

National Grid Cable Tunnel Replacement Project

Environmental Statement - Volume VI

Appendix 7.4: Bat Survey Report

December 2023



Quality information

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1 Introduction

1.1 Background

1.1.1 AECOM Ltd (hereafter referred to as AECOM) was commissioned by National Grid to undertake an ecological assessment to support the Environmental Statement for the (Tilbury to Grain and Tilbury to Kingsnorth) TKRE Cable Tunnel Replacement Project (hereafter referred to as 'the Proposed Development'). The Proposed Development relates to the replacement of the below ground cabled section of the TKRE 400 kV circuits with the construction of new bored tunnel under the River Thames to carry new cross linked polyethylene (XLPE) cables, together with new associated infrastructure either side of the Thames comprising:

- **A new cable sealing end compound:** consisting of:
 - **a new tunnel headhouse** which will cover the shaft into the tunnel;
 - **a new overhead line gantry structure** which will connect the overhead line downlead conductors and transfer them to six sealing end structures; and
- **Modifications to the existing overhead line (OHL):** The new OHL conductors will be connected to the existing TKRE 400kV OHL conductors via new terminal pylons. The old OHL conductors and existing pylons will be either replaced, refurbished or removed.

1.1.2 The required headhouses and SECs would fall within the jurisdiction of Thurrock Council (north of the River Thames) and Gravesham Borough Council (south of the River Thames).

1.2 Site Description

1.2.1 The extent of land required for the Proposed Development (hereafter 'the Site') is split into two areas, one in Tilbury ('the Tilbury Site') and the other in Gravesend ('the Gravesend Site'). They are split from each other by the River Thames and Thames Estuary.

Tilbury Site

1.2.2 The area north of the River Thames is located in Tilbury in the borough of Thurrock, Essex at Ordnance Survey (OS) grid reference TQ 66312 75869. The Tilbury Site is a mixture of in-use and disused industrial grounds and consists of a mixture of sparsely vegetated hard-standing, and larger areas of grassland, scrub and adjoining ditches.

1.2.3 The Tilbury Site is surrounded by an industrial and agricultural landscape with the River Thames adjacent to the south.

Gravesend Site

1.2.4 The area to the south of the River Thames is located in Gravesend, in the borough of Gravesham, Kent at OS grid reference TQ 67440 74151. The habitats on Site include grassland, scrubland, bare ground, ditches and marshy grassland. The eastern sections of the Gravesend Site are within Milton Rifle Range, and the western sections contain grazed pasture fields and the existing Eastcourt Marshes Electricity Substation.

1.2.5 The River Thames adjoins the northern boundary and the Thames and Medway Canal runs along the southern boundary of the Gravesend Site.

1.3 Pre-existing Information

- 1.3.1 A Preliminary Ecological Appraisal (PEA)¹ was completed in November 2022 in support of the Proposed Development, covering a wider area than the Red Line Boundary shown on Figure 1 in Volume VII as part of the site selection process.
- 1.3.2 The PEA identified that both the Tilbury Site and Gravesend Site contained habitat suitable to support roosting, foraging and commuting bats.

1.4 Objectives

- 1.4.1 The objectives of the bat surveys undertaken were to:
- Determine the presence or likely absence of roosting bats in both the Tilbury and Gravesend sections of the TKRE Site; and
 - Determine the use of each Site by commuting and foraging bats.
- 1.4.2 Recommendations for future works will be provided in the main body of the Environmental Statement, within the Ecology chapter.

¹ AECOM Ltd (2023) TKRE Preliminary Ecological Appraisal.
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2 Legislation

2.1 Conservation of Habitats and Species Regulations 2017 (as amended) and Wildlife and Countryside Act 1981 (as amended)

2.1.1 All UK native bat species and their roosts (whether bats are present or not) are protected under the Conservation of Habitats and Species Regulations 2017 (as amended)² and the Wildlife and Countryside Act 1981 (as amended)³. Taken together, under this legislation it is an offence to:

- Deliberately, intentionally or recklessly capture, injure or kill a bat;
- Damage/destroy a breeding site or resting place of a bat (this is an offence whether the act is deliberate or not);
- Deliberately, intentionally or recklessly disturb a bat; or
- Intentionally or recklessly obstruct access to any structure which a bat uses for shelter or protection.

2.1.2 A bat roost is defined as “any structure or place, which is used for shelter or protection” or a “breeding site or resting place”. Because bats commonly use the same roosts at particular times of the year after periods of absence, the roost is protected whether or not bats are resident.

2.1.3 Given the above legislation, the potential presence of bats at a site represents a material consideration in the planning process. Even where planning permission is not required there is still a legal responsibility placed on the developer to ensure that a Natural England licence is obtained to cover any works that have the potential to result in an offence under the above legislation.

2.2 Natural Environment Rural Communities Act 2006 (as amended)

2.2.1 Seven UK bat species are listed as species of principal importance within Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)⁴: namely barbastelle bat (*Barbastella barbastellus*), Bechstein's bat (*Myotis bechsteinii*), noctule bat (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), greater horseshoe bat (*Rhinolophus ferrumequinum*) and lesser horseshoe bat (*Rhinolophus hipposideros*). Under Section 40 of the NERC Act 2006, public bodies and statutory undertakers have a duty to have regard for SPI when carrying out their functions.

² Conservation of Habitats and Species Regulations 2017 (as amended). London: HMSO

³ Wildlife and Countryside Act 1981 (as amended). London: HMSO

⁴ Natural Environment and Rural Communities Act (2006). London: HMSO

3 Methods

3.1 Desk Study

- 3.1.1 Records of protected and/or notable species recorded within a 2km radius of Proposed Development were obtained from Essex Field Club and Kent⁵ and Medway Biological Records Centre (KMBRC)⁶ in support of the PEA⁷.
- 3.1.2 In addition, a review of publicly available information collected in support of nearby large scale infrastructure developments has been undertaken, and included a search for relevant data in planning documentation for the following developments:
- Lower Thames Crossing⁸;
 - Thurrock Flexible Generation Plant⁹; and
 - Tilbury 2¹⁰.

3.2 Field Survey

- 3.2.1 This section details the methods used to conduct the bat roost suitability assessment and bat activity surveys of the Sites. .

Bat Roost Suitability Assessment

- 3.2.2 A detailed inspection of buildings, other built structures and trees to be lost, or potentially lost (i.e. are within the red line boundary or within a 10m buffer of the red line boundary at the time of survey), was undertaken at both Sites on the 5th May 2023.
- 3.2.3 The assessment was undertaken by two AECOM ecologists, one of whom holds a Natural England WML-18 (Level 2) bat survey class licence.
- 3.2.4 The survey was conducted in line with the Bat Conservation Trust (BCT) best practice bat survey guidelines available at the time of survey (Collins, 2016)¹¹ and BS 8596 Surveying for bats in trees and woodlands (British Standards, 2015)¹²; however, the 2023 survey remains in line with new best practice guidance issued by the BCT on 15th September 2023 (Collins, 2023¹³).
- 3.2.5 Close focusing binoculars and a high-powered torch (Cluson Clulite) were used to conduct an external assessment from the ground. All potential access/egress points and features with suitability to support roosting bats (e.g. cracks, crevices) were identified and recorded along with any evidence which may have indicated the location of roosts, such as:
- Stains around entrance holes (resulting from the deposition of oil secretions in bat fur);
 - Scratch marks around entrance holes (resulting from bat claw holds);
 - Bat droppings;
 - Feeding remains; and
 - Odours or noise characteristic of bats.
- 3.2.6 On the basis of the survey, the overall suitability of each feature to support roosting bats was classified using a scale of negligible, low, moderate, high or confirmed (see Annex A for definitions of bat roost suitability categories). This assessment was based on both the intrinsic suitability of

⁵ Essex Field Club (2022) Datasearch Report Ref: EFC5454 28-11-2022

⁶ Kent and Medway Biological Records Centre (2022) Records Search Ref: ENQ/22/506

⁷ AECOM Ltd (2023) TKRE Preliminary Ecological Appraisal.

⁸ [Lower Thames Crossing | National Infrastructure Planning \(planninginspectorate.gov.uk\)](#)

⁹ [Thurrock Flexible Generation Plant | National Infrastructure Planning \(planninginspectorate.gov.uk\)](#)

¹⁰ [Tilbury2 | National Infrastructure Planning \(planninginspectorate.gov.uk\)](#)

¹¹ Collins, J. (ed) (2016) Bat Surveys For Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust: London.

¹² British Standards (2015) BS 8596 Surveying for bats in trees and woodlands

¹³ Collins, J. (ed) (2023) Bat Surveys For Professional Ecologists: Good Practice Guidelines (4th edition). Bat Conservation Trust: London.

features to support roosting bats and other evidence giving an indication of the likelihood of use by bats (e.g. presence of droppings, lack of cobwebs, or exposure to elements).

Bat Emergence Survey

- 3.2.7 Two suitably experienced ecologists undertook three dusk emergence surveys of a mature elder (*Sambucus nigra*) tree (Tree 1) at the Gravesend Site, which was assessed to have high suitability to support roosting bats, and a single emergence survey of the East Contractors Compound Switch Room (Building 1) at the Tilbury Site, which was assessed to have low suitability to support roosting bats.
- 3.2.8 For each survey at least one of the surveyors held a Natural England level 2 bat survey class licence.
- 3.2.9 The aim of the surveys was to identify bats leaving any roost that may be present. In accordance with the Bat Conservation Trust best practice survey guidelines at the time of survey (Collins, 2016) however, the 2023 survey remains in line with new best practice guidance issued by the BCT on 15th September 2023 (Collins, 2023). The dusk emergence surveys covered the period from 15 minutes before sunset to one and a half hours after sunset.
- 3.2.10 During these time periods surveyors observed potential access/egress points on the building. Surveyors carried echolocation detectors (Elekon Batlogger) to help determine which species are present. Cameras with infrared capabilities (Canon XA20) or thermal capabilities (Helion Pulsar) were deployed to help review potential emergences.
- 3.2.11 The time, location, number, species (where possible) and direction of flight was recorded for each bat pass (either echolocation heard or activity seen) encountered during the survey. The echolocation calls detected were recorded to an Elekon Batlogger to allow the use of BatExplorer analysis software (v2.0.2.0) to verify bat calls where required.
- 3.2.12 The dates, times and weather conditions of the bat emergence survey visits conducted are presented in Table 1.

Table 1: Bat Emergence Survey Dates and Weather Conditions

Site	Reference	Date of Survey	Sunset	Survey Start	Survey End	Weather Conditions
Gravesend	Tree 139	10/05/2023	20:35	20:20	22:05	Cool, slight breeze, cloudy. 13°C, Beaufort 1
Gravesend	Tree 139	21/06/2023	21:19	20:55	22:50	Warm, still, few clouds, 21°C, Beaufort 0
Gravesend	Tree 139	12/07/2023	21:15	20:55	22:50	Mild, slight breeze, few clouds, 19°C, Beaufort 1
Tilbury	Building 1	24/05/2023	20:56	20:26	22:26	Cool, mild breeze, partly cloudy. 13°C, Beaufort 2

Bat Activity Walked Transect Surveys

- 3.2.13 The number of survey visits, transects and automated static echolocation detectors used was determined through consideration of the size of the Site and its relative quality, in line with the BCT guidance available at the time of survey (Collins, 2016). Therefore, a programme of three activity surveys undertaken between April and September was deemed appropriate, with one visit undertaken in each season within this period (i.e. Spring, Summer and Autumn). Therefore, dusk activity surveys were undertaken in May (Spring), July (Summer) and September (Autumn).

