

The Lighthouse Green Fuels Order

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Abbreviations

Abbreviation	In full
ARUP	Ove Arup and Partners Limited
Auto ID	Automatic Identification
CIEEM	Chartered Institute of Ecology and Environmental Management
CRoW	Countryside and Rights of Way
CSZ	Core Sustenance Zones
INCA	Industry Nature Conservation Association
kHz	Kilohertz
LGF	Lighthouse Green Fuels
NERC	Natural Environment and Rural Communities
STBC	Stockton-on-Tees Borough Council
PPH	Passes Per Hour
QA	Quality Assurance

1 Introduction

- 1.1.1 Ove Arup and Partners Limited (Arup) was commissioned by Lighthouse Green Fuels (LGF) Projects Limited (the 'Applicant') to undertake bat acoustic analysis of automated/static data supplied by the Industry Nature Conservation Association (INCA), in relation to the Proposed Development.
- 1.1.2 This report will only cover the analysis of automated/static data. For remaining results from transect surveys, refer to the accompanying INCA Bat Survey Report (Annex B to this report).

2 Legislation and policy context

2.1 Legislation

2.1.1 A framework of international, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. Legislation relevant to and discussed within this report includes the following:

- The Conservation of Habitats and Species Regulations 2017 [Ref 1];
- Wildlife and Countryside Act 1981 (as amended) [Ref 2];
- Countryside and Rights of Way (CROW) Act 2000 [Ref 3]; and
- Natural Environment and Rural Communities (NERC) Act 2006 [Ref 4].

2.2 Policy

2.2.1 Stockton-on-Tees Borough Council (STBC) has a local planning framework [Ref 5] that aligns with national guidelines. It also sets out STBC's strategy for development, which includes specific policies aimed at conserving biodiversity, such as:

- Policy ENV 5 – Preserve, Protect, and Enhance Ecological Networks, Biodiversity and Geodiversity: this policy *“requires development to safeguard and strengthen ecological networks by protecting designated sites, priority habitats and species, and wider green corridors, while avoiding habitat fragmentation and, where possible, restoring and creating biodiversity. Proposals should deliver measurable enhancements to biodiversity and geodiversity, particularly within key landscape areas, ensuring that development contributes to a coherent, resilient ecological network rather than causing net loss.”*
- Policy ENV 6 – Green Infrastructure, Open Space, Green Wedges, and Agricultural Land: this policy *“requires development to protect, enhance and integrate the borough’s green infrastructure network, while safeguarding open space and green wedges from loss or harmful change. It resists the loss of designated or amenity open space unless it is demonstrably surplus, replaced by equivalent or better provision, or clearly outweighed by alternative recreational need, and ensures no resulting harm to character or biodiversity.”*

3 Methodology

3.1 Automated/static surveys

- 3.1.1 Automated/static surveys using static bat detectors were undertaken by INCA at six locations across the survey area between 13 May 2025 and 5 October 2025 (see Table 3.1). The model of all the static bat detectors used was the Batlogger S2 [Ref 6].
- 3.1.2 The static bat detectors were securely fastened to a suitable anchor point e.g. fence post or tree and set up to begin recording bat calls 20 minutes before sunset, continuing until 20 minutes after sunrise, collecting data on at least five consecutive nights per deployment month in appropriate (or best available) weather conditions.
- 3.1.3 The selected survey periods, including deployment dates, are provided in Table 3.1.

Table 3.1 Static Bat Detector Deployment Locations and Dates Provided by INCA and Update Following Arup Review (Inset 3.1).

Static Detector ID	Grid Reference	Feature and Connected habitats/features in the Wider Landscape	Spring Deployment	Summer Deployment	Autumn Deployment	Update
Static 1: N INEOS	NZ 52835 24558	Adjacent to hedgerow habitat from a review of aerial imagery	23 to 25 May 2025	23 to 29 July 2025	25 September to 5 October 2025	Spring: no deployment data received Autumn: no data received for 25 September 2025, 2 to 4 October 2025
Static 2: NW INEOS	NZ 52399 24273	Adjacent to scrub and grassland habitat from a review of aerial imagery	13 to 22 May 2025	17 to 22 July 2025	Not deployed	Spring: only received data for 13 May 2025 Autumn: received data from 25 September to 1 October 2025
Static 3: NE INEOS	NZ 52707 24312	Adjacent to woodland habitat from a review of	Not deployed	24 to 29 July 2025	25 September to 3 October 2025	Summer: no data received for 27 July

Static Detector ID	Grid Reference	Feature and Connected habitats/features in the Wider Landscape	Spring Deployment	Summer Deployment	Autumn Deployment	Update
		aerial imagery				and 28 July 2025
Static 4: CW INEOS	NZ 52259 23898	Adjacent to scrub and grassland habitat from a review of aerial imagery	23 to 26 May 2025	17 to 22 July 2025	25 September to 1 October 2025	
Static 5: S INEOS	NZ 52151 23636	Adjacent to scrub and grassland habitat from a review of aerial imagery	23 to 25 May 2025	17 to 22 July 2025	25 September to 3 October 2025	Spring: no data received for 24 May 2025
Static 6: CS INEOS	NZ 52428 23751	Adjacent to scrub and grassland habitat from a review of aerial imagery	23 to 26 May 2025	17 to 23 July 2025	Not deployed	Summer: no data received for 17 to 21 July 2025 Autumn: received data from 9 to 12 September 2025

