:

- *Six possibly seven bat species use the DNR corridor as a foraging area throughout the night [Common, Soprano and Nathusius' Pipistrelle, Noctule and Leisler's bat, Daubenton's bat and a possible Serotine bat].*
- *The southern part of the corridor is the most active with a greater diversity of species in greater numbers. In the southern and central area of the study bats were recorded during their emergence period, this means that bats had not travelled far from a roost site.*

[8] FORCE. 2019. Wildlife Reports in The Crane Valley. [ONLINE] Available at: https://www.force.org.uk/wildlife/wildlife-surveys/. [Accessed 14th June 2022].

[9] Furesfen (2014) Bat Survey Report, River Crane Corridor, Heatham Estate, Twickenham.

[10] Furesfen (2015) Bat Survey Report, Duke Of Northumberland River (Dnr) Kneller Gardens To Whitton Dene, L.B's Richmond And Hounslow.

- *The northern section of the DNR suffers from anthropogenic disturbance of light, noise, dust and smell as well as macrophytes choking the stream. The survey demonstrated the changing use over time by the bat community dependant on the demands of the breeding season and their synergy with insect swarming behaviour.*
- *It is just as important therefore to look after and encourage insects by imposing limits on pollutants such as dust, light, fumes and noise.*[10]

2016: Bat surveys were undertaken in 2016 by Furesfen on behalf of Hounslow Council with the collaboration from FORCE and assistance from Thames Water[11]. The survey area comprised a 2000m stretch of the Duke of Northumberland River centred between Mogden Sewage Works and Isleworth Ait. The survey findings were summarised as follows:

- *"Four bat species were detected during the surveys: common and soprano pipistrelle bats, Daubenton's bat and a Nyctalus bat species- the latter only briefly.*
- *Two species were found roosting in the central and north-eastern parts of the catchment; a pipistrelle roost in residential property around St. John's Park and a small roost of Daubenton's bats at the Church Lane Bridge by the confluence with the Thames.*
- *Pipistrelle bats use the lower DNR corridor as a foraging area throughout the night; particularly the*
- *Sewage Works and on occasion, Silverhall Park.*
- *The survey demonstrated anthropogenic disturbance of light spillage and glare from several*
- *Sources."*[11]

2020: FORCE installed an automatic bat detector at two locations along the River Crane. In July 2020 the detector was installed at the Briar Road Allotments Site, on the south side of the river (opposite Kneller Gardens at grid ref TQ 1482 7320). In August 2020 it was installed on the south bank of the river, adjacent to the Mereway Day Centre Site, and opposite Mereway Nature Park at grid ref TQ 1504 7330 (approximately 130m from the Greggs Site)[12].

The Bat Conservation Trust was commissioned to analyse the recordings and provide a summary of results and the implications of the species recorded. Six species in total were recorded (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's bat and an unidentified *Myotis* spp., thought likely to be Daubenton's bat). Common and soprano pipistrelle bats were the most frequently recorded. The report noted the absence of brown long-eared bat and Natterer's bat, both of which are resident species in the borough.

2021: FORCE installed an automatic bat detector at four locations within Donkey Woods along the River Crane during May – August 2021, located approx. 5km up stream of the Greggs Site[13]. Seven bat species were recorded (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's, brown long-eared and an unidentified *Myotis* spp., thought likely to be Daubenton's bat). Common and soprano pipistrelle bat were the most frequently recorded.

3.3 Pre-existing On-Site Bat Activity Surveys

2019: Richard Graves Associates undertook a series of bat surveys (employing manual detectors, automated detectors and thermal cameras) throughout June, July, and September 2019. The survey findings showed that at least seven bat species use the Gregg's Site to forage on / near and commute over (common pipistrelle, soprano pipistrelle, brown long-eared, Leisler's, noctule, Natterer's and Nathusius' pipistrelle), plus an unidentified *Myotis* species. Soprano pipistrelles bats were the most frequently recorded bat species. The vast majority of the bat activity observed during the surveys was recorded along

[11] Furesfen (2016) Bat survey and report on the Duke of Northumberland's River (DNR), Mogden-Isleworth Ait.
[12] Briggs, P., Inston, M., Venugopal, P., (2020) London Bat Group Lower Crane Bat Monitoring 2020 Summary of Results
[13] Briggs, P. (2021) London Bat Group Donkey Wood Bat Monitoring 2021 Summary of Results

or near to the adjacent River Crane. No bats, of any species, were observed exiting or re-entering any of the buildings on-site[2].

3.4 Desktop Study Records

Updated desktop data from the Local Records Centre Data (GiGL)) were obtained to determine if any new relevant bat records had been recorded on or near the Site[14].

The desktop records included a variety of bat species all of which were located more than 100m from the Site. Species included:

- Common pipistrelle *Pipistrellus pipistrellus*;
- Soprano pipistrelle *Pipistrellus pygmaeus*;
- Daubenton's bat *Myotis daubentonii*;
- Noctule *Nyctalus noctula*;
- Natterer's Bat *Myotis nattereri;*
- Serotine *Eptesicus serotinus*;
- Brown long-eared *Plecotus auritus*;
- Leisler's bat *Nyctalus leisleri*;
- Nathusius' pipistrelle *Pipistrellus nathusii;* and
- *Myotis* spp.

3.5 Protected Species Licences

Magic was used to search for granted European Protected Species Licence Applications relating to bats within 2km of the Site. Two Bat EPS Licences were recorded within the search area:

- A record for a Bat EPS Licence (EPSM2011-2993), dated between 26th April 2011 and 31st August 2014, in relation to common pipistrelle and soprano pipistrelle bat(s).
- A record for a Bat EPS Licence (2016-25082-EPS-MIT), dated between 6th of September 2016 and 1st September 2021, in relation to brown long-eared, soprano and common pipistrelle bat(s).

3.6 Preliminary Bat Roost Assessment

During 2022 Extended Phase 1 Habitat Update Survey, the buildings within the Site were subject to an external inspection for evidence of, and potential to support, bats[3]. Where safe access permitted, an internal inspection of the buildings for bats / signs of bats was also conducted.

The potential of the buildings on-site to host bat roosts was assessed to be generally low (with buildings categorised as possessing Low or Negligible Bat Roost Potential), and no bats or signs of bats were observed during the inspection. Many of the building were open-sided or, large and draughty and were therefore poorly insulated and less likely to provide the stable conditions required for roosting bats. However, the Site's close proximity to the River Crane, a confirmed bat commuting / foraging corridor, was considered to increase its potential suitability[3].

[14] GiGL eCountability (2022) An Ecological Data Search for Greggs Bakery on behalf of Richard Graves Associates Ltd. Report Ref: 12500. Prepared on the 2nd June 2022.

4 Bat Ecology and Legislation

4.1 Bat Ecology and Behaviour

4.1.1 British Bats

There are eighteen species currently known in the UK, of these ten have been recorded in London. The most commonly recorded species in London and the UK are common pipistrelle, soprano pipistrelle and brown long-eared[15].

4.1.2 Bat Roosts

Bats may use several types of roosts during the course of the year, depending on their ecological requirements. During the active season (March to October) bats roost in maternity colonies, which may contain large numbers and are relatively easy to detect. Maternity roosts usually only contain females and their pups. Adult male bats and non-lactating females may use a variety of different roosts during the course of the year but usually roost individually or in small numbers.

Different roosts can be used during the day and night and by some bats specifically for feeding. These roosts, which for common species are of minor nature conservation significance, can be difficult to detect. Mating roosts, used during the autumn, are also often easy to detect because of the high level of activity (dominated by 'social' calls) associated with them.

During the winter months bats, enter a state of torpor within hibernation roosts. These roosts, which are considered to be of nature conservation significance, require very specific conditions of temperature and humidity, which are not present in many structures.

4.1.3 Bat Behaviour

Bats echolocate to communicate, navigate and feed with calls recorded as social, commuting and foraging. Bat calls are typically beyond the range of human hearing, so ultrasound detectors can be used to hear and record them. These calls can be further analysed. Observation of bats in the field by expert surveyors is also important to correctly interpret bat behaviour.

4.2 Legal Protection

All British bat species are protected under the Wildlife and Countryside Act 1981 (as amended)[16] and the Conservation of Habitats and Species Regulations 2017, as amended[17].

Bats are listed on Schedule 2 (European Protected Species of animals) of the Conservation of Habitats and Species Regulations 2017, as amended, and are subject to the provisions of Regulation 41 which makes it an offence to:

- deliberately capture, injure or kill any wild bat;
- deliberately disturb bats (where disturbance is likely to impair their ability to survive, breed or reproduce, rear or nurture their young; or to hibernate or migrate; or to affect significantly the local distribution or abundance of the species);
- damage or destroy a breeding site or resting place of a bat; or
- be in possession of, control, transport, sell or exchange, or offer for sale or exchange any live or dead bat or any part of a wild animal or anything derived from a bat or any part of a bat.

[15] http://natsmaps.com/LondonBatAtlas/ Accessed 6th October 2019.

[16] HMG, 1981. The Wildlife and Countryside Act 1981. HMSO

[17] HMG, 2017. The Conservation of Habitats and Species Regulations. London: HMSO

Bats are also listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are subject to the provisions of Section 9 of the Act, which make it an offence to:

- intentionally or recklessly disturb a bat whilst it is occupying a structure or place which it uses for shelter or protection;
- intentionally or recklessly obstruct access to any structure or place used for shelter or protection by a bat;
- sell, offer or expose for sale, or to possess or transport for sale a live or dead bat or any part of or anything derived from a bat.