- 3.2.14 Given the size of the Sites, one transect route at each Site was considered to be appropriate. The two routes encompassed the relevant Site and adjacent suitable habitat, which is hereafter referred to as the 'Survey Area'.
- 3.2.15 Each activity survey involved two surveyors walking a pre-defined transect route within the Survey Area and included a series of 'listening points' located at potentially important features with regards to bats. At each 'listening point', surveyors recorded bat activity for three minutes using bat echolocation detectors. Any additional activity encountered whilst walking between points was also noted.
- The survey routes were designed to include potential flight paths or foraging areas, and features offering potential roost sites such as mature trees, within each Survey Area. The starting point and direction of the transect route was varied during each survey visit in order to ensure all areas of the transects were walked close to dusk. The transect routes are shown in Appendix G Figures 1 (Tilbury) and 2 (Gravesend).
- 3.2.16 Surveyors used echolocation detectors (Elekon Batlogger M) to help determine which species were present. Bat activity was plotted in the field on a GPS-enabled smartphone using the FieldMaps application.
- 3.2.17 Surveys were started at sunset and continued until at least two hours after sunset.
- 3.2.18 The time, location, number, species (where possible) and direction of flight were recorded for each bat pass (discrete burst of echolocation heard, or bat activity observed) encountered during the survey. Surveyors recorded the echolocation calls detected to a Batlogger to allow use of Bat Explorer software (v2.0.2.0) to verify bat calls where required.
- 3.2.19 Survey visits were scheduled to avoid nights with cold, wet or windy conditions. All surveys were undertaken during favourable weather conditions that are summarised in Table 2 below.

Table 2: Bat Dusk Activity Survey Dates and Weather Conditions

Site	Date of Survey	Survey Timings	Sunset	Temperature (°C) at Start of Survey	Weather Conditions
Gravesend	10/05/2023	20:35 – 22:35	20:35	18	Mild, overcast, light rain, 18°C, Beaufort 1
Gravesend	12/07/2023	21:15 - 23:15	21:15	19	Mild, slight breeze, few clouds, 19°C, Beaufort 1
Gravesend	11/09/2023	19:23 – 21:23	19:23	23	Warm, partly cloudy, 23°C, Beaufort 1
Tilbury	24/05/2023	20:56 – 23:00	20:56	13	Cool, mild breeze, partly cloudy. 13°C, Beaufort 2
Tilbury	18/07/2023	21:05 – 23:06	21:06	21	Warm, overcast, light rain at end of survey. 21°C, Beaufort 2
Tilbury	18/09/2023	19:08 – 21:11	19:09	18	Dry, gusting wind, partly cloudy, 18°C, Beaufort 2 (occasional gusts up to 6)

Automated Detector Surveys

- 3.2.20 An SM4bat static automated bat echolocation detector ('SM4bat detector') was placed along the transect within each Site in June, July and September 2023. The locations of the automated detectors are shown in Appendix G Figures 1 (Tilbury) and 2 (Gravesend).
- 3.2.21 The SM4bat detector surveys were intended to provide supplementary information on bat activity in addition to the walked activity transect surveys undertaken.

- 3.2.22 In accordance with the BCT good practice survey guidelines at the time of survey (Collins, 2016), the SM4bat detectors were left on the Sites for a minimum of five consecutive nights for each period. Data were recorded onto a SD card for subsequent echolocation call analysis using Analook software.
- 3.2.23 The SM4bat detectors were set up to record bat echolocation over the following periods:
- Gravesend:
 - Dusk 16/06/23 to dawn 28/06/23
 - Dusk 19/07/23 to dawn 24/07/23
 - Dusk 11/09/23 to dawn 18/09/23
 - Tilbury:
 - Dusk 16/06/23 to dawn 21/06/23
 - Dusk 19/07/23 to dawn 24/07/23
 - Dusk 11/09/23 to dawn 18/09/23

Limitations

- 3.2.24 It should be noted that ecosystems are dynamic and constantly changing, and therefore species may move or new species may be recorded in subsequent years. For this reason and in accordance with current guidance, the existing survey data are valid for two years (CIEEM, 2019)¹⁴, with bat roost suitability assessment data likely to be valid for 12 – 18 months. After this date, updated surveys are likely to be required and advice should be sought from an appropriately qualified ecologist to determine survey scope and methods.
- 3.2.25 Site-specific constraints are listed below.

Gravesend

- 3.2.26 SM4bat detector data for July was not available due to a technical fault with the automated detector. However, 12 nights of data is available for June, and therefore the absence of July data is not considered to be a significant constraint.
- 3.2.27 The SM4bat detector recorded for two nights in September, out of the seven nights deployed. While less than five nights of data was collected for September, in the context of the overall survey data collected for the Gravesend Site (including three emergence survey visits and three walked activity survey transects in addition to the SM4bat detector data) the collection of two nights of survey data for September is not considered to be a significant constraint.

Tilbury

- 3.2.28 The bat activity walked transect survey undertaken on 24th May 2023 was limited due to the fenced eastern section of the transect being locked and thus not accessible. An additional listening point was added just to the south of the fenced area as close as possible to the original transect, and recordings taken there for 3 minutes as for the other listening points along the transect. This section was not locked on the other visit dates and the surveys were completed as planned. Therefore, this is not considered to be a constraint.
- 3.2.29 The dusk walked bat activity transects in July and September commenced one minute after sunset at the Tilbury site. This is not considered to be a significant constraint to the survey results.

¹⁴ CIEEM (2019) Advice Note On the Lifespan of Ecological Reports and Surveys. Available at: <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf>

3.3 Quality Assurance

- 3.3.1 All AECOM ecologists follow the Chartered Institute of Ecology and Environmental Management (CIEEM) code of professional conduct when undertaking ecological work and many are Full or Fellow Members. They are appropriately qualified and will conduct their work using all reasonable skill and care. Many senior AECOM ecologists are also Chartered Environmentalists or Ecologists.
- 3.3.2 All bat surveys conducted were led by ecologist who hold a Natural England Level 2 Bat Survey licence.

4 Results

4.1 Tilbury

Desk Study

- 4.1.1 The desk study completed within the Preliminary Ecological Appraisal (PEA)¹⁵ for the Tilbury Site did not return any records of bats from Essex Field Club¹⁶ within 1km of the Tilbury Site within the last 10 years.
- 4.1.2 A search on the Multi- Agency Geographic Information for the Countryside website¹⁷ found one licence for the destruction of a breeding site and resting place of common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle and brown long-eared bats that was granted in 2019 (licence reference: 2019-39320-EPS-AD2-1) approximately 200m west of the Tilbury Site.
- 4.1.3 Bat activity surveys undertaken in support of the Lower Thames Tunnel ES¹⁸ in 2018 covered habitat to the north of the Tilbury Site found activity associated with Myotis sp bats, common pipistrelle, soprano pipistrelle, brown long-eared bat, and Nathusius's pipistrelle.
- 4.1.4 No bat activity surveys were undertaken in the immediate vicinity of the Tilbury Site as part of the Thurrock Flexible Power Generation Plant ES¹⁹.

Field Survey

Bat Roost Suitability Assessment

- 4.1.5 The initial inspection from the ground identified one building as being suitable to support roosting bats. Building 1 (East Contractors Compound Switch Room). The results of the bat roost suitability assessment are shown in Appendix G Figure 1.
- 4.1.6 Building 1 was a single storey height building constructed of breeze blocks with a single wooden louvered door (Plate 1). The roof consisted of a boarded timber frame covered with roofing felt. On all the building elevations there were timber fascia boards around the top of the breeze blocks immediately below the felt roof. Gaps where the fascia boards had lifted on the western and southern elevations of the building were recorded, providing potential access points and roosting features for bats (Plate 2).

¹⁵ AECOM Ltd (2023) National Grid TKRE Preliminary Ecological Appraisal

¹⁶ Essex Field Club (2022) TKRE Datasearch Report – Reference EFC5454

¹⁷ Department for Environment, Food and Rural Affairs (DEFRA) Multi-Agency Geographic Information for the Countryside.

¹⁸ [TR010032-001426-6.3 Environmental Statement Appendix 8.8 - Bats.pdf \(planninginspectorate.gov.uk\)](#)

¹⁹ [EN010092-000753-A6_Vol3_Chapter_9 Onshore Ecology.pdf \(planninginspectorate.gov.uk\)](#)



Plate 1: Building 1, looking north-east

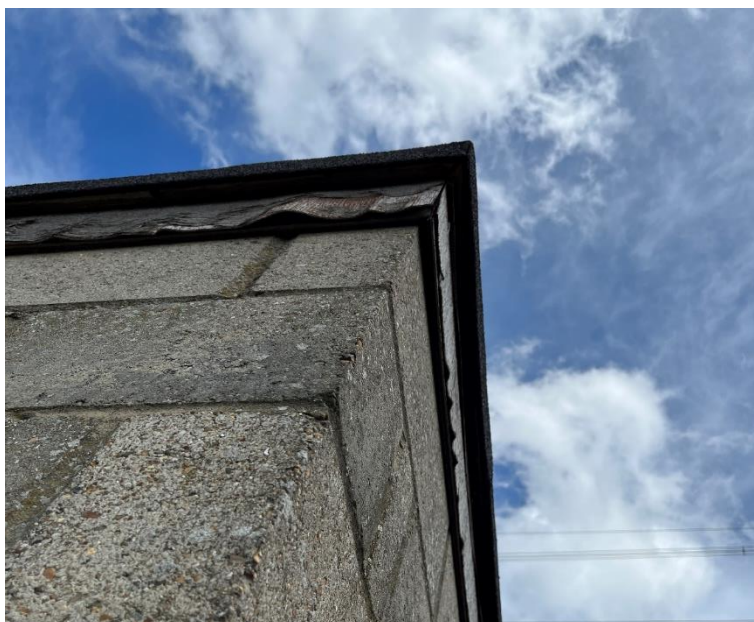


Plate 2: Gaps behind lifted fascia boards on southern and western elevations

- 4.1.7 At the time of the assessment the door was broken had been left open. The interior of the building was found to be open to the roof (Plate 3). Owl pellets were recorded inside the building, however no signs of bats were recorded.



Plate 3: Interior of Building 1 open to the roof

- 4.1.8 Overall Building 1 was assessed as having low suitability to support roosting bats. No other trees or structures were identified within the Site and 10m buffer with suitability to support roosting bats.

Bat Emergence Survey

Building 1 (East Contractors Compound Switch Room) – Dusk 24th May 2023

- 4.1.9 No bats were recorded emerging from the building. A single common pipistrelle bat was recorded foraging in the wider area.

Bat Activity Walked Transect Surveys

- 4.1.10 A summary of the results of the walked transect activity surveys are presented below, with full results in Annex C and shown in Appendix G Figures 3, 4 and 5 . Sonograms of species recorded are contained within Annex D.

May 2023

- 4.1.11 During the 24th May 2023 dusk activity survey, common pipistrelle bats were recorded commuting and foraging from 57 minutes after sunset, with a total of three registrations recorded. A single registration of a noctule bat was also recorded during the survey. Activity was recorded throughout the transect. The results of the survey are shown in Appendix G Figure 3 and presented in full in Annex C.

July 2023

- 4.1.12 During the 18th July 2023 dusk activity survey, common pipistrelle bats were recorded commuting and foraging from 49 minutes after sunset. Activity was recorded throughout the transect, with a total of 20 registrations of common pipistrelle bats. No other bat species were recorded. Activity was recorded throughout the transect. The results of the survey are shown in Appendix G Figure 4 and presented in full in Annex C.

September 2023

- 4.1.13 During the 18th September 2023 dusk activity survey, no registrations of bats were recorded.

Static Automated Detector Surveys

- 4.1.14 The results of the static automated detector surveys are outlined below. Full survey data can be found in Annex E. Bat sonograms can be found in Annex F.

June 2023

- 4.1.15 At least four species were recorded, comprising common pipistrelle, Nathusius' pipistrelle, noctule, and Leisler's bat (*Nyctalus leisleri*). In addition, registrations²⁰ were made of pipistrelle species (either common or Nathusius' pipistrelle²¹ (*Pipistrellus nathusii*)) and either noctule or Leisler's bat²². The detector recorded for five nights, during which registrations of bat echolocation were made on all five nights. Common pipistrelle was the most frequently recorded with a total of 81 registrations and a peak of 15 registrations during a single night on 19th June 2023. See Annex E for full details.