- 3.1.4 It is understood that where no data was received for some of the deployment dates, this was due to a lack of bat calls/recorded data.
- 3.1.5 Each static bat detector location, as shown in Inset 3.1, was chosen by INCA based on the presence of suitable habitats and features that could be directly or indirectly impacted by the Proposed Development.
- 3.1.6 The selection process also relied on professional judgment to identify habitats likely to be important for bats, both as flight corridors and/or for foraging. These habitats included hedgerows, woodlands, grasslands, and scrub. Descriptions of the habitats and features at each static deployment location are provided in Table 3.1.
- 3.1.7 Each static bat detector was deployed on a monthly basis between the Spring, Summer and Autumn periods of 2025 outlined in Table 3.1. Before each deployment, weather data, including temperature, wind speed, and precipitation, were reviewed by INCA against the Bat Conservation Trust

guidelines [Ref 7] to confirm that conditions were optimal for the entire deployment period.

- 3.1.8 For consistency, the same model of static bat detector was used throughout the survey duration, with the same parameter settings and microphone type, as recommended in the good practice guidelines for ecologists [Ref 7]. Static bat detectors were deployed by INCA ecologists, who were responsible for the positioning of the omnidirectional microphones to maximise the recorded activity and to avoid obstruction of sound by dense foliage or other potential sound barriers where possible.



Inset 3.1 Static Bat Detector Deployment Locations.

3.2 Bat activity data analysis

- 3.2.1 The static bat detectors recorded bat calls and produced .wav files containing a sequence of calls within a short time duration pre-determined by INCA ecologists. Each file can be considered a time a bat passed the recorder, i.e. a “bat pass”.

- 3.2.2 For the purpose of this report, the number of files recorded by the static bat detectors each night was considered as a proxy value for the number of “bat passes”.
- 3.2.3 Analysis of bat calls recorded on the static bat detectors was undertaken using Wildlife Acoustics Kaleidoscope Pro software, including the use of Automatic Identification (Auto ID), supported by further verification by experienced Arup personnel.
- 3.2.4 With the exception of noise files, Kaleidoscope Pro’s Auto ID function assigns a potential bat species to a single recording based on a confidence score which is derived from detected sonogram pulses. This confidence score assists in determining a species identity, along with an estimated likelihood of accurate Auto ID. This estimation specifically refers to the false positive rate - the probability that an assigned identification is incorrect. Kaleidoscope Pro adjusts this probability so that a higher probability corresponds to a lower false positive rate. For example, if a species is identified with a probability of 0.9 then there is a 10% chance that the classification is incorrect.
- 3.2.5 Following this, each recording was subjected to a two-stage quality assurance (QA) process. During the first stage of the QA process, two competent bat call analysts (technicians), one with eight years of acoustic analysis experience, manually reviewed recordings.
- 3.2.6 After the initial QA stage, a third competent bat call analyst (accredited auditor via BatAbility) reviewed the manual verification conducted by the first technicians. As part of this second QA stage, the auditor reassessed the technician’s manual verification before the twice-verified results were finalised and included in this report in the form of proportional results. Proportions were established for each location throughout the survey period. It is important to note that this is used to quantify bat activity, not bat abundance, which cannot be inferred from the data obtained as part of this suite of surveys.
- 3.2.7 Calls from bats belonging to the genus *Myotis* are known to produce very similar sounding calls, which are difficult to distinguish in the field, and when using bat call analysis software. For the purposes of this report the following species have been grouped and have been reported as *Myotis* sp. These comprise:
- Alcatloe bat (*Myotis alcathoe*);
 - Bechstein’s bat (*Myotis bechsteinii*);
 - Brandt’s bat (*Myotis brandtii*);

- Daubenton's bat (*Myotis daubentonii*);
 - Natterer's bat (*Myotis nattereri*); and
 - Whiskered bat (*Myotis mystacinus*).
- 3.2.8 This grouping is required to lower the probability of misidentification of species recorded during surveys. However, it is not expected to significantly impact the results of this assessment.
- 3.2.9 Common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) calls, which look and sound similar, have peak frequencies only 10 kilohertz (kHz) apart and these calls often overlap due to call plasticity, allowing bats to adapt their calls to the habitats they are in. Therefore, to avoid misidentification of species, the label *Pipistrellus* sp. has been used for any calls falling within the range of peak frequency where call overlap is known to occur between 49kHz and 51kHz.
- 3.3 [Data analysis of bat passes for static bat detector surveys](#)
- 3.3.1 The data generated during the automated/static surveys was spatially aggregated to determine the number of bat Passes Per Hour (PPH). The total number of bat passes counted throughout the night was divided by the night length in hours for each night surveyed, taking into account the changes in season over the survey periods.
- 3.3.2 Summary statistics for the bat passes per night have been provided within this report. These have been interpreted as relative percentiles to provide an evaluation of bat activity across locations for the species recorded and the assemblage. The scale used reflects that indicated by Ecobat:
- Low activity: 0-20th percentiles;
 - Low to moderate activity: 21st-40th percentiles;
 - Moderate activity: 41st-60th percentiles;
 - Moderate to high activity: 61st-80th percentiles; and
 - High activity: 81st-100th percentiles.
- 3.3.3 The Ecobat tool is a web-based resource developed by the Mammal Society to interpret bat activity data.
- 3.3.4 In evaluating the activity by night of individual species and the detection of bat passes relative to sunset; consideration has been given to the Core Sustenance Zones (CSZ) as set out within current guidance [Ref 7].