4.3 Bat Licences

Developers must ensure that they commission reasonable survey efforts to determine bat presence and, if required, obtain the necessary European Protected Species Licence for development from the relevant Statutory Organisation (for this site, Natural England), which is likely to require appropriate mitigation for disturbance and loss of habitats.

5 Methods

5.1 Introduction

This section details the surveyors, dates, methods and limitations of the following bat surveys undertaken at the Site in 2022:

- Exit / Re-Entry Surveys;
- Automated Static Bat Detector Deployment; and
- Thermal Imaging System Surveys.

5.2 Survey Personnel

The following experienced surveyors conducted the 2022 bat surveys at the Site:

Richard Graves BSc (Hons) MSc PGDip CEcol CEnv FCIEEM

Richard has twenty-eight years' experience as a practising ecologist and has been involved in bat surveys and survey design for major projects for over twenty years and the development of good practice for bat surveys. Richard is a fellow of the Chartered Institute of Ecology and Environmental Management (CIEEM) a chartered ecologist and a chartered environmentalist. Richard is also class licenced for great crested newt surveys, a class licenced bat surveyor and was technical review panel member of good practice guidelines for bat surveys.

Dr Suzy Cardy BSc (Hons) MSc CEcol MCIEEM

Dr Cardy has over eighteen years' experience in the management and execution of the ecological elements of large-scale development projects including major rail infrastructure developments and one of the UK's largest translocation of protected species. Suzy is a chartered ecologist, has a Natural England Level 2 Bat survey licence and has managed bat related projects ranging from low numbers of more common bat species, to sites hosting significant maternity roosts with hundreds of breeding bats present and the design of complex hibernation mitigation. Suzy has worked with a variety of Clients across multiple sectors (transport, industrial, education, government, healthcare, commercial, leisure and power / energy).

Dr Liat Wicks BSc (Hons) MSc CEcol MCIEEM

Dr Wicks is an ecological consultant and Chartered Ecologist with over eighteen professional experience specialising in bat surveys, mitigation, sound analysis and advice across the UK. She is a class 2 licenced bat surveyor and has produced numerous EPS applications and Bat Masterplans for major infrastructure projects. She is a Category L1 certified thermographer and has used thermal imaging technology for ecology work since 2017. Between 2012 and 2013 Dr Wicks was Head of Biodiversity at the Bat Conservation Trust.

5.3 Bat Exit / Re-Entry Surveys

Table 1 (Section 6) sets out the schedule and details of the Bat Exit /Re-Entry Surveys conducted at the Site in 2022.

The Dusk/ Dawn Bat Exit / Re-Entry Surveys were conducted within the active season for bats in 2022. In accordance with the Bat Surveys for Professional Ecologists, Good Practice Guidelines 3rd Edition[18], the dusk surveys were conducted from approximately between 15 minutes before sunset until approximately one and half - two hours after sunset. The dawn surveys were conducted from approximately one and half - two hours before sunrise until approx. sunrise.

[18] Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed)., London: The Bat Conservation Trust.

5.4 Automated Detector Surveys

Automated bat detectors (Batlogger S2s detectors) were deployed during the April, May and August surveys for bat call recording sessions. Following the end of the recording sessions, the automated detector(s) was retrieved, and the data collected and analysed.

5.5 Thermal Imaging Surveys

A thermal imaging system (Guide Track IR Pro19 Scope thermal imaging camera) was used to record heat signatures from any emerging bats, in order to aid detection of bats within the buildings and habitats on-Site / near the Site. The thermal imaging system is sufficiently sensitive to record bats otherwise not visible where their body temperatures are higher than their surroundings and ambient temperature (as would be anticipated during the active season). The camera was deployed during the April, May and August Surveys.

5.6 Equipment

The manual activity surveys were undertaken using the following equipment:

- Elekon Bat Logger M;
- Elekon Bat Logger M2;
- Batlogger S2;
- Kestrel 3500 and 5500 Weathermeters;
- Guide Track IR Pro19 Scope;

Sound analysis of bat calls was undertaken using the following software as appropriate to the detectors:

- Bat Explorer (Bat Logger); and
- Weather data was recorded on-site using Kestrel Weathermeters, the Bat Loggers and from the WeatherOnline weather database.

Bat data were analysed and reported using:

- R (www.cran.r-project.orgh;
- RMarkdown (http://rmarkdown.rstudio.com/); and
- RStudio ™ (https://www.rstudio.com).

5.7 Limitations

- Bat detectors favour recording of those bats which make loud calls (for example: pipistrelles and noctules) over those which make quieter calls or do not echolocate (for example brown long-eared and some *Myotis* bats). This potential bias introduced by the detectors is compensated for by the visual clues observed by experienced surveyors and thermal imaging.
- Bats are highly mobile and their distribution over nights and seasons transient. Therefore, a single site survey provides only a snapshot of the conditions at the time of survey with regards to nature conservation status. Bats also use several different roosts at different times of year and between years.
- The BCT Guidelines[18] state that "*The aim should be to carry out surveys in conditions that are close to optimal (sunset 10°C or above, no rain or strong wind) particularly where only one survey is planned*". Temperatures during the April Dawn survey dipped just below 10°C (9.8°C at the start and 9.5°C at the end). This may have been a factor in the absence of bat activity recorded by the manual bat detectors during this survey. However, bat activity was recorded by the automatic detector located in Area B (Automatic Detector Location C on Figure 12b) on the same date, which was more enclosed and possibly warmer, location than the more exposed areas of the Site.
- Two short spells of rain were experienced during the May Dusk Survey. However, bat activity was observed continually throughout the survey by the automatic detector located next to the riverside (Automatic Detector Location F on Figure 12a).

- This report includes a series of infographics which illustrate each bat pass recorded as symbol on an aerial plan. It is important to note that the mapping of the bat passes is indicative and approximate due to the tolerance ranges of the GPS systems used to record the bat pass locations.
- The number of bat calls / passes recorded does not correlate directly to the number of bats present or using a particular feature. One or two bats foraging over a particular feature may produce several hundred calls.

6 Results: Bat Activity Surveys

6.1 Introduction

The sections below present a summary of bat data collected, infographics generated using the data and provide an interpretation of the data set collected from the manual bat survey (see Section 7 and Section 8 for the Automated Detector and Thermal Camera results, respectively).

6.2 Survey Schedule

The bat surveys were conducted within the active season for bats in 2022 (Table 1). The surveys focused on key areas and habitats on and adjacent to the Site (Figure 3):

- Area A – Buildings on-site within the section of the Site accessed *via* Gould Road;
- Area B – Buildings on-site within the section of the Site accessed *via* Edwin Road (Automatic Detectors only – see Section 7); and
- River Crane – Sections of the river that flow adjacent to and in close proximity to the Site.

Figure 3: Key Areas Covered by Bat Surveys Google Earth 2023©

Table 1: 2022 Bat Survey Schedule

Date (2022)	Sunset / Sunrise Time	Survey Type	Description
21st April	20:06	Dusk Exit Survey	– Two surveyors conducting Exit Surveys for the buildings with bat roost potential on-site.
22nd April	05:52	Dawn Re-Entry Survey	– Two surveyors conducting Re-entry Surveys for the buildings with bat roost potential on-site.
17th May	20:48	Dusk Exit Survey	– Two surveyors conducting Exit Surveys for the buildings with bat roost potential on-site.
18th May	05:06	Dawn Re-Entry Survey	– Two surveyors conducting Re-entry Surveys for the buildings with bat roost potential on-site.
11th August	20:29	Dusk Exit Survey	– Two surveyors conducting Exit Surveys for the buildings with bat roost potential on-site.
12th August	05:42	Dawn Re-Entry Survey	– Two surveyors conducting Re-entry Surveys for the buildings with bat roost potential on-site.

6.3 Surveyor Locations

The surveyor locations during the bat surveys are shown in Figure 4 & 5.

Figure 4: Surveyor Locations April 2022 – Dusk & Dawn Survey Google Earth 2023©

Key: Exit/ Re-Entry Surveyor Locations

Figure 5: Surveyor Locations May & August 2022 – Dusk & Dawn Survey Google Earth 2023©

6.4 Weather Conditions

With the exception of the April Dawn Survey where temperatures dipped just below 10°C, temperatures and conditions during all the surveys were suitable for recording bats (Table 2) (also see the Limitations section).

Table 2: Bat Surveys Weather Conditions Summary

Date (2022)	Start / End	Survey Timings Temp (°C)	Relative Humidity (%)	Wind Speed (mph)	Rain
21st April	Start	16.0	43	0	×
	End	14.3	56	1	×
22nd April	Start	9.8	73	0	×
	End	9.5	75	0	×
17th May	Start	24.4	47	0	×
	End	22	70	3	×
18th May	Start	15.4	80	0	Two short spells of rain during the survey (approx. 10mins each)
	End	11.5	88	0	×
11th August	Start	26	45	0	×
	End	22	56	0	×
12th August	Start	17	70	0	×
	End	16.5	75	0	×

6.5 Existing Lighting

During the surveys, it was noted that external (security) and internal (building interior) lighting of the Site were directly illuminating sections of the River Crane adjacent to the north of the Site and most of the parking area in Area A (see photos in Figure 19).

6.6 Bat Species Recorded during Manual Bat Surveys

Three bat species and a number of undetermined *Myotis* bat calls were recorded using the Site in 2022 during the Manual Bat Surveys (Table 3).