July 2023

At least five species were recorded, comprising common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, and Leisler's bat. In addition, registrations were made of pipistrelle species (either common or Nathusius' pipistrelle), pipistrelle species (either common or soprano pipistrelle²³), either noctule, or Leisler's bat, and either noctule, serotine or Leisler's bat²⁴. The detector recorded for five nights, during which registrations of bat echolocation were made on four nights. Common pipistrelle was the most frequently recorded with a total of 249 registrations and a peak of 92 registrations on two nights, 19th and 20th June 2023. See Annex E for full details.

September 2023

- 4.1.16 At least three species were recorded, comprising common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle. In addition, registrations were made of pipistrelle species (either common or Nathusius' pipistrelle), and pipistrelle species (either common or soprano pipistrelle). The detector recorded for six nights, during which registrations of bat echolocation were made on six nights. See Appendix E for full details. Common pipistrelle was the most frequently recorded with a total of 26 registrations and a peak of 6 registrations during a single night on 16th September 2023.

4.2 Gravesend

Desk Study

- 4.2.1 The desk study completed within the PEA for the Tilbury Site returned records of nine bat species from a 1km radius of the Gravesend Site from Kent Biological Records Centre over the last 10 years. These species and the number of records associated with them are listed below:

- Twenty-one records of common pipistrelle;
- Eleven records of soprano pipistrelle;
- Two records of Nathusius pipistrelle;

²⁰ A registration has been classed as a single bat within a zero-crossing file.

²¹ Common pipistrelle and Nathusius' pipistrelle can be difficult to separate using a zero-crossing file when calls recorded are towards the lower end of the common pipistrelle peak frequency and higher end of the Nathusius' pipistrelle peak frequency. As such any pipistrelle bat with a peak frequency between 40kHz and 41kHz has been classified as pipistrelle bat.

²² Leisler's and noctule bats can be difficult to identify accurately when calls are recorded towards the lower end of the Leisler's peak frequency and higher end of the noctule peak frequency, therefore unless the species could be clearly distinguished have been grouped together.

²³ Common pipistrelle and soprano pipistrelle can be difficult to separate using a zero-crossing file when calls recorded are towards the lower end of the soprano pipistrelle peak frequency and higher end of the common pipistrelle peak frequency. As such any pipistrelle bat with a peak frequency between 49kHz and 51kHz has been classified as pipistrelle bat.

²⁴ Leisler's, noctule and serotine bat can be difficult to identify accurately if only part of the call is present towards the lower end of the serotine and Leisler's bat frequency and upper end of the noctule peak frequency, therefore unless the species could be clearly distinguished these have been grouped together.

- Fourteen records of Daubenton's bat (*Myotis daubentonii*);
- Fifteen records of Natter's bat (*Myotis nattereri*);
- Eight records of whiskered bats (*Myotis mystacinus*);
- Eighteen records of brown long-eared bat;
- Seven records of noctule bat; and
- One record of serotine bat (*Eptesicus serotinus*).

4.2.2 Bat activity surveys undertaken in support of the Lower Thames Crossing DCO²⁵ in 2018 included the firing range to the east of the Gravesend Site. Species recorded included common pipistrelle, soprano pipistrelle, Nathusius's pipistrelle, noctule, brown long-eared bat and *Myotis* bats.

Field Survey

Bat Roost Suitability Assessment

- 4.2.3 The initial inspection from the ground identified one tree (Tree 139) with a high suitability to support roosting bats.
- 4.2.4 Tree 139 (a veteran elder) had high suitability for supporting roosting bats due to the multiple bark fissures, woodpecker holes and callous rolls in the trunk (see Plate 4 below).



Plate 4. Tree 139, with woodpecker holes and fissured bark on the northern face

- 4.2.5 No other trees or structures were identified within the Site and 10m buffer with suitability to support roosting bats.

Bat Emergence Survey

Tree 139 Survey 1– Dusk 10th May 2023

²⁵ [TR010032-001426-6.3 Environmental Statement Appendix 8.8 - Bats.pdf \(planninginspectorate.gov.uk\)](#)

- 4.2.6 No bats were recorded emerging from the tree. Common pipistrelle, soprano pipistrelle, noctule bats and *Myotis* species were recorded in the wider area.

Tree 139 Survey 2 – Dusk 21st June 2023

- 4.2.7 No bats were recorded emerging from the tree. Common pipistrelle bats were recorded in the wider area.

Tree 139 Survey 3 – Dusk 12th June 2023

- 4.2.8 No bats were recorded emerging from the tree. Common pipistrelle bats were recorded in the wider area.

Bat Activity Walked Transect Surveys

- 4.2.9 A summary of the results of the walked transect activity surveys are presented below, with full results in Annex C. Transect Points (TP) and survey results in Appendix G Figures 6, 7 and 8. Sonograms of species recorded are contained within Annex D.

May 2023

- 4.2.1 During the 10th May 2023 dusk activity survey, common and soprano pipistrelle bats were recorded commuting and foraging from 45 minutes after sunset. A total of 24 registrations of common pipistrelle and six registrations of soprano pipistrelle were made, predominantly comprising brief passes with occasional foraging activity. A single registration of a Leisler's bat was recorded during the survey. Activity was recorded throughout the transect. The results of the survey are shown in Appendix G Figure 6 and presented in full in Annex C.

July 2023

- 4.2.2 During the 12th July 2023 dusk activity survey, a single noctule bat was recorded foraging at 54 minutes after sunset. Common and soprano pipistrelle bats were recorded commuting and foraging throughout the survey, with a total of seven registrations of common pipistrelle, four of soprano pipistrelle, and one pipistrelle bat registration (either common or soprano) that could not be identified to species level. Activity was recorded throughout the transect. The results of the survey are shown in Appendix G Figure 8 and presented in full in Annex C.

September 2023

- 4.2.3 During the 11th September 2023 dusk activity survey, common and soprano pipistrelle bats were recorded commuting and foraging from 47 minutes after sunset, with 22 registrations of common pipistrelle activity and five registrations of soprano pipistrelle activity. *Myotis* species bats were recorded on two occasions during the survey. Activity was recorded throughout the transect. The results of the survey are shown in Appendix G Figure 9 and presented in full in Annex C.

Static Automated Detector Surveys

- 4.2.4 The results of the static automated detector surveys are outlined below. Full survey data can be found in Annex E. Bat sonograms can be found in Annex F.

June 2023

- 4.2.5 At least seven species were recorded, comprising common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's, serotine and a *Myotis* bat species. In addition registrations were made that could not be determined to species level for common, soprano and Nathusius' pipistrelle bats, and between noctule, Leisler's and serotine bats. A single registration was also made that could not be separated between *Myotis* and brown long-eared bat. The detector recorded for twelve nights, during which registrations of bat echolocation were made each night. Common

pipistrelle was the most frequently recorded with a total of 1231 registrations and a peak of 158 registrations during a single night on 26th June 2023. Myotis bats were the second most frequently recorded species with a total of 386 registrations over 12 nights, and a peak of 49 registrations during a single night. See Annex E for full details.

July 2023

- 4.2.6 During the July SM4bat detector survey no recordings were made due to a technical fault.

September 2023

- 4.2.7 At least five species were recorded, comprising common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule and a Myotis species. In addition, registrations were made of pipistrelle species (either common or soprano pipistrelle, and either noctule, Leisler's bat or serotine. Common pipistrelle was the most frequently recorded with a total of 155 registrations and a peak of 112 registrations during a single night on 11th September 2023. See Annex E for full details.

5 Discussion

5.1 Tilbury

Roosting Bats

- 5.1.1 No bats were recorded emerging from Building 1 at the Tilbury Site. Bats were therefore considered to be absent.
- 5.1.2 Since completion of the surveys the building has been demolished. Prior to clearance the building was subject to a pre-demolition inspection to confirm that no bats or birds were present.

Foraging and Commuting Bats

- 5.1.3 During the walked bat activity transect surveys undertaken in May, July and September 2023 and static automated bat detector surveys undertaken in June, July and September 2023 common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, and Leisler's bats were identified to species level. As such the Tilbury Site is considered to support an assemblage of at least five species of bats, with low levels of predominantly foraging activity or brief passes recorded for each species present, concentrated around the Site margins and adjacent suitable habitats outside of the Site boundary.
- 5.1.4 Common pipistrelle was the most frequently recorded species during the walked activity surveys and also during the static automated detector monitoring.
- 5.1.5 During the walked transects bats were predominantly recorded either foraging or as brief registrations along the scrub margins of ditches bordering the Site. Low levels of bat activity were recorded across the walked transect surveys, with four registrations of bats (three common pipistrelle and one noctule) during the June 2023 visit, 20 common pipistrelle registrations during the July 2023 visit and no bats recorded during the September 2023 visit.
- 5.1.6 In general, low numbers of registrations of bats were recorded on the SM4bat detectors. The highest number of registrations was of common pipistrelle bats during each period of survey effort, with 249 registrations across the five nights of data collection during July 2023. Lower numbers of registrations of common pipistrelle were recorded during other months with 81 registrations of the five nights of data collection in June 2023, and 26 registrations during six nights of data collection in September 2023. Across the surveys low numbers of soprano pipistrelle, Nathusius' pipistrelle, noctule and Leisler's bats were recorded, in addition to low numbers of pipistrelle bat calls that could not be identified to species level, and calls from either noctule, Leisler's or serotine bats that could not be identified to species level.
- 5.1.7 Notwithstanding their legal protection, common pipistrelle and soprano pipistrelle are both common and widespread across the UK (BCT, 2010a²⁶; BCT 2010b²⁷). Nathusius' pipistrelle is a rare bat in the UK, though records have increased in recent years. It is a migratory species, with higher numbers recorded in autumn, but is now considered to breed in the UK (BCT, 2010c²⁸). Leisler's bat is relatively widespread (BCT, 2010d)²⁹. Noctule bat is relatively widespread, but scarce in areas with intensive agriculture (BCT 2010f)³⁰.
- 5.1.8 The works will result an increase in human activity, noise and vibration. During construction works, noise produced may cause disturbance to commuting and foraging bats. Bats utilize echolocation as a means of navigating their environment. As such, increased noise associated with construction works during dusk and night-time hours may influence the availability of acoustic information to foraging bats. In turn, noise disturbance may displace bats from the Site. For example, Schaub *et al*

²⁶ BCT (2010) Common pipistrelle Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/commonpipistrelle_11.02.13.pdf?v=1541085177

²⁷ BCT (2010) Soprano pipistrelle Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/sopranopipistrelle_11.02.13.pdf?v=1541085183

²⁸ BCT (2010) Nathusius pipistrelle. Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/sopranopipistrelle_11.02.13.pdf?v=1541085183

²⁹ BCT (2010) Leisler's bat. Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/leislars_11.02.13.pdf?v=1541085180

³⁰ BCT (2010) Noctule. Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/noctule_11.02.13.pdf?v=1541085182

(2008)³¹ experimentally demonstrated that bats avoided sound playback compartments suggesting that noise can degrade foraging suitability to bats.

- 5.1.9 A detailed review of lighting impacts to bats has been published by Stone et al. (2015)³². Lighting associated with the Proposed Development may adversely affect bats if allowed to spill onto hedgerows and scattered trees. Light that spills onto bat commuting routes can result in bats not using a commuting corridor. This can consequently fragment the network of commuting routes available to bat species.
- 5.1.10 Security lighting at the compound/s should be designed in line with the best practice guidelines of the Institute of Lighting Professionals and the Bat Conservation Trust (2023)³³ to reduce impacts on bats by avoiding directional lighting and light spill on trees and sensitive foraging areas and commuting routes. Security lighting should be fitted with motion sensors to reduce the amount of time light is spilt on to adjacent habitats. Lighting should be directional and fitted with a hood, cowl, louvre or shield to direct the light to the intended area only, if appropriate.
- 5.1.11 Operational lighting should also be designed in line with the best practice guidelines of the Institute of Lighting Professionals and the Bat Conservation Trust (2023). This should balance the safety of pedestrians and potential impacts on bats. All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources will not be used. LED luminaires will be used where possible, with a warm white spectrum (ideally <2700 Kelvin) adopted to reduce the blue light component. Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone et al., 2015). Only luminaires with an upward light ratio of 0% and with good optical control should be used. Luminaires should be mounted on the horizontal, with no upward light tilt. Any external security lighting should be set on motion-sensors and short (1 min) timers.
- 5.1.12 Full details of the impacts of the Proposed Development and proposed mitigation measures will be provided within the Biodiversity Chapters of the Environmental Statement (ES Volume III Chapter 7 (Tilbury), ES Volume IV Chapter 15 (Gravesend)).