3.4 Assumptions and limitations

- 3.4.1 Arup was responsible for the analysis of bat acoustic data supplied by INCA only. Arup was not responsible for site selection, distribution of statics, deployment period, collection of equipment, dates or locations set out by INCA.
- 3.4.2 As discussed within the INCA Bat Survey Report (Annex B to this report), issues with the static bat detector hardware resulted in a few occasions where only three nights of data were collected, and other occasions where the static bat detectors were deployed for far greater than five nights.
- 3.4.3 Upon review of data supplied by INCA, Arup ecologists noted several days of missing data, or data that was collected over periods INCA outlined no deployment. Therefore, an updated column of data received was included in Table 3.1. It is also understood that where no data was received for some of the deployment dates, this was due to a lack of bat calls/recorded data.
- 3.4.4 Despite several limitations regarding the selection of static deployment location being noted within the INCA Bat Survey Report (Annex B to this report), these were not considered to have a significant effect on survey effort by INCA and are listed below:
- Light pollution was considerable. With only areas furthest from the roads and buildings not being affected;
 - The Seal Sands Road was used by large Heavy Goods Vehicles travelling at speed creating extra noise and light pollution closer to this road;
 - There was consistent background noise from operations to the west and south;
 - Terrain in the south was very uneven under foot making it difficult to walk around, particularly in the dark;
 - Vegetation in the south was very dense in places, with reeds and bramble, making it difficult to walk around site. The area to the south west of the southern were inaccessible due to the dense bramble. The bramble also grew considerably throughout the season making accessing the same areas difficult or not possible, despite taking tools to cut through vegetation; and
 - There were few suitable structures or trees to install the static bat detectors on.
- 3.4.5 Batlogger with Auto ID software [Ref 8], which would have provided greater consistency with the use of Batlogger S2 static bat detectors, was not used

as the required licence to use the software was not available. Consequently, bat acoustic data was analysed using Kaleidoscope Pro to filter noise files. This approach did not affect the quality of the data analysed, although it generated outputs that are less user-friendly for subsequent use.

4 Results

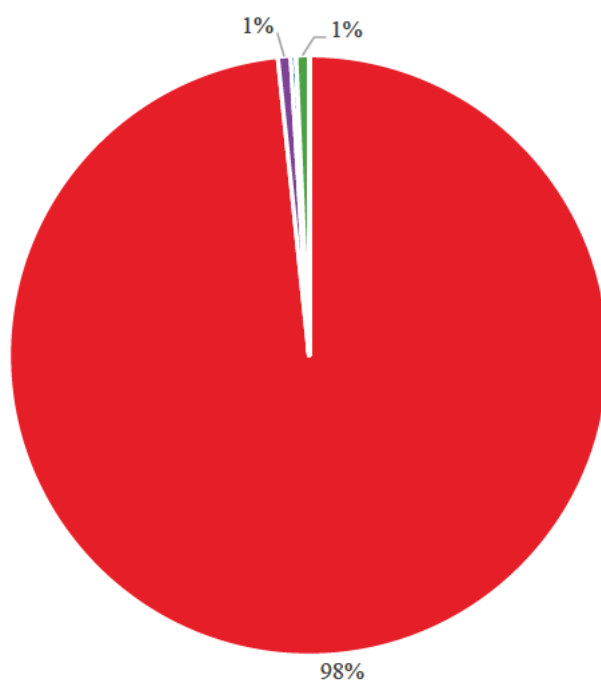
4.1 Automated/static surveys

- 4.1.1 The six static bat detectors deployed for the Proposed Development recorded at least eight bat species. This included four species and four species groups.
- 4.1.2 No Annex II species were recorded.
- 4.1.3 Additional detections included common pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), *Pipistrellus* sp., brown long-eared bat (*Plecotus auritus*), *Nyctalus* sp., noctule (*Nyctalus noctule*), *Myotis* sp., and bat sp.
- 4.1.4 The locations of the static bat detectors (see Table 3.1) and the proportion of recorded bat activity by each recorded species throughout the survey period is illustrated in Inset 4.1.
- 4.1.5 A summary of the spatially aggregated bat data is provided in Table 4.1 and Table 4.2, which identifies the total bat passes for each location and species divided by the number of night hours [Ref 9] (given the bat PPH), with reference to current guidance [Ref 7].
- 4.1.6 An evaluation is also provided in Inset 4.1 of the relative activity levels of low, to high activity. Light green represents low activity, and red indicates the location where the highest bat activity for each species was experienced throughout the survey period at each location.
- 4.1.7 A table showing the total bat passes for each location is also provided in Annex A: Activity categories are based on relative percentile ranking within the dataset for each species and do not represent absolute thresholds of ecological value.