Table 3: Bat Species Recorded During the Manual Bat Surveys

Scientific Name	Common Names	Bat Species Description
Pipistrellus pipistrellus	Common pipistrelle	Common pipistrelles are the most common and widespread of all British bat species. They are found in lots of places, including towns and cities, as well as in the countryside. They are small, and their flight is fast and jerky as they pursue small insects which they catch and eat whilst flying. A single pipistrelle can consume up to 3,000 insects in one night.
Myotis spp.	*Myotis* sp.	Undetermined species of *Myotis* bat.
Nyctalus noctula	Noctule	Noctules are fairly large for a British bat. The noctule is generally one of the first bats to be seen of an evening, and they like to hunt over open ground, particularly pasture.
Pipistrellus pygmaeus	Soprano pipistrelle	The soprano pipistrelle was discovered as a different species to the common pipistrelle in the 1990s - they are very similar, but they use slightly different echolocation calls and there are subtle differences in how they look. They also tend to roost and hunt in slightly different places, with the soprano pipistrelle favouring river habitat and wetland areas.

6.7 Bat Pass Numbers during the Manual Bat Surveys

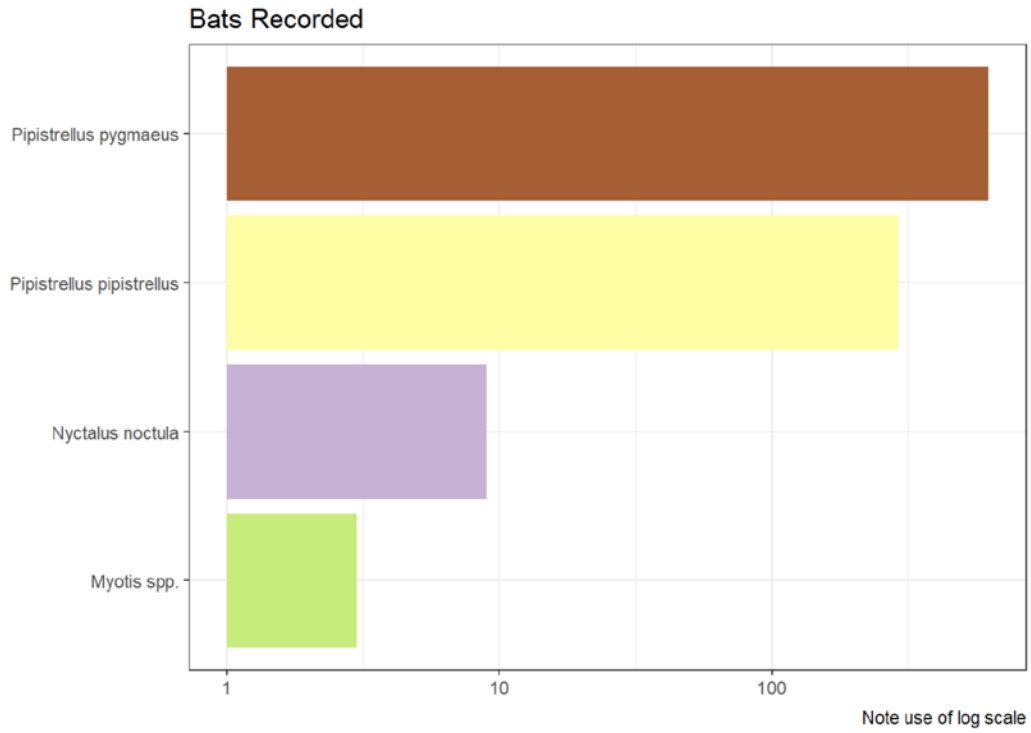
Soprano pipistrelles bats were the most frequently recorded bat species (accounting for over 67% of the manually recorded bat passes recorded), followed by common pipistrelles (accounting for over 31)% of the bat passes recorded). Low numbers of noctule and *Myotis* bats (species unconfirmed), were also recorded (Table 4 and Figure 6 & 7).

Table 4: Summary of Bat Pass Numbers from the Bat Surveys[19]

Scientific Name	Common Names	Bat Pass Count	Colour in Figures
Pipistrellus pipistrellus	Common pipistrelle	293 (*31.51%*)	
Myotis spp.	*Myotis sp.*	3 (*0.32%)*	
Nyctalus noctula	Noctule	9 (0.97%)	
Pipistrellus pygmaeus	Soprano pipistrelle	625 (*67.20%)*	
Total		**930**	

[19] "*Relative bat activity can be measured from the search-phase echolocation calls of bats or, more commonly, from 'bat passes/sequences' – where a pass/sequence is a series of calls belonging to an individual bat*" Paola F. Reason, Stuart E. Newson & Kate E. Jones (2016) Recommendations for using automatic bat identification software with full spectrum recordings.

Figure 6: Bat Passes, per Species -Total Calls - Manual Bat Surveys



6.8 Bat Activity Across the Site

An illustration of the bat activity recorded across the Site, for the manual bat surveys combined, is presented in Figure 7. The surveys across the Site enabled both acoustic recordings of each species detected, and visualisation of their flight paths, behaviour and direction of flight during the earlier part of the night and later parts of the pre-dawn surveys.

The vast majority of the bat activity observed during the surveys was recorded, off-site, along the River Crane. Bat activity over the Site itself was very limited in comparison to that recorded along the river. The clusters of bat activity in two main hot spots is, in part, product of the static nature of the Exit / Re-entry Surveys - i.e., the surveyors were stationary throughout the survey.

The majority of the river immediately adjacent to the Site was brightly lit by security and building lights from the former Greggs Bakery.

Figure 7: Bat Activity – Bat Passes from All 2022 Bat Surveys Combined - Manual Bat Surveys © Google Earth 2023

6.9 Bat Activity Recorded – Per Species

The locations of the bat observations for each species group are recorded are shown in Figure 8. The different pipistrelle species were recorded along the river corridor, with occasional recordings over Area A within the Site.

The high-flying 'big bat' species, noctule, was recorded commuting and foraging over the hard standing habitat and buildings as well as along the river corridor. Big bat species are typically not tied to linear features in the landscape. The *Myotis* species (undetermined *Myotis* species) were exclusively recorded foraging over the river suggesting that the species may have been a Daubenton's or Natterer's bats which are notably associated with waterbodies, over which they hunt.

Figure 8: Location of Bat Observations, by Species © Google Earth 2023

***Myotis* Species**	**'Big Bat' Species**
	
Pipistrelle Species	
	

6.10 Bat Activity Recorded – Per Month

The number of bat species recorded per month, ranged from two to three. The highest species richness was recorded in May and August (Table 5 and Figure 9).

Table 5: Bat Species Richness, per Month -Total number of bat species Recorded from the Bat Surveys

Month	Number of Bat Species Recorded*
April	2
May	3
August	3

* Excludes calls identified to only genera level i.e., *Myotis*

Figure 9: Location of Bat Observations, by Month © Google Earth 2023

April

May

August

6.10.1 Bat Activity Timings & Roosts Recorded

When a bat is recorded just after sunset or just before sunrise, is it possible that it is roosting nearby. The timings vary per bat species, but the typical emergence times for common and soprano pipistrelles is approximately 20-30mins after sunset[20].

Figure 10 shows the potential proximity of a roost based on an observed emergence time of less than 90 minutes after sunset. The coloured dots show the bat species and time they were observed. The white vertical dotted lines represent sunset times. The white bar indicates the approximate time the bat species exit from their roost[21]. The results are shown for each month[22].

Figure 11: shows the potential proximity of a roost based on the timing of bat observations closest to sunrise. The coloured dots show the bat species and time they were observed. The white vertical dotted lines represent sunrise times. The results are shown for each month.

Based on Figures 10 and 11 times, the following species are likely to be roosting on or near the transect routes surveyed:

- Soprano pipistrelle;
- Common pipistrelle;
- *Myotis* species (species unconfirmed); and
- Noctule.

[20] Russ, J. (Ed) (2021) Bat Calls of Britain and Europe, A Guide to Species Identification, Pelagic Publishing.

[21] Andrews, H. & Pearson, L (2022). "Review of Empirical Data in Respect of Emergence and Return Times Reported for the UK's Native Bat Species." https://drive.google.com/file/d/1DeGHxyr9-p5XH6R6CRimsmquVD188WY8/view.

[22] No figures have been produced for surveys where no bats were recorded, or where the activity recorded was outside of the time period specified on the figures.