5.2 Gravesend

Roosting Bats

- 5.2.1 No bats were recorded emerging from Tree 139 at the Gravesend Site. However, the tree retains high suitability to support roosting bats.
- 5.2.2 If Tree 139 is to be retained, it is recommended that directional lighting is avoided and no works undertaken within 10m of the tree. If works are required within 10m of the tree this will need to be conducted over winter (November to March, weather-dependent) outside of the active bat season, when bats would not normally be present in the type of roost that the trees are suitable to support (i.e. not hibernation roosts) to avoid any disturbance impacts. If works are required within 10m of Tree 139 during the active season (April to October) measures should be undertaken to avoid disturbance of bats potentially present, such as avoiding directional lighting of the tree and taking measures to mitigate the potential impact of noise and vibration, for example by use of hand tools where possible.
- 5.2.3 If Tree 139 is to be felled, a precautionary method of felling under the supervision of a suitably qualified ecologist who holds at least a Natural England WML-CL18 (Bat Survey Level 2) is recommended to avoid potential impacts on roosting bats. The precautionary felling method recommended is as follows:
 - The felling contractors will be notified that the trees have been assessed for bats by way of a toolbox talk, and that although no signs of roosts have been identified, potential for bat occupancy was identified;

³¹ Schaub et al (2008) Foraging bats avoid noise. J. Exp. Biol. 211, 3174– 3180

³² Stone, E.L., Harris, S. and Jones, G., 2015. Impacts of artificial lighting on bats: a review of challenges and solutions. Mammalian Biology, 80, pp213-219

³³ Institute of Lighting Professionals and Bat Conservation Trust (2023) Bats and artificial lighting at night Guidance Note GN08/23

- Trees will be subject to an aerial inspection of features by an ecologist who holds a Natural England WML-CL18 (Bat Survey Level 2) licence where possible;
- Where aerial inspection is not possible, trees will be soft felled (sections of the tree will be carefully lowered to the ground for inspection by an ecologist) under an ecological watching brief;
- Trees will be felled using hand tools; and
- The removal of the trees should be undertaken at a time of year least likely to impact on bats. As the tree to be removed does not have any suitability for hibernating bats, works should be undertaken between late October and early March inclusive.

- 5.2.4 Should bats be discovered, clearance should stop immediately, and a Natural England licence should be obtained before works continue.
- 5.2.5 In order to provide replacement potential roosting opportunities for those lost, two bat boxes should be provided at suitable locations within the Gravesend Site, or in suitable areas adjacent to the Site as close to the original potential roost feature as possible.
- 5.2.6 In accordance with the current guidance (CIEEM, 2019) the results of the bat emergence survey of Tree 139 are considered to be valid for a period of up to 18 months. If demolition commences more than 18 months after the completion of the bat emergence survey on 12th July 2023, the survey will require updating to confirm the continued absence of roosting bats.

Foraging and Commuting Bats

- 5.2.7 During the walked bat activity transect surveys undertaken in May, July and September 2023 and static automated bat detector surveys undertaken in June, July and September 2023 common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's and serotine bats were identified to species level. In addition, Myotis bats, considered most likely to be Daubenton's bats based on the habitats present within the Site, were recorded, and a possible registration of brown long-eared bat. As such the Gravesend Site is considered to support an assemblage of at least seven species of bats, with low levels of predominantly foraging activity or brief passes recorded for each species present. Activity was concentrated around the Site margins and wet ditches, as well as within adjacent suitable habitats outside of the Site boundary.
- 5.2.8 Common pipistrelle was the most frequently recorded species during the walked activity surveys and also during the static automated detector monitoring.
- 5.2.9 Notwithstanding their legal protection, common pipistrelle and soprano pipistrelle are both common and widespread across the UK (BCT, 2010a; BCT 2010b). Nathusius' pipistrelle is a rare bat in the UK, though records have increased in recent years. It is a migratory species, with higher numbers recorded in autumn, but is now considered to breed in the UK (BCT, 2010c). Leisler's bat is relatively widespread (BCT, 2010d). Noctule bat is relatively widespread, but scarce in areas with intensive agriculture (BCT 2010f). The serotine bat is relatively uncommon with a restricted distribution in southern England and south Wales (BCT2010g³⁴). Brown long-eared bats are common and widespread across the UK (BCT, 2010h³⁵). Daubenton's bat is fairly widespread (BCT, 2010, I³⁶) and closely associated with aquatic habitats, taking insect prey from close to water.
- 5.2.10 The works will result an increase in human activity, noise and vibration. During construction works, noise produced may cause disturbance to commuting and foraging bats. Bats utilize echolocation as a means of navigating their environment. As such, increased noise associated with construction works during dusk and night-time hours may influence the availability of acoustic information to

³⁴ BCT (2010) Serotine bat. Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/serotine_11.02.13.pdf?v=1541085183&_gl=1*nb2mcg*_ga*MTQ3NDcyNTAxMy4xNjk0NjA4Mzkz*_ga_G28378TB9V*MTcwMDgyNzg1Mi44LjEuMTcwMDgyODAzNy4wLjAuMA..

³⁵ BCT (2010) Brown long-eared bat. Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/brownlongeared_11.02.13.pdf?v=1541085177&_gl=1*hlzbx0*_ga*MTQ3NDcyNTAxMy4xNjk0NjA4Mzkz*_ga_G28378TB9V*MTcwMDgyNzg1Mi44LjEuMTcwMDgyODAzOC4wLjAuMA..

³⁶ BCT (2010) Daubenton's bat. Available at: https://cdn.bats.org.uk/uploads/pdf/About%20Bats/daubentons_11.02.13.pdf?v=1541085178&_gl=1*f0q4xo*_ga*MTQ3NDcyNTAxMy4xNjk0NjA4Mzkz*_ga_G28378TB9V*MTcwMDgyNzg1Mi44LjAuMTcwMDgyNzg1Mi4wLjAuMA..

foraging bats. In turn, noise disturbance may displace bats from the Site. For example, Schaub et al (2008) experimentally demonstrated that bats avoided sound playback compartments suggesting that noise can degrade foraging suitability to bats.

- 5.2.11 A detailed review of lighting impacts to bats has been published by Stone *et al.* (2015). Lighting associated with the Proposed Development may adversely affect bats if allowed to spill onto hedgerows and scattered trees. Light that spills onto bat commuting routes can result in bats not using a commuting corridor. This can consequently fragment the network of commuting routes available to bat species.
- 5.2.12 Security lighting at the compound/s should be designed in line with the best practice guidelines of the Institute of Lighting Professionals and the Bat Conservation Trust (2023) to reduce impacts on bats by avoiding directional lighting and light spill on trees and sensitive foraging areas and commuting routes. Security lighting should be fitted with motion sensors to reduce the amount of time light is spilt on to adjacent habitats. Lighting should be directional and fitted with a hood, cowl, louvre or shield to direct the light to the intended area only, if appropriate.
- 5.2.13 Operational lighting should also be designed in line with the best practice guidelines of the Institute of Lighting Professionals and the Bat Conservation Trust (2023). This should balance the safety of pedestrians and potential impacts on bats. All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources will not be used. LED luminaires will be used where possible, with a warm white spectrum (ideally <2700 Kelvin) adopted to reduce the blue light component. Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone et al., 2015). Only luminaires with an upward light ratio of 0% and with good optical control should be used. Luminaires should be mounted on the horizontal, with no upward light tilt. Any external security lighting should be set on motion-sensors and short (1 min) timers.
- 5.2.14 Full details of the impacts of the Proposed Development and proposed mitigation measures will be provided within the Environmental Statement (ES) Volume III Chapter 7: Biodiversity – Tilbury and ES Volume IV Chapter 15: Biodiversity - Gravesend.

Annex A Bat Roost Suitability Criteria

Table 3: Suitability of Features to Support Roosting Bats (Collins, 2016)

Suitability to Support Roosting Bats	Description
Confirmed	A feature within which bats are seen to be present (either live bats, or bat carcasses) or heard 'chattering' inside will be classified as a confirmed roost. In addition any feature/structure found to contain droppings during inspections will in the first instance be considered as a confirmed roost. N.B. In some cases it may be appropriate to revise this assessment following further survey (e.g. for buildings containing low numbers or old droppings and showing no evidence of use during emergence surveys).
High	A feature which, due to its size, depth, shape, orientation or other physical properties (such as ability to maintain a constant temperature, accessibility for bats) is considered to be ideal for use by bats. Potential feeding remains, urine staining or scratch marks (in the absence of droppings) within or around the feature are likely to indicate presence of a bat occupation and therefore suggest high risk that a roost is present. In the absence of such signs, assigning a feature high risk will also be informed by the surveyor's knowledge of bat ecology and preferred roost types (relative to the feature being assessed). The quality of the surrounding habitat for bats will also be considered. For example. A building within an area of woodland is more likely to be occupied by bats than one adjacent to large areas of hard standing (as the bats would use the woodland for feeding, and potentially roosting).
Moderate	Potential examples of high risk features are:
Low	A south facing opening on a trunk that appears to form a significant wound within the tree, with uncluttered drop zone and good connectivity to other areas of suitable habitat; or
Negligible	Gap below a ridge tile that provides potential point of access to a pitched roof, with marked cleaner tile below indicating potential use by bats

Annex B Bat Emergence Survey Full Results

Tilbury

Building 1: East Contractors Compound Switch Room

Visit 1: Dusk 24th May 2023

Project Name		TKRE Tilbury		Surveyors		KH, SK	
Survey Location		Building 1		Rain (0-5)		0	
Date		24/05/23		Wind (Beaufort 0-7)		2	
Start		20:26		Temperature		13°C	
Sunset		20:56		Weather Description		Cool, mild breeze, partially cloudy, dry	
Finish		22:56		Cloud Cover (0-5)		2	
Time	Species	No. of Bats	Emerge (Y/N)	Recording (Y/N)	Description		
21:57	Common pipistrelle	1	N	Y	Commuting, heard not seen		

Gravesend

Tree 139

Visit 1: 10th May 2023

Project Name		TKRE Gravesend			Surveyors		KH, LD	
Survey Location		Tree 139			Rain (0-5)		0	
Date		10/05/23			Wind (Beaufort 0-7)		1	
Start		20:20			Temperature		13°C	
Sunset		20:35			Weather Description		Cool, slight breeze, cloudy.	
Finish		22:05			Cloud Cover (0-5)		2	
Time	Species	No. of Bats	Emerge (Y/N)	Recording (Y/N)	Description			
21:12	Common pipistrelle	1	N	Y	Foraging along treeline at 2m height			
21:18	Noctule	1	N	Y	Commuting, heard not seen			
21:36	Soprano pipistrelle	1	N	Y	Brief pass, heard not seen			
21:38	Common pipistrelle	1	N	Y	Commuting, heard not seen			
21:43	Common pipistrelle	1	N	Y	Foraging, heard not seen			
21:43	Myotis species	1	N	Y	Commuting, heard not seen			
21:50	Myotis species	1	N	Y	Commuting, heard not seen			

Project Name		TKRE Gravesend		Surveyors	KH, LD
21:51	Common pipistrelle	1	N	Y	Foraging, heard not seen