4.2 Activity levels

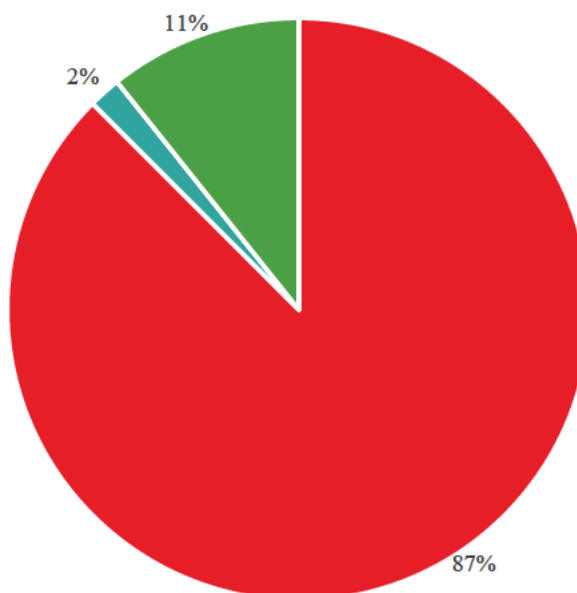
- 4.2.1 As identified in Table 4.1 and Table 4.2, overall bat activity was recorded as low across all static locations.
- 4.2.2 The majority of bat passes recorded across all static locations on site throughout each survey period were from common pipistrelle (see Inset 4.1).

Static 1



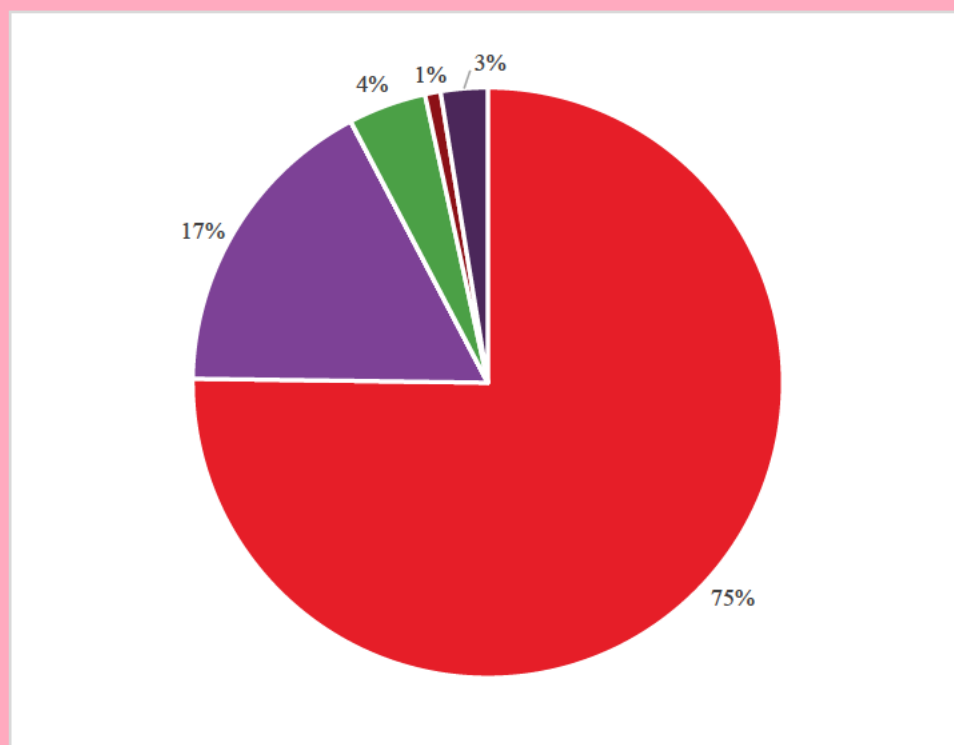
- Common pipistrelle
- Nathusius pipistrelle
- Pipistrelle species
- Brown long-eared bat
- Nyctalus species
- Noctule
- Myotis species
- Bat species

Static 2



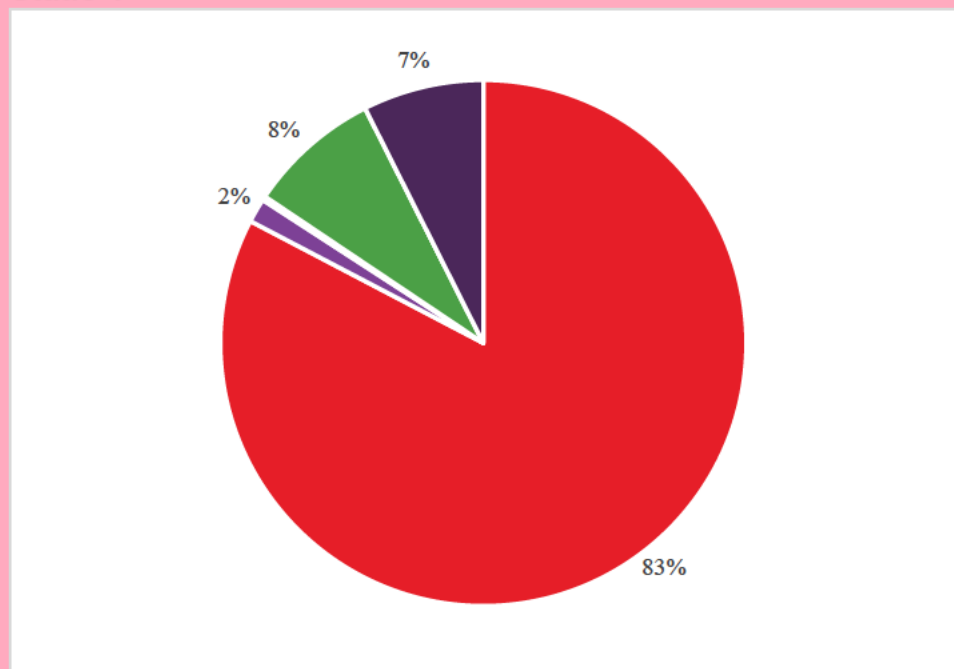
- Common pipistrelle
- Nathusius pipistrelle
- Pipistrelle species
- Brown long-eared bat
- Nyctalus species
- Noctule
- Myotis species
- Bat species