Figure 10: Bat Emergence Times During the Dusk Surveys – Manual Bat Surveys

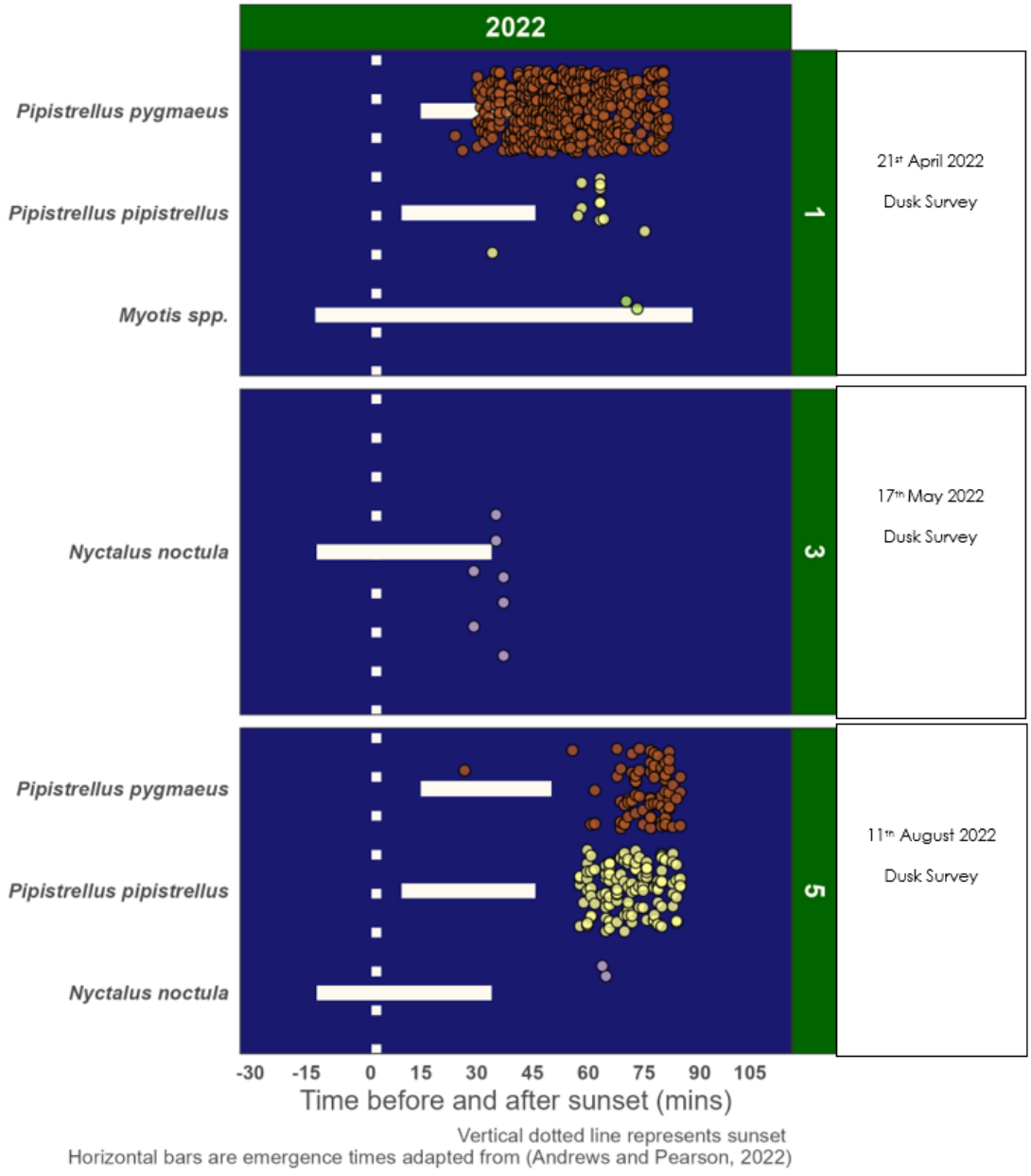
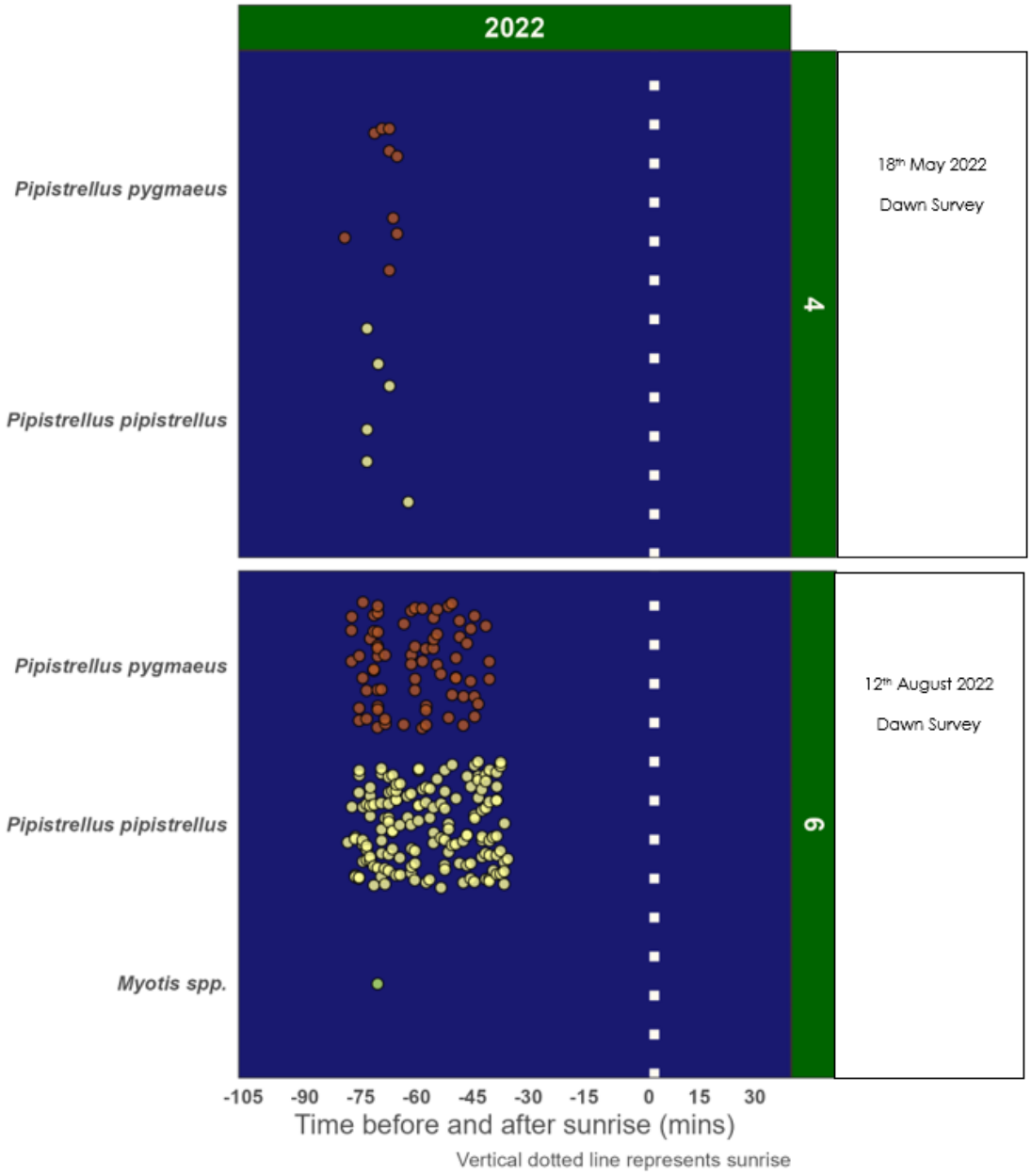


Figure 11: Bat Re-entry Times During the Dawn Surveys – Manual Bat Surveys



7 Results: Automated Detector Surveys

7.1 Automated Detector Session Schedule

Seven automated detectors recording sessions were undertaken at the Site using Batlogger S2 detectors. The dates of the automatic detector deployment and retrieval is shown in Table 6.

Table 6: Summary of Automated Detector Sessions

Automatic Detector Session	Automatic Detector Location		Deployment Date	Retrieval Date
	Ref **(Fig 12a&b)**	Description		
1	A	Area A	21/04/22	22/04/2022
2	B	Riverside	21/04/22	22/04/2022
3	C	Area B	21/04/22	22/04/2022
4	D	Area A	17/05/2022	18/05/2022
5	E	Area B	17/05/2022	18/05/2022
6	F	Riverside	17/05/2022	18/05/2022
7	F	Riverside	11/08/2022	12/08/2022

7.2 Automated Detector Locations

The automated detector locations are illustrated in Figure 12a and Figure 12b.

Figure 12a: Automated Detector Locations Sessions © Google Earth 2023

Figure 12b: Automated Detector Locations Sessions © Google Earth 2023

7.3 Bat Species Recorded from Automated Detectors

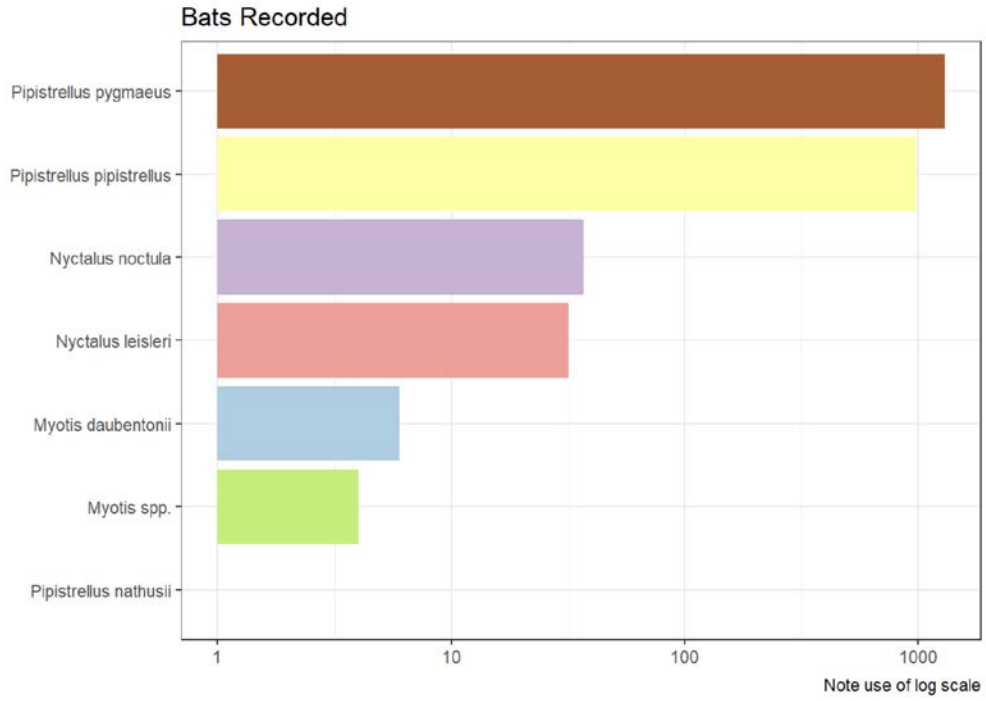
A considerable volume of bat activity was recorded by the automated detectors during their deployment. Six bat species, plus an undetermined *Myotis* species, were recorded by the automated detectors (Table 7 and 8). Common pipistrelle, soprano pipistrelle, noctule, Daubenton's bat, Nathusius' pipistrelle, Leisler's bat and an undetermined *Myotis* species were recorded. Daubenton's bat, Leisler's bat and Nathusius' pipistrelle were only recorded by the automated detectors and not by the manual detectors (Table 7 and Figure 13).