Visit 2: 21st June 2023

Project Name		TKRE Gravesend		Surveyors	KS, PW
Survey Location		Tree 139		Rain (0-5)	0
Date		21/06/2023		Wind (Beaufort 0-7)	0
Start		20:55		Temperature	21°C
Sunset		21:19		Weather Description	Warm, still, few clouds
Finish		22:50		Cloud Cover (0-5)	1
Time	Species	No. of Bats	Emerge (Y/N)	Recording (Y/N)	Description
22:07	Common pipistrelle	1	N	Y	Heard not seen
22:37	Common pipistrelle	1	N	Y	Brief pass, heard not seen
22:38	Common pipistrelle	1	N	Y	Foraging, heard not seen
22:39	Common pipistrelle	1	N	Y	Brief pass, heard not seen
22:43	Common pipistrelle	1	N	Y	Brief pass, heard not seen
22:44	Common pipistrelle	1	N	Y	Brief pass, heard not seen
22:47	Common pipistrelle	1	N	Y	Brief pass, heard not seen
22:47	Common pipistrelle	1	N	Y	Foraging, heard not seen
22:48	Common pipistrelle	1	N	Y	Brief pass, heard not seen

Visit 3: 12th July 2023

Project Name		TKRE Gravesend		Surveyors	KH, LD
Survey Location		Tree 139		Rain (0-5)	0
Date		12/07/23		Wind (Beaufort 0-7)	1
Start		20:55		Temperature	19°C
Sunset		21:15		Weather Description	Mild, slight breeze, partially cloudy, dry
Finish		22:50		Cloud Cover (0-5)	3
Time	Species	No. of Bats	Emerge (Y/N)	Recording (Y/N)	Description
21:58	Common pipistrelle	1	N	Y	Commuting, heard not seen

Project Name		TKRE Gravesend		Surveyors		KH, LD
22:09	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:13	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:14	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:16	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:17	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:18	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:22	Common pipistrelle	1	N	Y	Foraging, heard not seen	
22:35	Common pipistrelle	1	N	Y	Foraging, heard not seen	

Annex C Bat Activity Full Survey Results

Tilbury

Visit 1: Dusk 25th May 2023

Time	Species	Number	Activity	Observation	Transect Point
21:54	Common pipistrelle	1	Brief pass	Heard not seen	5
22:34	Common pipistrelle	1	Brief pass	Heard not seen	1
22:39	Common pipistrelle	1	Brief pass	Heard not seen	3-4
22:51	Noctule	1	Brief pass	Heard not seen	5-6

Visit 2: Dusk 18th July 2023

Time	Species	Number	Activity	Observation	Transect Point
21:55	Common pipistrelle	1	Foraging	Heard and seen	2-3
21:57	Common pipistrelle	1	Brief pass	Heard and seen	2-3
22:12	Common pipistrelle	1	Brief pass	Heard and seen	5
22:13	Common pipistrelle	1	Brief pass	Heard and seen	5
22:15	Common pipistrelle	1	Brief pass	Heard not seen	5-6
22:20	Common pipistrelle	2	Brief pass	Heard not seen	6
22:24	Common pipistrelle	1	Brief pass	Heard not seen	6-1
22:25	Common pipistrelle	1	Foraging	Heard not seen	6-1
22:26	Common pipistrelle	1	Foraging	Heard not seen	6-1
22:26	Common pipistrelle	1	Brief pass	Heard not seen	6-1
22:28	Common pipistrelle	2	Brief pass	Heard and seen	6-1
22:28	Common pipistrelle	1	Brief pass	Heard not seen	6-1
22:29	Common pipistrelle	1	Brief pass	Heard not seen	6-1
22:30	Common pipistrelle	1	Brief pass	Heard not seen	6-1
22:31	Common pipistrelle	1	Brief pass	Heard not seen	1
22:32	Common pipistrelle	1	Brief pass	Heard not seen	1
22:32	Common pipistrelle	1	Foraging	Heard not seen	1
22:38	Common pipistrelle	1	Brief pass	Heard not seen	2
22:44	Common pipistrelle	1	Brief pass	Heard not seen	3
23:06	Common pipistrelle	1	Brief pass	Heard not seen	6

Visit 3: Dusk 18th September 2023

Time	Species	Number	Activity	Observation	Transect Point
No bat activity recorded.					

Gravesend

Visit 1: Dusk 10th May 2023

Time	Species	Number	Activity	Observation	Transect Point
21:16	Leisler's bat	1	Brief pass	Heard not seen	5-6
21:20	Soprano pipistrelle	1	Brief pass	Heard not seen	6
21:28	Common pipistrelle	1	Brief pass	Heard not seen	7
21:29	Common pipistrelle	1	Foraging	Heard not seen	7
21:32	Common pipistrelle	1	Brief Pass	Heard not seen	1
21:32	Common pipistrelle	1	Brief pass	Heard not seen	1
21:42	Common pipistrelle	1	Brief pass	Heard not seen	2
21:43	Common pipistrelle	1	Brief pass	Heard not seen	2
21:46	Soprano pipistrelle	1	Brief pass	Heard not seen	2-3
21:46	Common pipistrelle	1	Brief pass	Heard not seen	2-3
21:49	Common pipistrelle	2	Brief pass	Heard not seen	2-3
21:50	Common pipistrelle	1	Brief pass	Heard not seen	2-3
21:53	Common pipistrelle	2	Brief pass	Heard not seen	2-3
21:56	Soprano pipistrelle	1	Brief pass	Heard not seen	2-3
21:57	Common pipistrelle	1	Foraging	Heard not seen	2-3
21:59	Soprano pipistrelle	1	Foraging	Heard not seen	2-3
22:03	Common pipistrelle	1	Brief pass	Heard not seen	2-3
22:03	Soprano pipistrelle	1	Brief pass	Heard not seen	2-3
22:05	Common pipistrelle	1	Brief pass	Heard not seen	2-3
22:09	Common pipistrelle	3	Brief pass	Heard not seen	3
22:10	Common pipistrelle	1	Brief pass	Heard not seen	3-4
22:13	Common pipistrelle	1	Brief pass	Heard not seen	3-4
22:16	Common pipistrelle	1	Brief pass	Heard not seen	4
22:17	Common pipistrelle	2	Brief pass	Heard not seen	4
22:19	Common pipistrelle	1	Brief pass	Heard not seen	4
22:20	Common pipistrelle	1	Brief pass	Heard not seen	4
22:23	Common pipistrelle	1	Brief pass	Heard not seen	4-5
22:25	Common pipistrelle	1	Brief pass	Heard not seen	5
22:30	Common pipistrelle	1	Brief pass	Heard not seen	5
22:34	Common pipistrelle	1	Social calls	Heard not seen	6

Time	Species	Number	Activity	Observation	Transect Point
22:35	Soprano pipistrelle	1	Brief pass	Heard not seen	6

Visit 2: Dusk 12th July 2023

Time	Species	Number	Activity	Observation	Transect Point
21:46	Noctule	1	Foraging	Heard not seen	4
22:09	Common pipistrelle	1	Foraging	Heard not seen	1-2
22:10	Common pipistrelle		1	Brief Pass	2m height
22:18	Soprano pipistrelle	1	Foraging	Heard not seen	3
22:22	Common pipistrelle	1	Foraging	Heard not seen	6-7
22:26	Pipistrelle species	1	Foraging	Heard not seen	4
22:29	Soprano pipistrelle	1	Foraging	Heard not seen	4-5
22:34	Soprano pipistrelle	1	Foraging	Heard not seen	5
22:39	Soprano pipistrelle	1	Foraging	Heard not seen	5
22:45	Common pipistrelle	1	Foraging	Heard not seen	5-6
22:47	Common pipistrelle	1	Foraging	Heard not seen	6
23:00	Common pipistrelle	1	Foraging	Heard not seen	1
23:11	Common pipistrelle	1	Foraging	Heard not seen	5-6

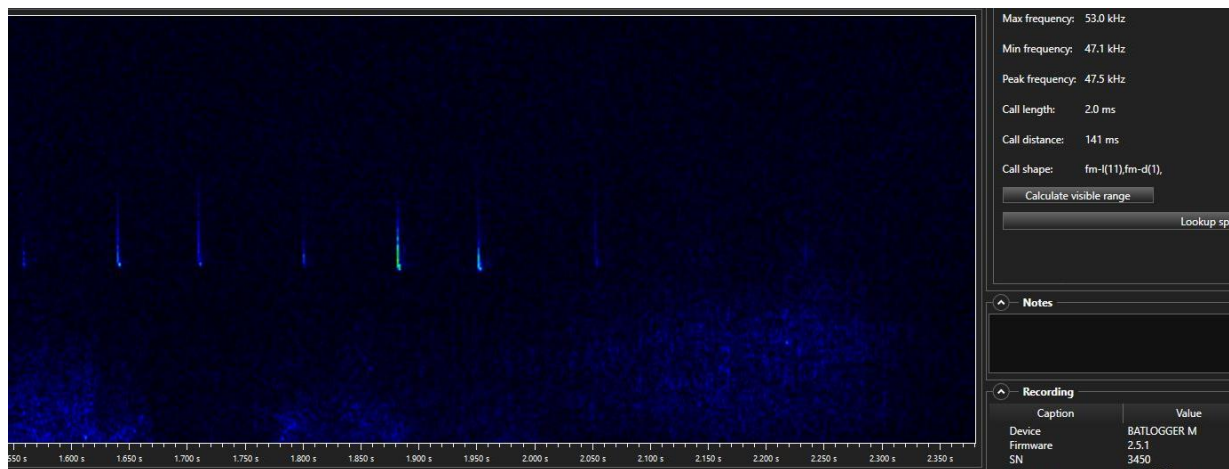
Visit 3: Dusk 11th September 2023

Time	Species	Number	Activity	Observation	Transect Point
20:10	Common pipistrelle	1	Brief pass	Heard not seen	1-2
20:11	Common pipistrelle	1	Brief pass	Heard not seen	1-2
20:12	Common pipistrelle	1	Brief pass	Heard not seen	1-2
20:15	Soprano pipistrelle	1	Brief pass	Heard not seen	3-4
20:25	Common pipistrelle	1	Brief pass	Heard not seen	5
20:26	Common pipistrelle	1	Brief pass	Heard not seen	5-6
20:27	Common pipistrelle	1	Brief pass	Heard not seen	5-6
20:29	Common pipistrelle	1	Brief pass	Heard not seen	5-6

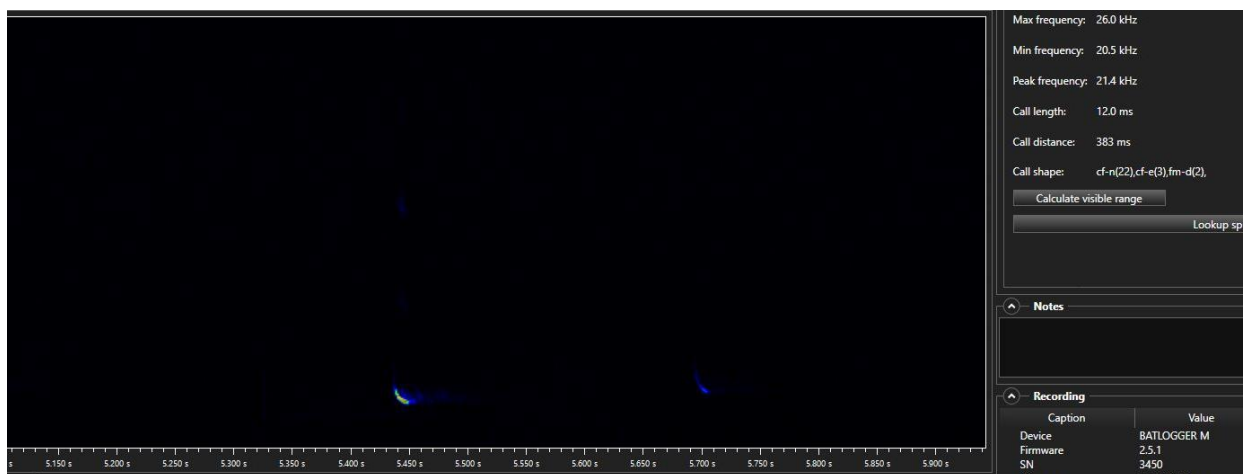
Time	Species	Number	Activity	Observation	Transect Point
20:31	Common pipistrelle	1	Brief pass	Heard not seen	6-7
20:36	Common pipistrelle	1	Brief pass	Heard not seen	7-1
20:45	Common pipistrelle	1	Brief pass	Heard not seen	3-4
20:45	<i>Myotis</i> species	1	Brief pass	Heard not seen	5-6
20:46	Common pipistrelle	1	Brief pass	Heard not seen	5-6
20:57	Soprano pipistrelle	1	Brief pass	Heard not seen	5-6
20:58	Common pipistrelle	1	Brief pass	Heard not seen	5-6
21:00	Common pipistrelle	1	Brief pass	Heard not seen	5-6
21:01	Common pipistrelle	1	Brief pass	Heard not seen	6
21:02	Common pipistrelle	2	Brief pass	Heard not seen	6
21:03	Common pipistrelle	2	Foraging	Heard not seen	6
21:04	Common pipistrelle	1	Brief pass	Heard not seen	6
21:07	Common pipistrelle	1	Brief pass	Heard not seen	7
21:08	Common pipistrelle	1	Brief pass	Heard not seen	7
21:19	Common pipistrelle	1	Brief pass	Heard not seen	6
21:19	Soprano pipistrelle	1	Brief pass	Heard not seen	6
21:20	Soprano pipistrelle	1	Brief pass	Heard not seen	6
21:20	<i>Myotis</i> species	1	Brief pass	Heard not seen	6
21:21	Common pipistrelle	1	Brief pass	Heard not seen	3-4
21:23	Common pipistrelle	1	Brief pass	Heard not seen	6
21:23	Soprano pipistrelle	1	Foraging	Heard not seen	6