Static 3

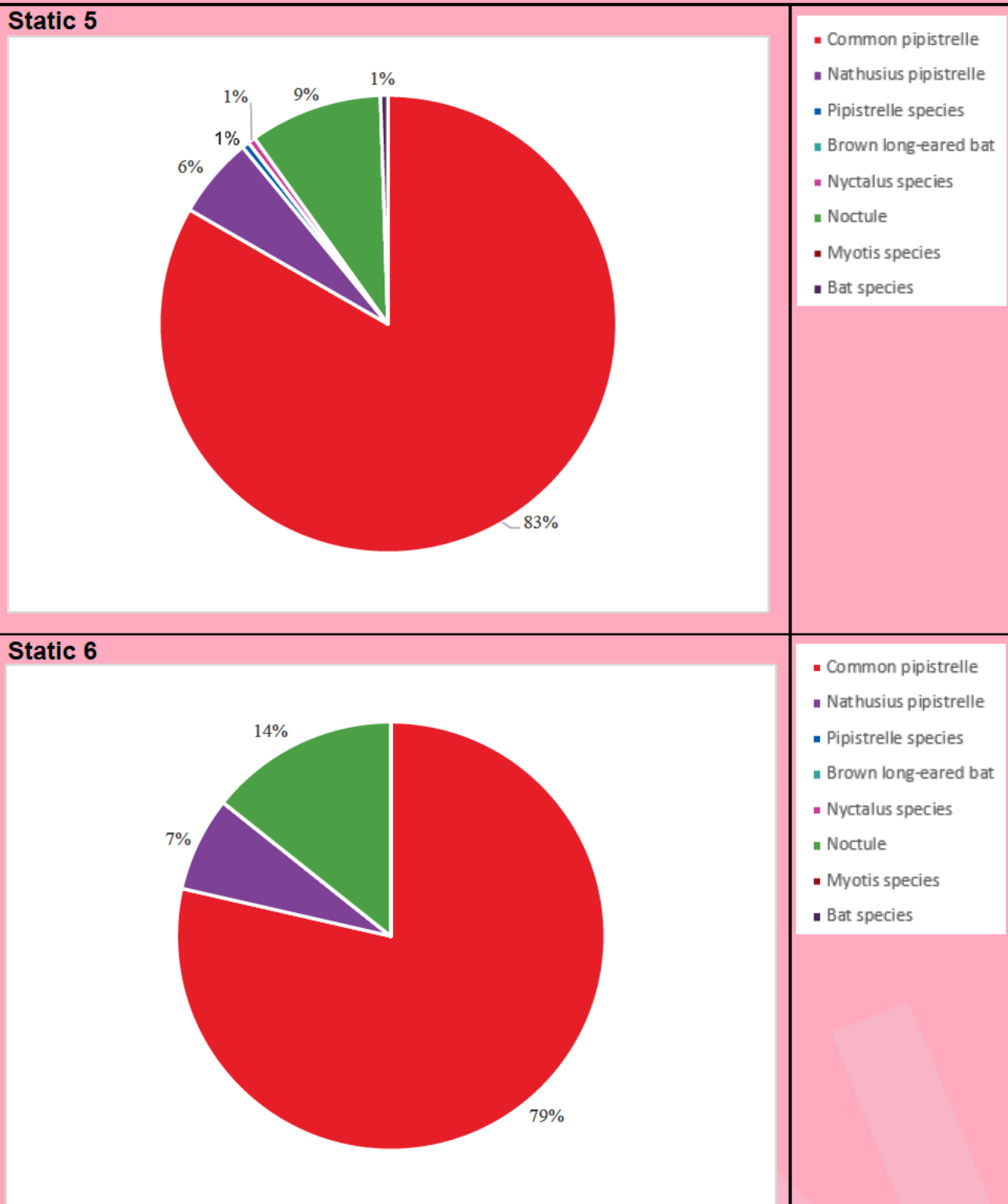


- Common pipistrelle
- Nathusius pipistrelle
- Pipistrelle species
- Brown long-eared bat
- Nyctalus species
- Noctule
- Myotis species
- Bat species

Static 4



- Common pipistrelle
- Nathusius pipistrelle
- Pipistrelle species
- Brown long-eared bat
- Nyctalus species
- Noctule
- Myotis species
- Bat species



Inset 4.1 Proportion of Recorded Bat Activity by Each Recorded Species Throughout the Survey Period.

Table 4.1 Summary of Bat PPH for Locations 1 to 3.