Table 7: Additional Bat Species Recorded During the Automatic Detector Bat Surveys*

Scientific Name	Common Names	Bat Species Description
Myotis daubentonii	Daubenton's bat	Daubenton's bats have a strong association with water and they normally hunt for food over smooth surfaced water such as ponds, lakes and slow flowing rivers and streams. They have a pale belly and fly low over the water, using their large feet and tail to scoop up insects from the water surface.
Pipistrellus nathusii	Nathusius' pipistrelle	This bat is quite rare in the UK, though records have increased in recent years. It is migratory and is most commonly found in autumn, although there are now records of colonies remaining all year and breeding in the UK. It is similar in appearance to, but slightly larger than the common and soprano pipistrelles and the fur on its back is longer, sometimes giving a shaggy appearance. The Nathusius' is strongly associated with water and woodlands.
Nyctalus leisleri	Leisler's bat	Leisler's are typically a forest species roosting in holes in trees, although they are also known to roost in the houses. They have golden-tipped hair and were formally known as the hairy-armed bat.

*For information on the other species recorded during the surveys see Table 3.

Figure 13: Bat Passes, per Species -Total Calls - Automated Bat Surveys



More than half of the of the bat passes recorded were from soprano pipistrelle bats (54.94%). Despite differences in the number of recording sessions, levels of activity recorded adjacent to the River Crane (Locations B & F) total bat passes: 2,317 (98.2%)) far outweighed that recorded on-site (Locations A, C, D and E – total bat passes: 42 (1.8%)) (Table 8).

Table 8: Summary of Bat Pass Numbers from Automated Detector Sessions

Common Names	Automated Detector Session						
	1 Location A	2 Location B	3 Location C	4 Location D	5 Location E	6 Location F	Totals
Common pipistrelle	3	1	6	1	0	972	983 (*41.7%*)
Daubenton's	0	3	0	0	0	3	6 (*0.25%*)
Myotis sp.	0	0	0	0	0	4	4 (*0.17%*)
Nathusius' pipistrelle	1	0	0	0	0	0	1 (*0.04%*)
Noctule	1	0	0	7	0	29	37 (*1.57%*)
Soprano pipistrelle	7	282	16	0	0	991	1296 (*54.94%*)
Leisler's bat	0	0	0	0	0	32	32 (*1.36%*)
Total	12 (0.51%)	286 (12.12%)	22 (0.93%)	8 (0.34%)	0	2,031 (86.10%)	2,359

7.3.1 Bat Activity Timings & Roosts Recorded

Figure 14 shows the proximity of a roost based on an observed emergence time of less than 90 minutes after sunset. The coloured dots show the bat species and time they were observed. The white vertical dotted lines represent sunset times. The white bar indicates the approximate time the bat species exit from their roost[23]. The results are shown for each month.

Figure 15: shows the proximity of a roost based on the timing of bat observations closest to sunrise. The coloured dots show the bat species and time they were observed. The white vertical dotted lines represent sunrise times. The results are shown for each month[22].

Based on Figures 14 and 15 times, the following species are likely to be roosting on or near the transect routes surveyed:

- Common pipistrelle; and
- Soprano pipistrelle.
- Daubenton's Bat
- Noctule

[23] Andrews, H. & Pearson, L (2022). "Review of Empirical Data in Respect of Emergence and Return Times Reported for the UK's Native Bat Species." https://drive.google.com/file/d/1DeGHxyr9-p5XH6R6CRimsmquVD188WY8/view.

14: Bat Emergence Times During the Dusk Surveys - Automated Bat Surveys

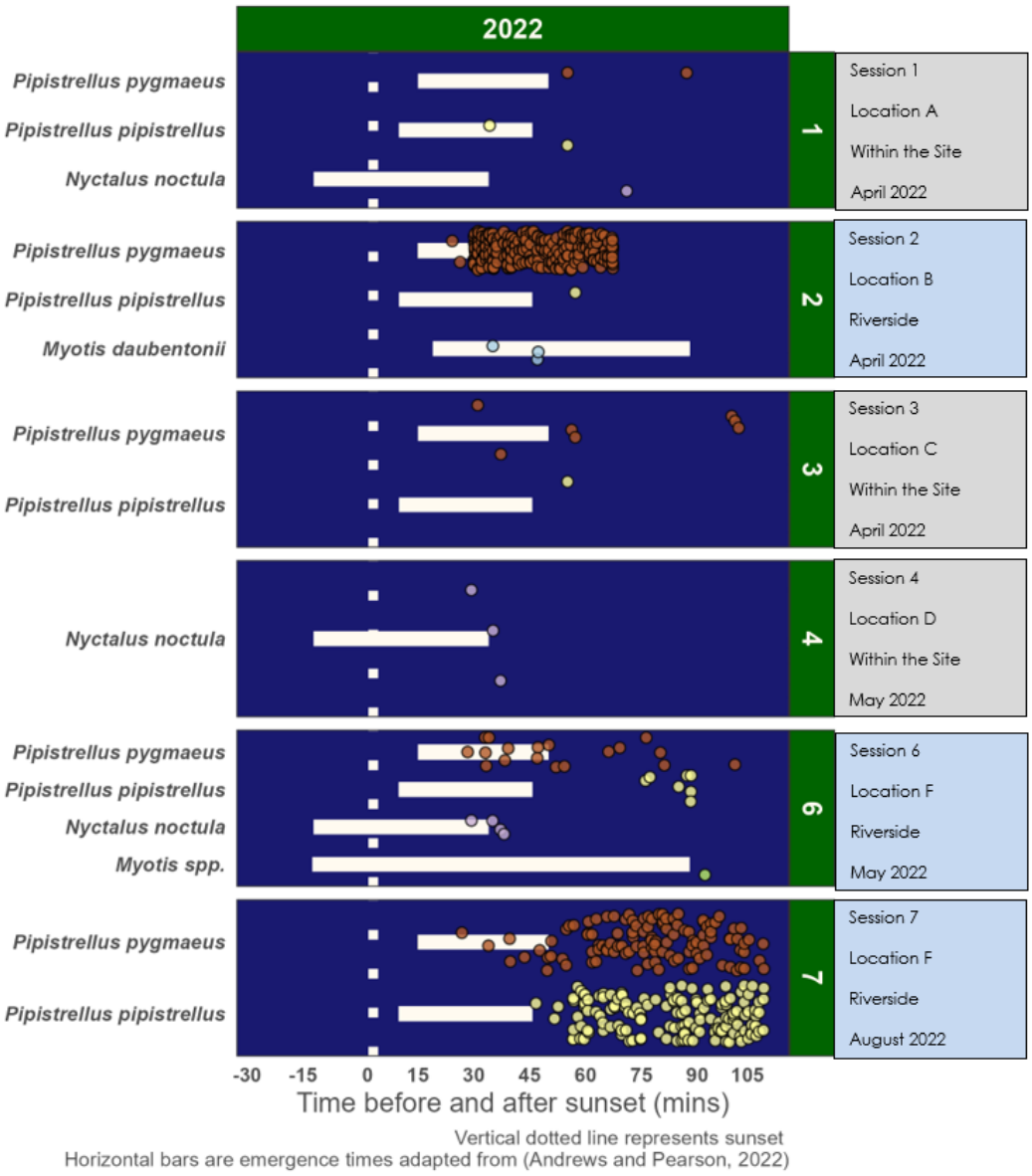
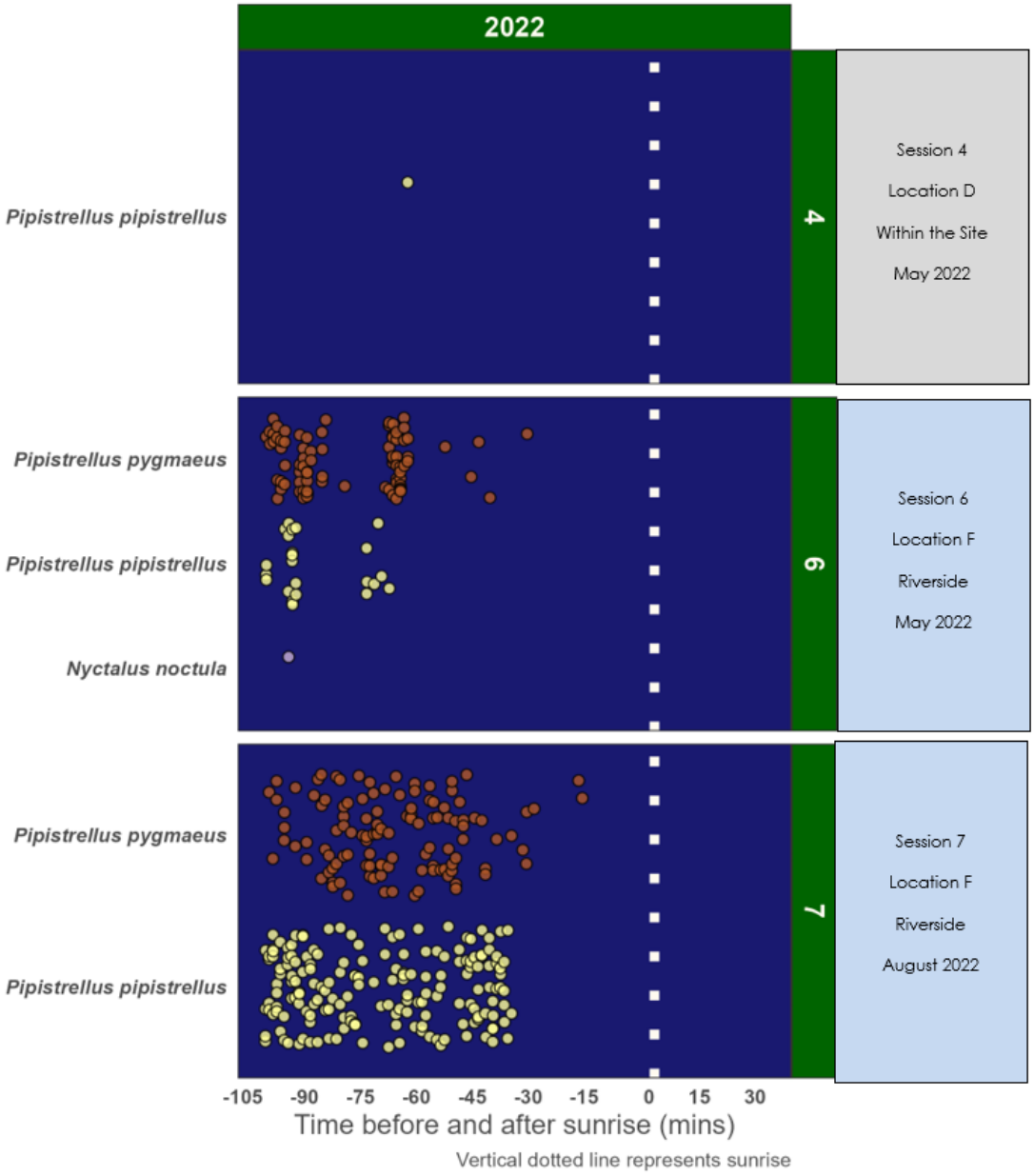