Annex D Bat Activity Survey Sonograms

Tilbury

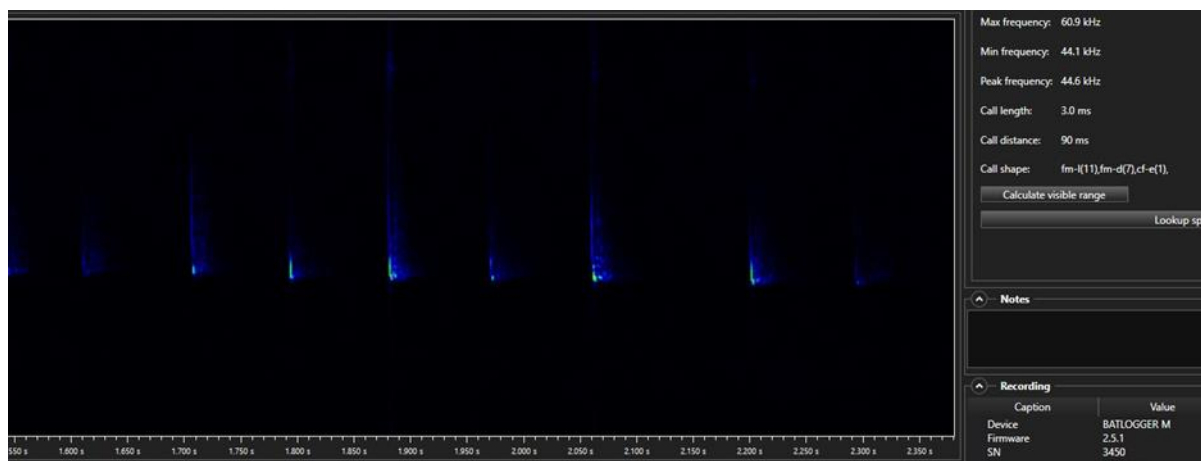


Common pipistrelle recorded at Tilbury at 21:54 on 25/05/23

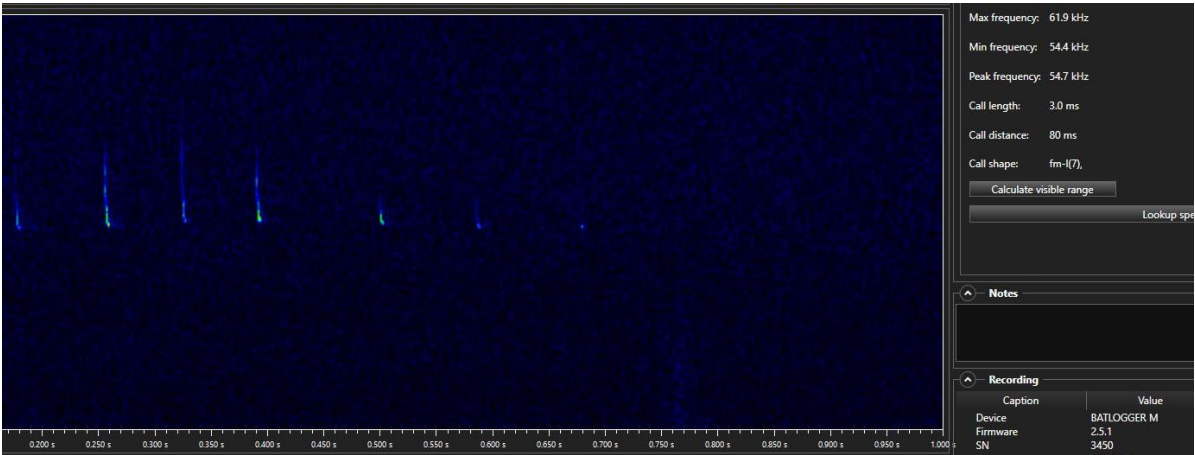


Noctule recorded at Tilbury at 22:50 on 25/05/23

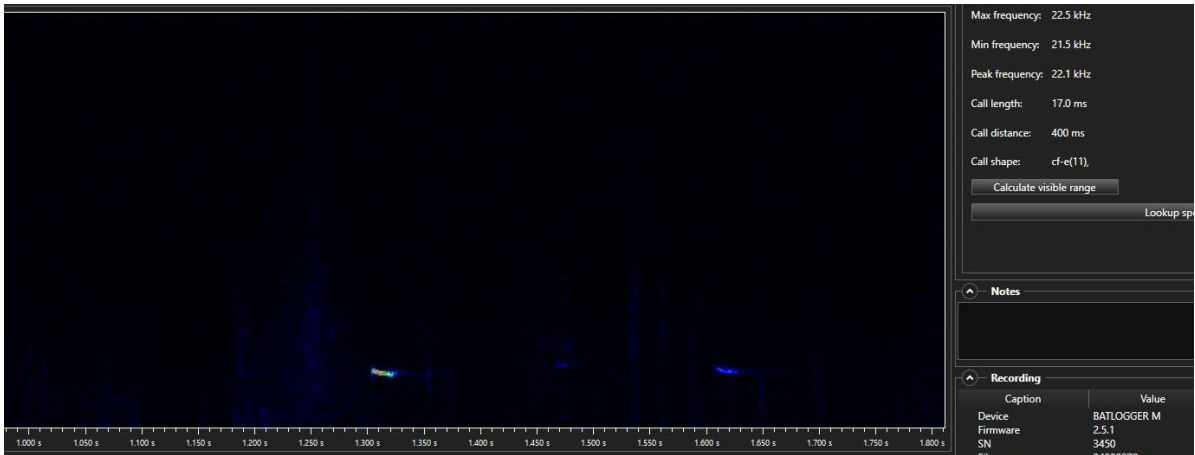
Gravesend



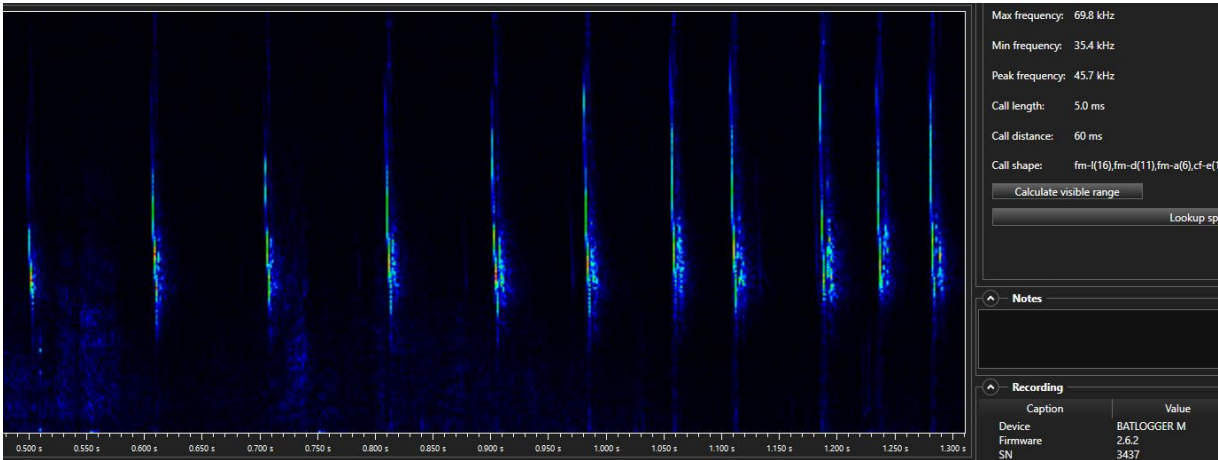
Common pipistrelle recorded at Gravesend at 21:29 on 10/05/23



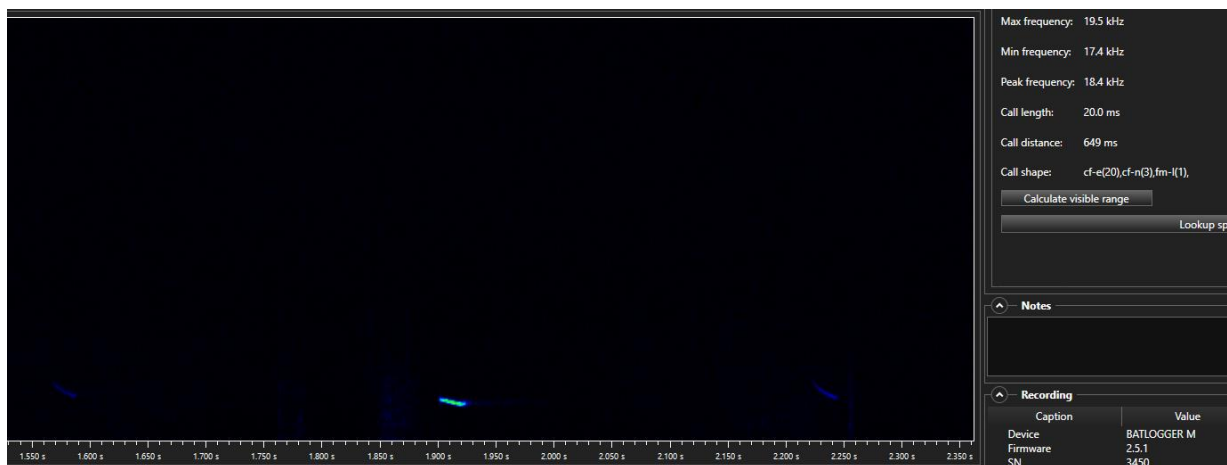
Soprano pipistrelle recorded at Gravesend at 21:20 on 10/05/23



Leisler's bat recorded at Gravesend at 21:16 on 10/05/23



Myotis recorded at Gravesend at 21:20 on 11/09/23



Noctule recorded at Gravesend at 21:46 on 12/07/23

Annex E Full Static Automated Detector Results

Tilbury

June

Date (night commencing)	Observation					
	Leisler's bat	Noctule	Noctule or Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Common or Nathusius' pipistrelle
16/06/2023	0	2	1	0	43	9
17/06/2023	0	0	0	0	1	0
18/06/2023	0	0	1	0	14	0
19/06/2023	1	0	0	5	15	2
20/06/2023	0	0	2	0	8	0
Total	1	2	4	5	81	11