Common Name	Total Bat PPH														
	Location 1 (N of INEOS)					Location 2 (NW of INEOS)					Location 3 (NE of INEOS)				
	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level
Common pipistrelle	-	117.21	2.85	100.8	Low	0.48	5.45	0	4.91	Low	7.44	0.24	1.8	8.83	Low
Nathusius pipistrelle	-	0	0.53	0.7	Low	0	0	0	0	N/A	0	0	1.5	2.01	Low
Pipistrellus species	-	0.12	0.15	0.3	Low	0	0	0	0	N/A	0	0	0	0	N/A
Brown long-eared	-	0	0	0	N/A	0	0	0.08	0.1	Low	0	0	0	0	N/A
Nyctalus species	-	0	0	0	N/A	0	0	0	0	N/A	0	0	0	0	N/A
Noctule	-	0.73	0.08	0.7	Low	0	0.73	0	0.6	Low	0	0	0.38	0.5	Low
Myotis species	-	0	0	0	N/A	0	0	0	0	N/A	0	0	0.08	0.1	Low
Bat species	-	0	0	0	N/A	0	0	0	0	N/A	0.36	0	0	0.3	Low
Total	-	118.06	3.6	102.51	/	0.48	6.18	0.08	5.62	/	7.8	0.24	3.75	11.74	/

Red highlight indicates the location where the highest bat activity for each species was experienced throughout the survey period at each location, "-" indicates no deployment data received for survey period.

Table 4.2 Summary of Bat PPH for Locations 4 to 6.

Common Name	Total Bat Passes PPH														
	Location 4 (CW of INEOS)					Location 5 (S of INEOS)					Location 6 (CS of INEOS)				
	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level
Common pipistrelle	22.21	5.7	7.65	33.5	Low		7.64	7.28	16.05	Low	2.64	-	0	2.21	Low
Nathusius pipistrelle	0	0	0.45	0.6	Low		0	0.83	1.1	Low	0	-	0.15	0.2	Low
Pipistrellus species	0	0	0.08	0.1	Low		0	0.08	0.1	Low	0	-	0	0	N/A
Brown long-eared	0	0	0	0	N/A		0	0	0	N/A	0	-	0	0	N/A
Nyctalus species	0	0	0	0	N/A		0.12	0	0.1	Low	0	-	0	0	N/A
Noctule	0.24	2.42	0.83	3.31	Low		0.85	0.83	1.81	Low	0.48	-	0	0.4	Low
Myotis species	0	0	0	0	N/A		0	0	0	N/A	0	-	0	0	N/A
Bat species	2.76	0.85	0	3.01	Low		0.12	0	0.1	Low	0	-	0	0	N/A
Total	25.21	8.97	9	40.52	/		8.73	9	19.26	/	3.12	-	0.15	2.81	/

Red highlight indicates the location where the highest bat activity for each species was experienced throughout the survey period at each location, “-” indicates no deployment data received for survey period.

5 Conclusions

- 5.1.1 This report presents the results of bat activity surveys (automated/static bat detector surveys) undertaken by INCA between May 2025 and October 2025 to identify species present and the way bats use the site (commuting, foraging and any indicators of roost proximity). This report should be considered in combination with transect data reported by the INCA Bat Survey Report (Annex B to this report).
- 5.1.2 At least eight bat species were recorded, comprising four identified to species level and four species groups (e.g. *Myotis* sp., *Pipistrellus* sp.):
- Common pipistrelle;
 - Nathusius' pipistrelle;
 - Brown long-eared bat;
 - Noctule;
 - *Pipistrellus* sp.;
 - *Nyctalus* sp.;
 - *Myotis* sp.; and
 - Bat sp.
- 5.1.3 Overall bat activity across the survey area was assessed as low, which is consistent with INCA's interpretation of the transect survey data.

6 Disclaimer

- 6.1.1 This technical note is the result of survey work undertaken by INCA in between May and October 2025. This report refers, within the limitations stated, to the condition of the site at the time of the surveys.
- 6.1.2 Changes in legislation, guidance, site design, or best practice may necessitate a re-assessment/survey. No warranty is given as to the possibility of future changes in the condition of the site.
- 6.1.3 If design and/or development boundaries are revised, future surveys may be required in accordance with Chartered Institute of Ecology and Environmental Management (CIEEM) guidance [Ref 10].

References

- Ref 1 The Conservation of Habitats and Species Regulations (2017) Available online: <https://www.legislation.gov.uk/ukxi/2017/1012/contents/made> [Accessed June 2026].
- Ref 2 Wildlife and Countryside Act (1981) Available online: <https://www.legislation.gov.uk/ukpga/1981/69/contents> [Accessed June 2026].
- Ref 3 Countryside and Rights of Way Act (2000). Available online: <https://www.legislation.gov.uk/ukpga/2000/37/contents> [Accessed June 2026].
- Ref 4 Natural Environment and Rural Communities (NERC) Act (2006). Available online: <https://www.legislation.gov.uk/ukpga/2006/16/contents> [Accessed June 2026].
- Ref 5 Stockton-on-Tees Borough Council (2019). Local Plan. Available online: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=1645450086087 [Accessed June 2026].
- Ref 6 BATLOGGER (n.d.). BATLOGGER S2. Available online: https://www.batlogger.com/en/products/batlogger_s2/ [Accessed June 2026].
- Ref 7 Bat Conservation Trust (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition).
- Ref 8 BATLOGGER (n.d.). BatExplorer. Available online: <https://www.batlogger.com/en/products/batexplorer/> [Accessed June 2026].
- Ref 9 Online resource time and date was used to calculate the approximate night length for each survey period. Available online: <https://www.timeanddate.com/sun/@2636138?month=5&year=2025> [Accessed June 2026].
- Ref 10 Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, Coastal and Marine.