Figure 15: Bat Re-entry Times During the Dawn Surveys - Automated Bat Surveys



8 Results: Thermal Imaging Surveys

8.1 Thermal Imaging Schedule

A thermal imaging system (Guide Track IR Pro19 Scope) was used to detect heat signatures from any emerging bats. The thermal camera was deployed during the following surveys:

Table 9: Summary of Thermal Imaging Sessions

Date	Camera Location (Fig 16)
21/04/2022	B
22/04/2022	B
17/05/2022	A
18/05/2022	A
11/08/2022	A
12/08/2022	A

8.2 Thermal Imaging Locations

The deployment locations of the thermal imaging camera are shown in Figure 16.

Figure 16: Aerial Mapping indicating the Location of the Thermal Imaging Camera during Bat Surveys © Google Earth 2023

Key: Thermal Camera Indicative Field of Vision for Thermal Camera

8.3 Bat Activity Recorded from Thermal Imaging

Thermal images of the buildings on-site and the adjacent habitats were taken during the bat surveys (Figure 17). However, no bats were detected emerging or re-entering any of the buildings on-site on the thermal imaging cameras.

Figure 17: Examples of Thermal Images of the Buildings and Habitats on Site (see Appendix A for Building References)

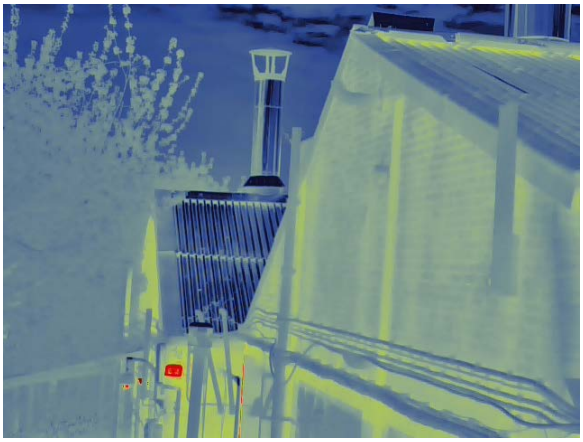
Image 1: Standard image taken on 21st April 2022, Facing Buildings 11 (adjacent to the River Crane)	**Image 2:** Thermal image, facing Building 11 (adjacent to the River Crane) during 21st April Survey
	
Image 3: Standard image taken on 17th May 2022, Facing Building 10	**Image 4**: Thermal image of a pipistrelle bats foraging over the River Crane
	

Image 5: Thermal Scope view over the River Crane and alongside the northern edge of the Site boundary during the August 2022 Surveys	**Image 6**: Thermal Scope view over alongside the northern edge of the Site boundary during the August 2022 Surveys
	

9 Interpretation & Recommendations

9.1 Introduction

The following chapter makes recommendations for the avoidance of harm to bats and their habitats, and enhancements to benefit bats, based on the levels of activity and evidence of bats recorded in 2019 and 2022.

9.2 Bat Species Composition

During the 2022 bat surveys, six bat species were recorded foraging on / near and commuting over the Site: common pipistrelle, soprano pipistrelle, noctule, Daubenton's bat, Nathusius' pipistrelle, Leisler's bat, plus an unidentified *Myotis* species.

With the exception of Daubenton's bat, all of these bat species were previously recorded during the 2019 bat surveys. Two species recorded in 2019, were not recorded in 2022: brown long-eared, and Natterer's.

Bat detectors favour recording of those bats which make loud calls (for example: pipistrelles and noctules) over those which make quieter calls or do not echolocate (for example brown long-eared and some *Myotis* bats) and this may, in part explain the absence of brown long-eared in the current survey results. The surveys in 2019 also extended to the River Crane, north of the Site and to the east and west along the river including areas subject to less, or no artificial lighting.

In terms of the 'big bat' species, noctules and Leisler's bat were recorded in both 2019 and 2022 surveys. Serotine bats however were absent from the 2019 and 2022 bat surveys at the Greggs Site and were also absent from the sites along the River Crane recently surveyed by FORCE[12,13]. With regard to serotine bats, the Lower Crane Bat Report states that:

"*this species* [serotine] *appears to have undergone a severe decline over the last 20 years to the extent that it is now a very elusive species and may now be virtually absent from the borough*.[12]"

The Donkey Wood Bat Report states that:

"*Another local species, serotine, appears to have become very scarce locally, no longer being recorded during bat detector surveys at former key locations such as the WWT London Wetland Centre. Furthermore, trapping surveys in the local area have failed to capture any individuals of this species. Therefore, its possible absence from Donkey Wood may well now be typical of West London as a whole*."[13]

9.3 Bat Roost Sites

No bats, of any species, were observed exiting or re-entering the buildings on-site. However, based on the emergence times recorded during the 2022 surveys, at least four species of bat: common pipistrelle, soprano pipistrelle, noctule, Daubenton's bat, plus an undetermined *Myotis* species, are likely to be roosting near the Site.

9.4 Precautionary Pre-Demolition Checks

Between 2018 and 2022, a comprehensive suite of bat potential assessments and surveys has been conducted and a considerable volume of bat data has been recorded and analysed for this Site. The bat species that use the Site and the features that are important to them for commuting and foraging have largely been identified.

However, as building conditions can deteriorate over time, leading to concomitant changes in bat suitability, if building demolition is delayed beyond the start of the next bat active season (April / May 2023), as a *precautionary* measure, one follow-up Bat Dusk/ Dawn Survey should be conducted and a bat focused Tool Box Talk given, before demolition begins.

If a bat is observed during the building demolition, works must stop immediately and a suitably qualified and licenced ecologist consulted immediately. In this situation, a Natural England licence would be required prior to the re-start of works. Appropriate mitigation may be required including replacement roosts, to ensure the favourable conservation status of the species is maintained.

9.5 Protection of the River Crane Corridor

The results from the bat surveys shows that bats are using the River Crane corridor to forage and commute. It is important that good construction practice in relation to ecology should be followed during the site clearance and construction works to prevent water course pollution (for example, avoidance of run-off and lighting).

Where a Demolition Management Plan (DMP) / Construction Management Plan (CMP) and Site Waste Management Plan (SWMP) are prepared for the development, its recommended that they include a section detailing the provisions aimed at protecting biodiversity, including avoiding any additional lighting of the watercourse during construction.

9.6 Consideration of Lighting

9.6.1 Potential Impacts of Lighting

Lighting schemes can damage bat foraging habitat directly through loss of land and spatial exclusion of bats due to high illuminance, or indirectly by severing commuting routes from roosts, through light spillage polluting hedgerows, mature tree lines and other linear features often used by commuting bats. Lighting around roosts has also been shown to delay emergence, causing bats to miss the peak in insect prey abundance affecting survival and health[24].