July

Date (night commencing)	Observation								
	Noctule/ Leisler's/ serotine	Leisler's bat	Noctule	Noctule/ Leisler's	Nathusius' pipistrelle	Common pipistrelle	Common/ Nathusius' pipistrelle	Common/ soprano pipistrelle	Soprano pipistrelle
19/07/2023	1	1	3	1	1	92	5	2	2
20/07/2023	0	0	1	1	0	92	0	3	1
21/07/2023	1	0	2	0	0	48	1	1	0
22/07/2023	0	0	0	0	0	0	0	0	0
23/07/2023	0	0	1	0	0	17	0	0	0
Total	2	1	7	2	1	249	6	6	3

September

Date (night commencing)	Observation				
	Nathusius' pipistrelle	Common pipistrelle	Common or Nathusius' pipistrelle	Common or soprano pipistrelle	Soprano pipistrelle
11/09/2023	0	5	0	0	1
12/09/2023	1	4	2	0	1

Date (night commencing)	Observation Nathusius' pipistrelle	Common pipistrelle	Common or Nathusius' pipistrelle	Common or soprano pipistrelle	Soprano pipistrelle
13/09/2023	0	4	0	1	0
14/09/2023	3	4	0	0	0
15/09/2023	0	3	0	0	1
16/09/2023	1	6	0	0	0
Total	5	26	2	1	3

Gravesend

June

Date (night commencing)	Observation Serotine	Myotis/ brown long-eared	Myotis bat	Noctule/ Leisler's/ serotine	Leisler's bat	Noctule	Noctule/ Leisler's	Nathusius' pipistrelle	Common pipistrelle	Common/ Nathusius' pipistrelle	Common/ soprano pipistrelle	Soprano pipistrelle
16/06/2023	0	0	47	0	0	5	6	0	96	7	4	4
17/06/2023	0	0	46	1	0	0	1	1	50	1	5	2
18/06/2023	1	0	49	0	0	8	0	1	146	4	32	10
19/06/2023	1	0	37	0	3	1	1	0	64	1	3	10
20/06/2023	1	0	30	2	0	3	0	0	125	0	45	27
21/06/2023	0	1	28	1	9	0	0	0	118	0	14	20
22/06/2023	0	0	26	0	1	2	0	0	20	1	2	1
23/06/2023	0	0	26	0	0	1	0	1	144	1	28	21
24/06/2023	3	0	26	0	2	1	0	0	39	3	6	7
25/06/2023	0	0	20	0	1	0	1	0	147	0	34	20
26/06/2023	1	0	36	0	2	5	1	0	158	0	29	32
27/06/2023	1	0	15	1	0	0	0	0	124	1	37	57
Total	8	1	386	5	18	26	10	3	1231	19	239	211

July

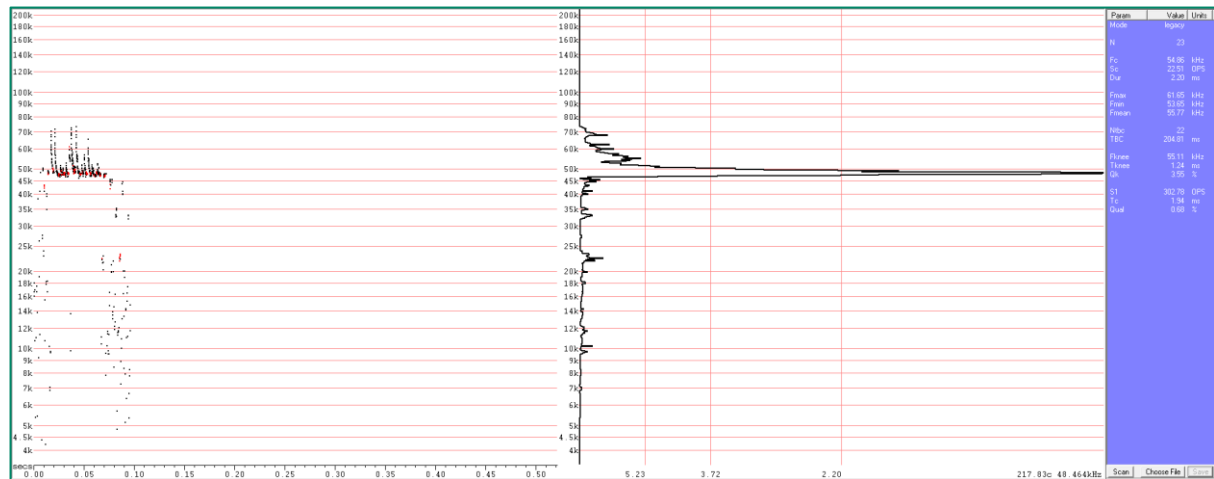
No data recorded.

September

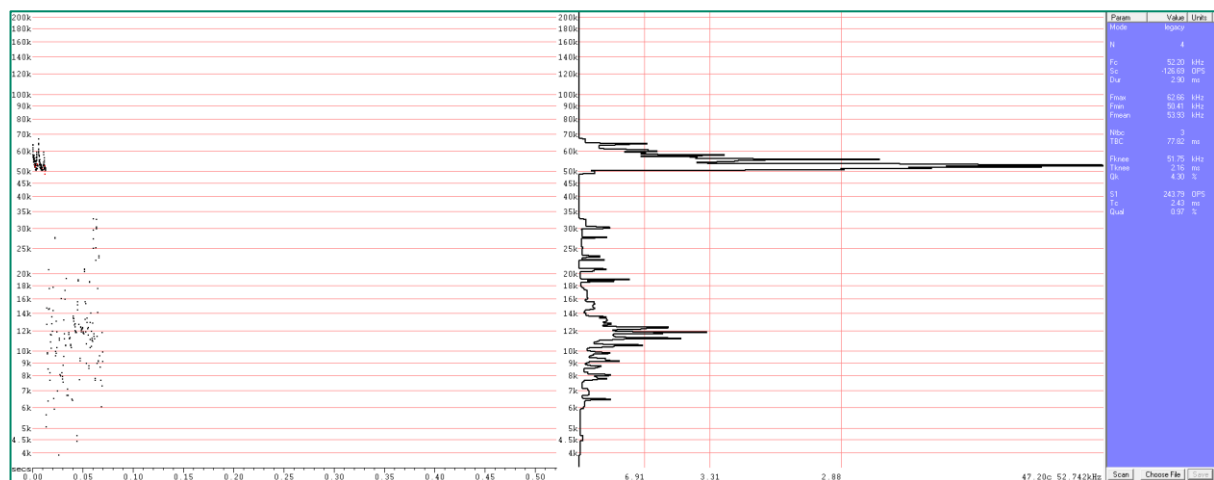
Date (night commencing)	Observation							
	<i>Myotis</i> bat	Noctule/ Leisler's/ serotine	Noctule	Noctule/ Leisler's	Nathusius' pipistrelle	Common pipistrelle	Common/ soprano pipistrelle	Soprano pipistrelle
11/09/2023	28	1	1	0	1	112	7	22
12/09/2023	11	0	0	1	1	43	2	5
Total	39	1	1	1	2	155	9	27

Annex F Automated Static Detector Sonograms

Tilbury



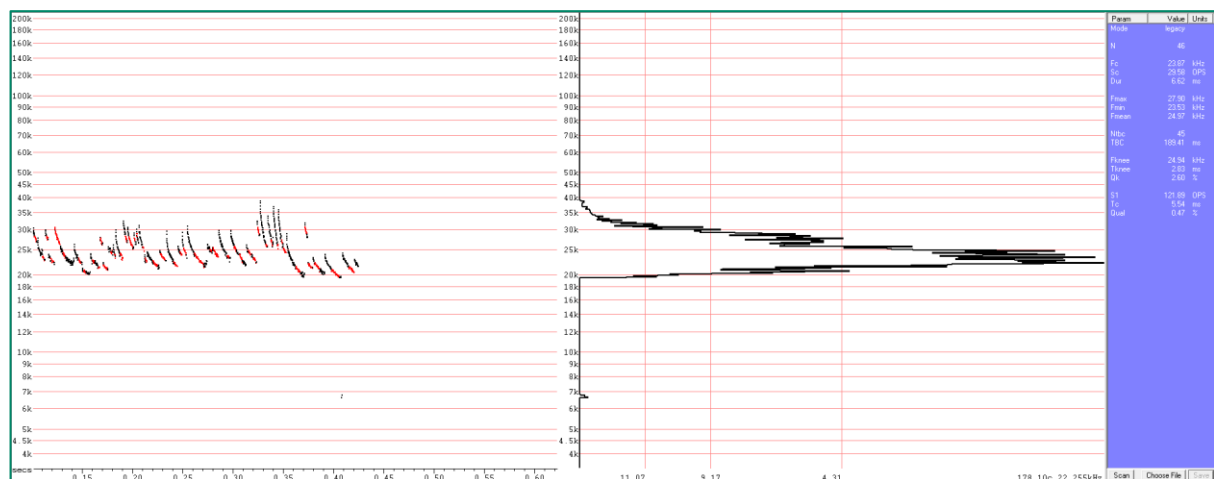
Common pipistrelle recorded at Tilbury at 20:44 on 12/09/2023, F6 compression



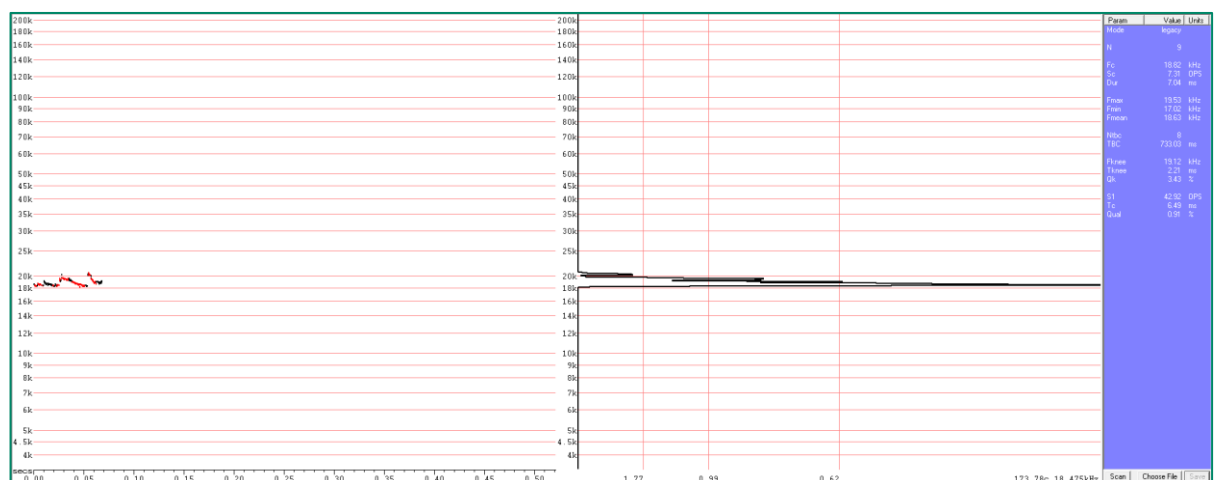
Soprano pipistrelle recorded at Tilbury at 21:55 on 12/09/2023, F6 compression



Nathusius' pipistrelle recorded at Tilbury at 21:23 on 14/09/2023, F6 compression