Annex A: Automated/Static Surveys – Total Bat Passes

Common Name	Total Bat Passes Per Location														
	Location 1 (N of INEOS)					Location 2 (NW of INEOS)					Location 3 (NE of INEOS)				
	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level
Common pipistrelle	-	967	38	1005	Low	4	45	0	49	Low	62	2	24	88	Low
Nathusius pipistrelle	-	0	7	7	Low	0	0	0	0	N/A	0	0	20	20	Low
Pipistrellus species	-	1	2	3	Low	0	0	0	0	N/A	0	0	0	0	N/A
Brown long-eared	-	0	0	0	N/A	0	0	1	1	Low	0	0	0	0	N/A
Nyctalus species	-	0	0	0	N/A	0	0	0	0	N/A	0	0	0	0	N/A
Noctule	-	6	1	7	Low	0	6	0	6	Low	0	0	5	5	Low
Myotis species	-	0	0	0	N/A	0	0	0	0	N/A	0	0	1	1	Low
Bat species	-	0	0	0	N/A	0	0	0	0	N/A	3	0	0	3	Low
Total	-	974	48	1022	/	4	51	1	56	/	65	2	50	117	/

Common Name	Total Bat Passes Per Location														
	Location 4 (CW of INEOS)					Location 5 (S of INEOS)					Location 6 (CS of INEOS)				
	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level	Spring	Summer	Autumn	Total	Activity Level
Common pipistrelle	185	47	102	334	Low	-	63	97	160	Low	22	-	0	22	Low
Nathusius pipistrelle	0	0	6	6	Low	-	0	11	11	Low	0	-	2	2	Low
Pipistrellus species	0	0	1	1	Low	-	0	1	1	Low	0	-	0	0	N/A
Brown long-eared	0	0	0	0	N/A	-	0	0	0	N/A	0	-	0	0	N/A
Nyctalus species	0	0	0	0	N/A	-	1	0	1	Low	0	-	0	0	N/A
Noctule	2	20	11	33	Low	-	7	11	18	Low	4	-	0	4	Low
Myotis species	0	0	0	0	N/A	-	0	0	0	N/A	0	-	0	0	N/A
Bat species	23	7	0	30	Low	-	1	0	1	Low	0	-	0	0	N/A
Total	210	74	120	404	/	-	72	120	192	/	26	-	2	28	/

Annex B: Bat Survey Report

INCA 2025-59

Bat Survey Report

**Bat Transects
Static Detector Deployment**

**Alfanar
'Lighthouse Green Fuels' Project**

November 2025



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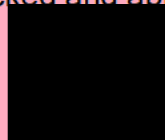
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Report prepared for and on behalf of the
Industry Nature Conservation Association by:



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November
2025

Checked and approved by



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Executive Summary

Bat transect surveys were commissioned by the client, Alfano Projects (hereafter referred to as 'Alfano'). This report details investigations into bats which are present in selected areas of the 'Lighthouse Green Fuels' Project within the Borough of Stockton-on-Tees.

The acoustic data that was acquired by INCA and is detailed within this report is being handed over to ARUP to undertake the acoustic analysis. This report represents the bat activity that was noted during the walking transects by sight and sound through the handheld Batlogger detectors.

Throughout all of the bat transects undertaken, on both the north and south sites on INEOS land, there was only a single Noctule *Nyctalus noctula* pass.

This accords with existing knowledge about bat activity in this area. Based on these surveys and existing knowledge, bats are unlikely to be a significant consideration for works going forwards at this site. However, these results need to also be considered alongside the results from the static detector data before conclusions can be made.

1. Introduction

Bat transect surveys, referred to as 'Night-time Bat Walkovers' (NBW) in new guidance, were completed on three separate dates for both the sites to the north and south of the seal sands road throughout 2025.

The surveys were targeted at specific areas where it was most likely to encounter bats to maximise the effectiveness of each survey. Surveys were therefore focused on the parts of the sites where there were areas considered of potentially suitable habitat for bats. Each transect covered approximately the same areas of habitat, but slightly different routes were taken each survey. This was due to the terrain and vegetation being difficult to walk on, particularly in the dark, and to gain more survey coverage. Surveys were undertaken in Spring, summer and autumn.

2. Legislation, Planning Policy, and Guidance

2.1 Legislation

Bats are a protected species covered by several pieces of national and international legislation. The laws safeguard bats, their roosts, and habitats due to their ecological importance and vulnerability.

The key legislative provisions related to bats are:

1. The Wildlife and Countryside Act 1981 (as amended)

- Bats are listed under Schedule 5 of this Act, giving them full protection.
- It is an offense to:
 - Kill, injure, or capture a bat intentionally.
 - Disturb a bat while it is using a place of shelter or protection (a roost).
 - Damage, destroy, or obstruct access to a bat roost, even if bats are not present.
 - Possess or trade in bats, dead or alive, or any part of a bat, unless authorized.
- Bat Roosts: Since bats often reuse the same roosts, bat roosts are protected whether or not bats are present.

2. The Conservation of Habitats and Species Regulations 2017 (as amended)

- This regulation transposes the EU Habitats Directive into UK law and gives bats further protection.
- Bats are classified as European protected species (EPS), meaning it is an offence to:
 - Deliberately capture, injure, or kill a bat.
 - Deliberately disturb bats, particularly during significant life stages (mating, rearing young, hibernating).
 - Damage or destroy a breeding site or resting place (i.e., roost) of bats.