It should be noted that some bat species (common pipistrelle and noctule) can benefit from lighting and are known to forage around and above streetlights, whereas other species such as brown long-eared bats are light averse and will avoid brightly lit areas. As such the severity of impacts of any lighting scheme will vary depending on the species present.

9.6.2 Designing a Site-Specific Lighting Strategy

As part of the design process, the impact of external lighting on the local biodiversity has been considered, in line with current guidance and in consultation with the Project Lighting Team (Desco (Design & Consultancy) Ltd. This strategy has been revised in response to comments from the local planning authority [5,6]. Any lighting during construction will be addressed in the CEMP.

The 'Exterior Lighting Assessment Supplementary Report: Minimising the Impact of Lighting on Nocturnal Wildlife'[5] provides a site-specific lighting strategy aimed at protecting bats and other nocturnal wildlife from the potential deleterious impacts of light spill on sensitive habitats.

The lighting strategy for the Site has been formulated to avoid, and where this is not possible for safety or security reasons, minimise any light trespass on the River Crane Corridor so it can continue to function as a 'dark corridor'. The lighting strategy has been based on principles of the:

- Bats and Artificial Lighting in the UK[25];
- Planning guidance (National Planning Policy Framework, 2021)[26]; and

[24] Stone, E.L. (2013) Bats and Lighting: Overview of current evidence and mitigation guidance

[25] Bat Conservation Trust and Institution of Lighting Professionals Guidance Note 08/ 18 "Bats and Artificial Lighting in the UK" Bats and the Built Environment Series

[26] Ministry of Housing, Communities & Local Government. 2021. Policy paper: National Planning Policy Framework February 2021

- Design Guidance Protecting Bats in Waterside Development[27].

as detailed in the following section.

9.6.3 River Corridor Lighting Zones & Bats

For bats, the risk of disturbance from light trespass decreases inland with the increasing distance from the water's edge. Therefore, a number of different 'lighting zones' can be delineated running parallel to the river. As set out in the 'Design Guidance Protecting Bats in Waterside Development[27]. Each of these zones can then be assigned light level limit to be imposed at the outset of scheme design as set out in the table below. Please note that this guidance refers to the ideal artificial lighting (or lack of) situation with respect to bats and does not consider requirements in relation to human safety or security.

Table 10: Summary of River Lighting Zones

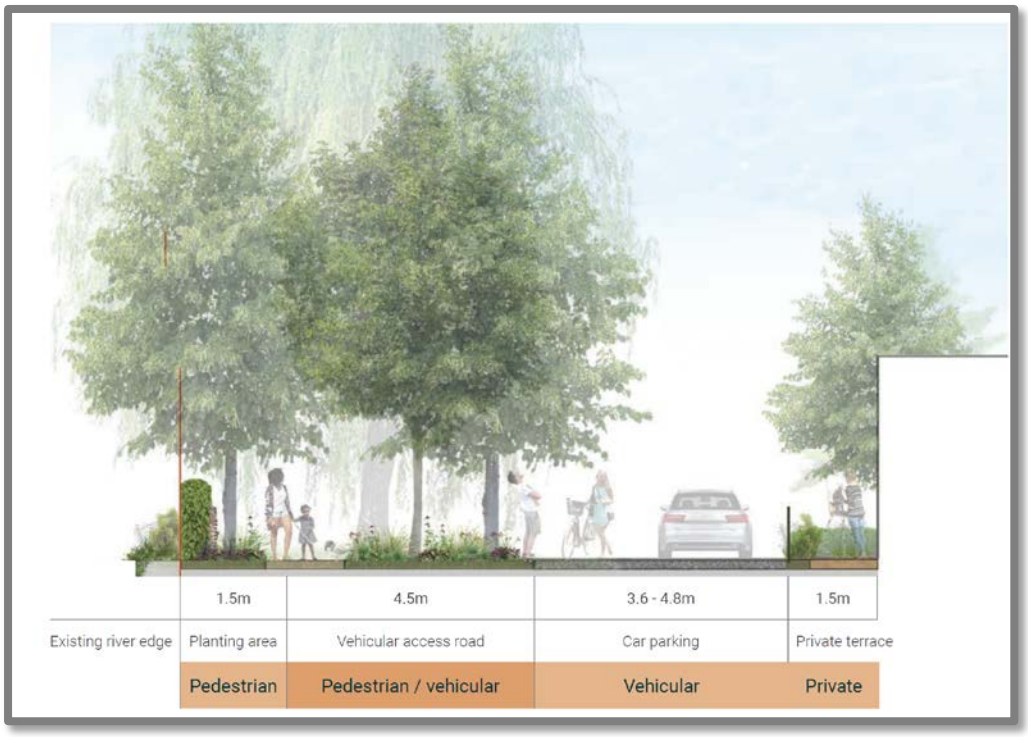
Zone	Location	Distance from Water's Edge	Light Limit	Development
Zone A	At the river channel and bank. Includes natural and engineered banks and moorings etc.	Approx. 0-2m from water's edge	<0.1 lux	No development and no /limited human access.
Zone B	At the bank top which includes the towpath or can be flat ground with continuation of bank vegetation.	Approx. 2-6m from water's edge	<0.5 lux	No development, accept access ways for cyclists and pedestrians.
Zone C	At the development edge - the transitional zone between undisturbed river corridor and the built environment.	Approx. 6-10m from water's edge	<3.0 lux	Limited development such as communal amenity areas.
Zone D	Development Zone – includes illuminated parking and the first buildings in from the water's edge.	Variable	No lux limits	Buildings and hard standings.

9.6.4 Riverside Landscaping

The Site landscaping strategy seeks to restrict the amount of light spill reaching the River Crane by providing a 5m buffer zone between the river and built development (Figure 18). We understand that this will include native tree planting and a continuous native species hedge (circa 1300mm high) which will be planted on the riverside, behind a 600mm brick wall with 700mm slatted fence above, to try to reduce light spill onto the river from the new development.

[27] The Environment & Design Team (2018) WaterSpace Design Guidance Protecting Bats in Waterside Development

Figure 18: Riverside 5m Buffer Zone[4]



9.6.5 Bespoke Lighting Detail

In accordance with good practice (Bats and artificial Lighting in the UK[25]) and planning guidance (National Planning Policy Framework[26]), following additional key points have been incorporated into the lighting design:

- Lighting in the apartments will be recessed LED downlighting, set back from the windows;
- External luminaires will comprise LED lamps which produce no UV emissions which ensures insects are not attracted away from neighbouring habitats;
- The LED street luminaire design has been amended so that the 4000mm high columns adjacent to the river have been removed and no lighting will be included in the 5m buffer strip;
- Car park / bollard lighting will use DW Windsor Pharola DS (for dark skies compliant schemes);
- The apartment blocks and houses in the proposed development will be set back approximately 11,000 mm from the edge of the river;
- Any use of uplighting on trees and other landscape features has been avoided; and
- The external lighting has been modelled using lighting design software, the calculation outputs of which are enclosed within the revised Exterior Lighting Assessments [5,6] and this has enabled lighting levels and spill across the space to be accurately predicted, thus ensuring that light is not provided to areas which do not require illumination and that the River Crane at this section becomes a 'Dark Corridor'.

Overall, there would be a considerable improvement on the current factory lighting situation (Figure 19) in relation to maintaining and creating the river at this section as a dark corridor. The proposed changes will provide a darker, deeper and wider commuting / foraging zone than currently exists. With all of the above mitigation applied, the residual light spill on the river corridor will be of the average 0.21lux, which is similar to that experienced on a clear full moon (0.25- <1 lux) and with average lux levels within the buffer zone at 1.09 lux, down to 0.1 lux in certain areas (Figure 20).

With the development set back approximately 11000mm from the river's edge, the introduction of a 600mm brick wall complete with 700mm slatted fence above and substantial hedge planting along the river frontage, combined with the river surface being approximately 1200 – 1500mm below ground level, the proposal provides for a darker, deeper and wider fly/foraging zone than currently exists. This results in a new 3400mm dark foraging zone across on the river's surface. This is far greater than the estimated 500mm wide zone that exists with the boundary wall and factory building high level windows[6].

Figure 19: Photos of Exiting Factory Light Spill on to River Corridor

Image 5: Internal and external security lighting in Area A

Image 5: External security lighting on-site, adjacent to the River Crane

Figure 20: Revised Riverside External Lighting Illustrations[6]

9.7 Enhancement

Opportunities for biodiversity gain as well as avoiding impact have been considered and incorporated into the design. Based on the bat survey information at the Site, the following enhancements, specific to bats, will be undertaken[4]:

- Use of native species in landscaping proposals; tree, hedge and plant species planting as part of a landscaping scheme (using native species / species of value to biodiversity[4]). Species lists sources will include (Gunnell 2012[28]) & (Bat Conservation Trust 2015[29]) and the following native species: *Crataegus monogyna (*provides summer flowers and autumn berries and creates a dense hedge, good for nesting bird habitat*), Fagus sylvatica, Ilex aquifolium (*good evergreen species providing autumn food source for birds*), Silene dioica, Lychnis flos-cuculi, Galium verum, Leontodon hispidus, Leucanthemum vulgare, Lotus corniculatus, Primula veris, Prunella vulgaris, Ranunculus acris, Rumex acetosa, Agrostis capillaris, Cynosurus cristatus, Festuca rubra and Acer campestre*.
- Creation of a wider natural corridor formed as part of the 5m river buffer to include a river corridor hedgerow and native tree planting; and
- Creation of 706 m^2 of green roof(s) will provide habitat for invertebrates which bats can forage over.
- Four bat boxes within new builds which will be installed on-site.