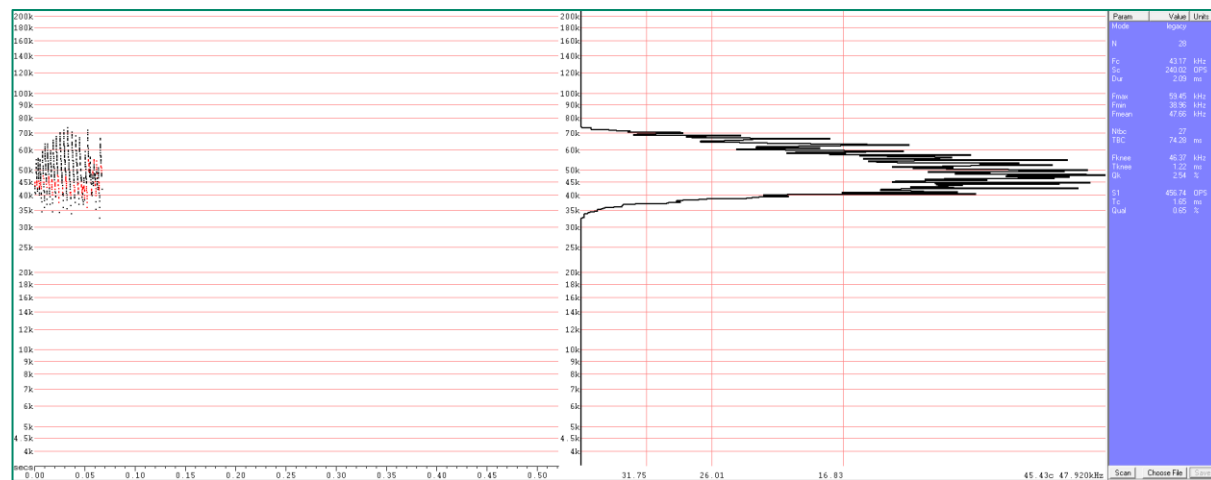


Leisler's bat recorded at Tilbury at 23:12 on 19/07/2023, F6 compression

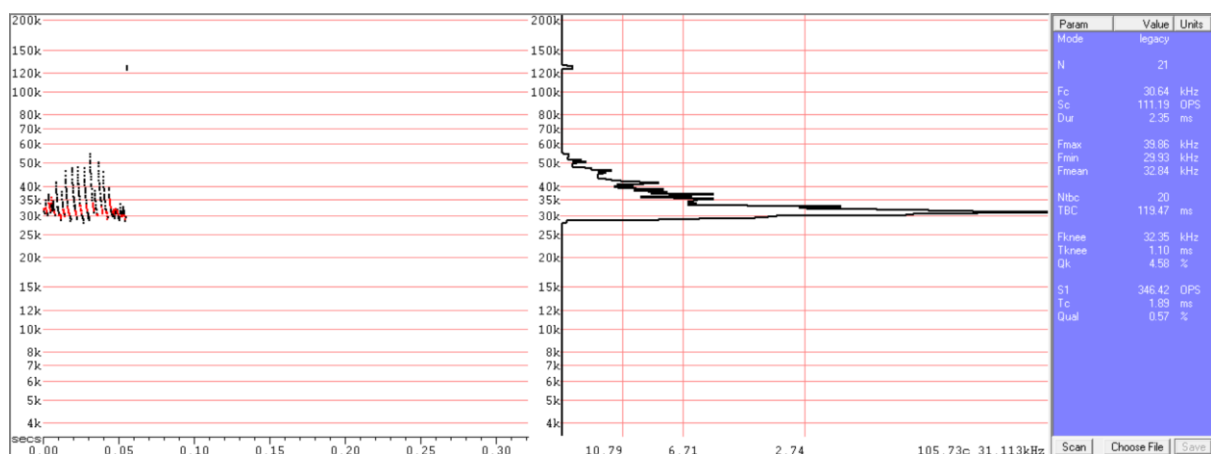


Noctule recorded at Tilbury at 22:24 on 19/07/2023, F6 compression

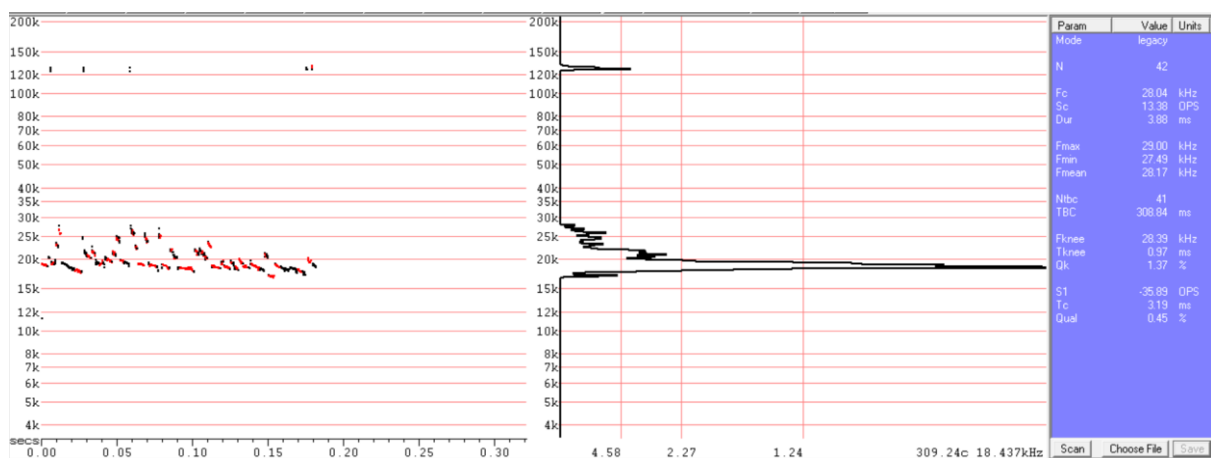
Gravesend



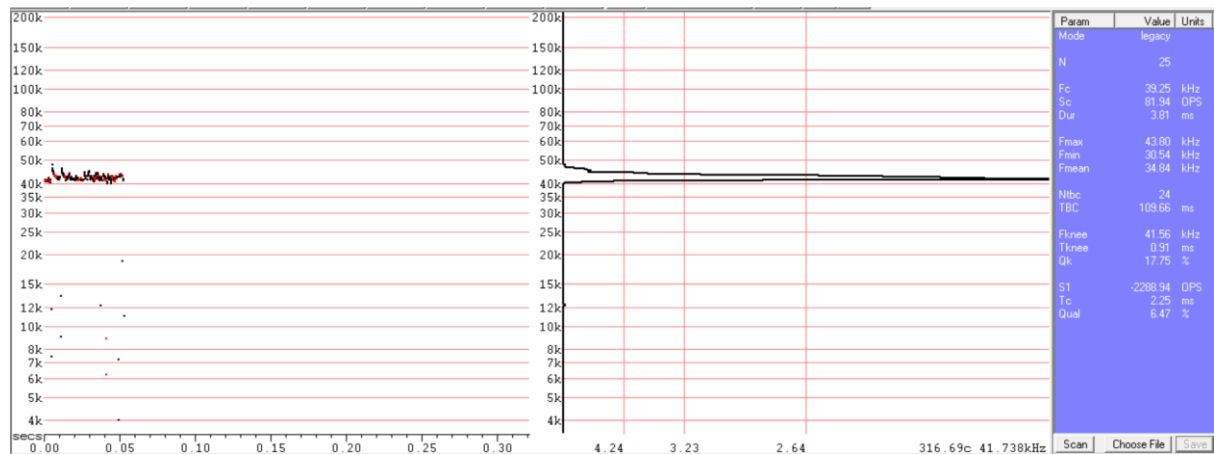
Myotis recorded at Gravesend at 00:06 on 17/06/2023, F6 compression



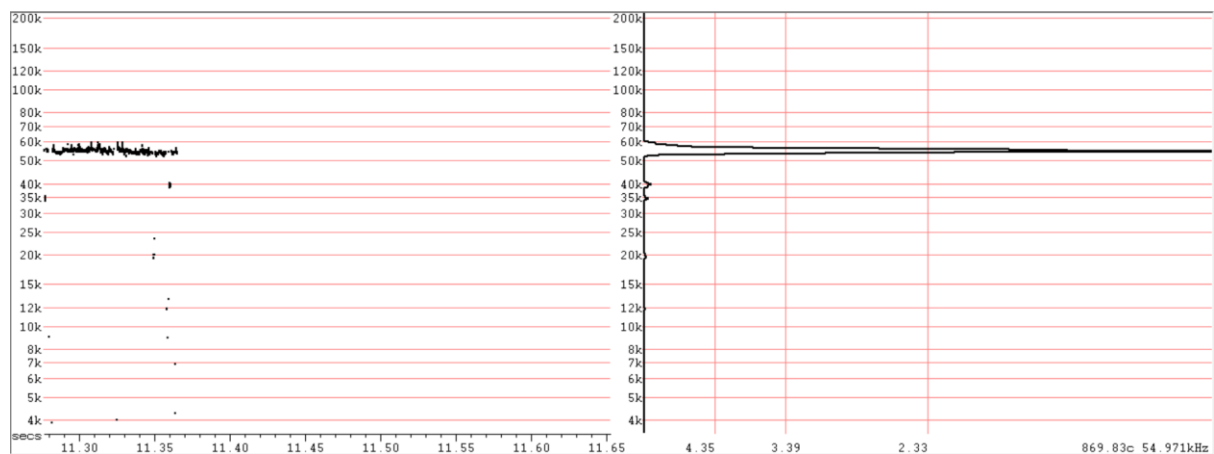
Serotine recorded at Gravesend at 03:26 on 25/06/2023, F6 compression



Noctule recorded at Gravesend at 22:19 on 16/06/2023, F6 compression



Common pipistrelle recorded at Gravesend at 22:39 on 16/06/2023, F6 compression



Soprano pipistrelle recorded at Gravesend at 20:37 on 11/09/2023, F6 compression

Annex G Figures



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LEGEND

- Red Line Boundary (Above Ground)
- SM4 Bat Detector
- Bat Transect Route
- Bat Structure
- Low suitability to support roosting bats

NOTES
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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
60677311

FIGURE TITLE
Bat Roost Suitability and Bat Activity
Transect Route: Tilbury

FIGURE NUMBER
Figure 1



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LEGEND

- Red Line Boundary (Above Ground)
- SM4 Bat Detector
- Bat Roost Suitability
 - High suitability to support roosting bats
- Bat Transect Route

NOTES

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ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

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FIGURE TITLE

Bat Roost Suitability and Bat Activity
Transect Route: Gravesend

FIGURE NUMBER

Figure 2

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LEGEND

-  Red Line Boundary (Above Ground)
-  May 2023 Dusk Bat Activity Survey Results
-  Common pipistrelle
-  Noctule

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ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

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FIGURE TITLE

May 2023 Dusk Bat Activity Survey
Results - Tilbury

FIGURE NUMBER

Figure 3

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LEGEND

 Red Line Boundary (Above Ground)

July 2023 Dusk Bat Activity Survey Results

 Common pipistrelle

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Environmental Statement

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July 2023 Dusk Bat Activity Survey
Results - Gravesend

Figure 4



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LEGEND

Red Line Boundary (Above Ground)

No Bats Recorded

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PROJECT NUMBER

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FIGURE TITLE

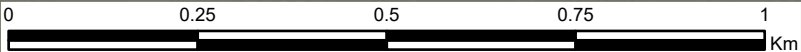
September 2023 Dusk Bat Activity
Survey Results - Tilbury

FIGURE NUMBER

Figure 5



1:10,000 @ A3



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- LEGEND**
- Red Line Boundary (Above Ground)
 - May 2023 Dusk Bat Activity Survey Results
 - Common pipistrelle
 - Leisler's
 - Noctule
 - Soprano pipistrelle
 - <all other values>

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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
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FIGURE TITLE
May 2023 Dusk Bat Activity Survey
Results - Gravesend

FIGURE NUMBER
Figure 6



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- LEGEND**
- Red Line Boundary (Above Ground)
 - ▲ July 2023 Dusk Bat Activity Survey Results
 - ▲ Common pipistrelle
 - ▲ Noctule
 - ▲ Soprano pipistrelle
 - ▲ Unknown pipistrelle

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ISSUE PURPOSE
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FIGURE TITLE
July 2023 Dusk Bat Activity Survey
Results - Gravesend

FIGURE NUMBER
Figure 7

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LEGEND

Red Line Boundary (Above Ground)

September 2023 Dusk Bat Activity Survey Results

Common pipistrelle

Soprano pipistrelle

Myotis

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ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

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FIGURE TITLE

September 2023 Dusk Bat Activity Survey Results - Gravesend

FIGURE NUMBER

Figure 8