[28] Gunnell, K., Grant, G and Williams, C. (2012). *Landscape and Urban Design for Bats and Biodiversity*, Bat Conservation Trust.
[29] Bat Conservation Trust, 2015. *Encouraging Bats: A Guide for Bat-Friendly Gardening and Living'*.

10 Ecological Impact Assessment

10.1 Baseline Data

Baseline data is presented in this report and includes:

- Desktop records from GiGL, FORCE Surveys and a Preliminary Bat Roost Features Survey;
- Manual activity surveys across the active season in 2019 and 2022;
- Thermal imaging surveys completed in conjunction with the manual activity surveys; and
- Automated detector surveys.

The purpose of the field surveys was to identify any roosting within the Site and assess nearby habitats for bat use, activity type and species in order to inform any mitigation required or possibilities for enhancement.

- Collectively, the activity 2019 and 2022 surveys recorded up to eight species plus an undetermined *Myotis* species, which are consistent with records from previous surveys and surveys conducted by other parties.
- The most commonly recorded species was soprano pipistrelle, which was recorded along all parts of the of the survey area.
- During the manual surveys, Leisler's and noctule bats were frequently recorded close to the permanent floodlighting of a council depot north of the Site and the river in 2019.
- In 2022, noctules were recorded commuting over the western edge of the Site.
- *Myotis* bats (both in 2019 and 2022), as well as a single Nathusius' pipistrelle bat (in 2019 and 2022), and Daubenton's bat(s) (in 2022) bat were recorded along the river in unlit / darker areas / dark areas of the Site.
- A single brown long-eared bat was recorded within the darker area of the Site (in 2019), away from the river.

10.2 Potential Impacts

The main potential impact to bats resulting from the operation of development are loss of habitat and new artificial lighting (which can also lead to loss of habitat). However, the impacts of artificial lighting on bats varies by species, with respect to foraging and commuting. It is likely that directing lighting directly onto roosts is detrimental to all bat species recorded in the UK.

As far as it is known, with respect to the species recorded, and this appears consistent with the results of field surveys, species (including noctule, Leisler's, and common and soprano pipistrelle) which use an aerial hawking strategy can benefit from concentrations of insect prey drawn towards artificial lighting while those species that use a gleaning strategy (including *Myotis* and brown long-eared) actively avoid artificial lighting and may also suffer a reduction in prey availability as it is attracted away from darker areas.

The Site, although no longer in use as a bakery, was still artificially lit during the 2019 and 2022 surveys with security lighting directed towards the river and interior building lighting switched on. Levels of lighting within the rest of the survey area varied greatly from mostly dark to very brightly lit. The 2019 survey also recorded a high concentration of light tolerant species attracted to the security lighting of the council depot to the north. The darker parts of the survey area were used by all the bat species recorded while the brightly lit areas were only used by species known to be tolerant.

Nathusius' pipistrelle was only recorded in a darker part of the survey area (off-site) in 2019 and was recorded by the automatic detector near the Gould Road entrance to the Site in 2022. This species is known

to forage occasionally around artificial lighting[30], however, only one bat pass was recorded for this species during the 2019 surveys and only one bat pass was recorded during 2022 surveys. Additionally, there is insufficient evidence to assess how it may have been responding to artificial lighting.

10.3 The Do Nothing Alternative and Consideration of the Mitigation Hierarchy

The potential impacts on bats from the proposed development are considered in accordance with the Mitigation Hierarchy, which is to consider avoiding impacts, mitigating impacts that cannot be avoided and compensating for impacts that cannot be avoided or mitigated. In this case avoiding an impact would equate with a do-nothing scenario, which would involve the retention of existing buildings and hardstanding immediately above the river embankment with detrimental security and building lighting directed directly into the river corridor used by bats.

10.4 Consideration of Alternatives

The proposed development has now been through two iterations of landscape design and three iterations of lighting design with respect to the border with the River Crane:

- The first including a boardwalk, play areas and car parking and lighting (referred to in Table 11 as '**Boardwalk**'); and
- The second including a 5m buffer zone with biodiverse native species planting and no lighting (referred to in Table 11 as '**Buffer Zone'**).

10.5 Impact Significance by Bat Species

Impacts are considered to be adverse, neutral, or beneficial with significance considered to be negligible minor, moderate or major, all in (this case) a local context and considered in respect of the change between the existing situation and the revised option for a 5m buffer zone with biodiverse planting, green roof and bat roost box provision. Impacts that are negligible or minor are not considered to be significant, impact that are moderate or major are considered to be significant.

The following table summarises the impact on each species and its significance with respect to changes in artificial lighting and changes in habitat provision during the operation of the development.

Table 11: Impact Significance by Species

Bat Species / Feature	Do Nothing	Boardwalk Scheme Iteration *	Buffer Zone Scheme Iteration *	Significant Yes / No
Nathusius' pipistrelle	Insufficient Information	Minor beneficial	Moderate beneficial	Insufficient Information
Common Pipistrelle	Minor adverse	Minor beneficial	Moderate beneficial	Yes
Soprano pipistrelle	Minor adverse	Minor beneficial	Moderate beneficial	Yes
Leisler's	Neutral	Minor adverse	Minor adverse	No
Noctule	Neutral	Minor adverse	Minor adverse	No
Brown long-eared	Moderate adverse	Minor beneficial	Moderate beneficial	Yes

[30] Dietz, C, von Helverson, O. & Nill, D. (2007) *Bats of Britain, Europe and Northwest Africa* (P. 296 – 300) A & C Black Publishers, London

Natterer's	Moderate adverse	Minor adverse	Moderate beneficial	Yes
Daubenton's bat	Moderate adverse	Minor adverse	Moderate beneficial	Yes
Myotis	Moderate adverse	Minor adverse	Moderate beneficial	Yes
Roost availability	Negligible – Minor adverse	Minor beneficial	Minor beneficial	No
Habitat Availability	Moderate adverse	Minor Beneficial	Moderate beneficial	Yes

* See Section 10.4 for a description of these iterations of the development design

The impacts on bat species are considered in the context of the activity observed in the field at and near to the Site. Common and soprano pipistrelles do avoid artificial lighting while commuting, but may feed on prey attracted to lighting. Noctules usually commute much higher in the air than pipistrelles and were clearly attracted to lighting during these surveys. During the 2019 surveys, the lighting over the nearby depot attracted foraging bats of these species considerably more than the lighting over the river.

Lighting of the watercourse discourages brown long-eared from commuting, but is a less important part of the foraging habitat for this species than it is for most *Myotis* species, leading to an increase in beneficial impact for this genera, with respect to brown long-eared.

There are no significant adverse impacts to any bat species resulting from the operation of the development, incorporating a 5m buffer zone. There are significant potential beneficial impacts to pipistrelle species, brown long-eared, Daubenton's bat and *Myotis* species. The benefits are considered to be moderate rather than major as the proposed development relates a relatively small section of the river corridor and there is no ability to affect other built development and artificial lighting that affects bats along the river corridor.

11 Conclusion

In 2022, Richard Graves Associates undertook a series of bat activity surveys on the Greggs Bakery Site, Twickenham. These surveys provide updated information in support of a Planning Application for proposed development. The report has been produced using bat survey data collected in 2022 and previous survey results.

The survey findings show that, collectively for the 2019 and 2022 surveys, at least eight species of bat use the Site to forage on / near and commute over (common pipistrelle, soprano pipistrelle, brown long-eared, Leisler's, noctule, Natterer's, Nathusius' pipistrelle, Daubenton's bat plus an unidentified *Myotis* species).

Brown-long eared bats and Natterer's were recorded in 2019, but not in 2022 and Daubenton's bat was recorded in 2022, but not confirmed as a species present in 2019.

No bats, of any species, were observed exiting or re-entering any of the buildings on-site either in 2019 or 2022. However, a high level of early bat activity was recorded (off-site) along the River Crane. Based on the collective emergence times recorded during the 2019 and 2022 surveys, at least five species of bat: common pipistrelle, soprano pipistrelle, Daubenton's bat, Leisler's bat, and noctule, plus an undetermined *Myotis* species, are likely to be roosting near the Site.

The proposed development has been designed to minimise any impacts to the local bat population, whilst providing bat targeted enhancements.

The lighting strategy has been developed to ensure that there would be a considerable improvement on the current factory and security lighting in relation to restoring this section of the river as a dark corridor. The proposed changes will provide a darker, deeper and wider fly / foraging zone than currently exists. With all of the lighting mitigation applied, the residual light spill on the river corridor will be of the order 0.21lux, which is similar to that experience on a clear full moon (0.25- <1 lux).

Opportunities for biodiversity gain, as well as avoiding impacts have been considered and incorporated into the design. Based on the bat survey information at the Site, enhancements, specific to bats, will comprise: a planting palette which benefits bats by providing a food source for insects, tree planting to provide potential future roosting opportunities, bat boxes across the Site and a green corridor of native hedge which will run parallel to the river corridor, adding a green linear feature along which bats can commute and forage.

A series of recommendations have been made which include: 1) *pre-cautionary* pre-clearance checks for bats in buildings; and 2) the employment of good construction practice in relation to ecology (specifically the River Crane) during the site clearance and construction works to prevent water course pollution.

If the recommendations of this report, and the Phase 1 Habitat Survey Report[3], there are no undue constraints, with respect to bats, to the proposed development.

Appendix A

- Building References Plan


Building References
Greggs Bakery, Twickenham
Legend
Building References
Indicative Site Boundary
9
8
10
7b
11
7a
12
4
6
3
2
5
1
N
70 m
Google earth