3. The Countryside and Rights of Way Act 2000 (CRoW Act)

- This legislation strengthens the Wildlife and Countryside Act by including provisions that emphasize the protection of Sites of Special Scientific Interest (SSSIs) where bats may be found.
- It also clarifies the offense of reckless disturbance of protected species, which includes bats.

4. The Natural Environment and Rural Communities (NERC) Act 2006

- Section 41 of the Act lists certain bat species as species of principal importance for conservation in England. Public authorities, such as local councils, have a duty to consider the conservation of biodiversity, including bat populations, when making planning decisions.

2.2 Planning Policy

Stockton-on-Tees has a local planning framework that aligns with national guidelines, incorporating protections for bats as part of wider biodiversity;

- Local Plan (Adopted January 2019): the Stockton-on-Tees Local Plan sets out the Borough's strategy for development, which includes specific policies aimed at conserving biodiversity, such as:
 - **Policy ENV 5 – Preserve, Protect, and Enhance Biodiversity:** This policy states that proposals must assess and mitigate their potential impacts on biodiversity, which includes any harm to bats and their habitats. Developers must submit ecological reports when applying for planning permission if bats are likely to be affected.
 - **Policy ENV 6 – Green Infrastructure:** This promotes the creation and protection of green spaces, which indirectly supports bat populations by preserving natural habitats and foraging areas.

3. Desk Study

Bats are mobile and widespread throughout the survey area, however no roost locations have been identified so far, however they are unlikely to be present.

The data source is from INCAs own records which are a comprehensive set of records from employed surveyors, associates and known local naturalists recorded on an ad hoc basis and on voluntary surveys outside of work hours. It was determined that these records would be more relevant for this survey as they would be more numerous and localised than those from the local Records Centre (ERIC). This is particularly considering INCA ecologists and associates are often present on, or are more familiar with, the habitats within the industrial sites of the region, when the general public, using citizen science are not.

A zone of Influence of 2 km was applied when searching for data, but the closest records outside of this

zone may also be highlighted.

A search for granted European Protected Species licences was undertaken using MAGIC maps. The closest granted licence was 2.8km to the south west within industrial buildings for Common pipistrelle. This licence was for works to be undertaken between October 2014 and October 2015, a short time period, therefore it is likely that this was a small roost site.

The following species could be expected to occur within the sites and be identified as part of the survey effort:

Noctule

Low single figures are regularly present over RSPB Saltholme. The same individual bats have been recorded to the east of the A178 Seaton Carew road. The closest record to site is 1km south west of the southern site.

Soprano Pipistrelle

No known records from North Tees.

Nathusius' Pipistrelle

At least one confirmed record from Hartlepool, 5km to the north and further probable records from around RSPB Saltholme, but these may have been migrants rather than resident.

Common Pipistrelle

The most generalist and "urban" bat species and the only one that would be expected to be found around industrial sites on a regular basis. INCA has only recorded small numbers on most industrial sites. It has only been recorded in low single figures at RSPB Saltholme, despite there being abundant, apparently suitable habitat there; this is assumed to be due to the lack of nearby roosting opportunities. The closest record to site is 580m south of the southern site.

4. Methodology

4.1 Transect Surveys

Transect surveys were conducted by Sarah Barry, Ian Bond, Robert Woods, Phil Roxby, Mark Morris and Morgan Robson-Young. Sarah, Ian, Robert and Phil hold Class 2 bat survey licences and Mark and Morgan have experience of bat surveying. Ian and Mark are full members of the Chartered Institute of Ecology and Environmental Management (CIEEM) while Sarah and Robert are Associate members.

In accordance with the Bat Conservation Trust guidelines (Collins, J (ed.), 2023), transect surveys were carried out within each bat active season, Spring, Summer and Autumn. Each transect was walked at a constant pace by two surveyors to record levels of bat activity, starting at sunset and continued for an hour after sunset. One hour was deemed sufficient as this had targeted the key time that common pipistrelles would be emerging from roosts and foraging. Common pipistrelle are the only bat species that would be likely to be foraging on site. There is no suitable habitat on site for roosting or foraging for *Myotis* species and BLE. The desk study results, together with the local specialist knowledge of INCA studying industrial Teesside for over two decades was determined so that a full two to three hour survey was not necessary. Both the north and south site transects consisted of a loop of the site and it was deemed unnecessary to undertake this loop twice in one evening. Also, although the habitat to the south was more suitable for foraging bats, areas of this site were darker and very uneven under foot, resulting in a health and safety risk.

Surveys were conducted during suitable weather conditions (temperatures above 10°C at dusk, little/no wind, no precipitation) when bats are most likely to be active.

The transect routes were identified to maximise the potential for encountering bats across the two sites within a mix of habitats including self-seeded birch woodland and open grassland with reedbeds, mixed scrub and open mosaic habitat.

These are detailed below along with the weather conditions encountered during each survey.

4.2 Static detectors

In accordance with the Bat Conservation Trust guidelines, a minimum of two static detectors were deployed per transect during each bat active season. These were given an identification number based upon location of deployment. Static detectors used were Batlogger S2's. These were securely fastened to a suitable anchor point, *e.g.* fence post or tree and set to record for a minimum of five consecutive nights, beginning 20 minutes before sunset until 20 minutes after sunrise. Although the 2023 BCT guidelines state that surveys should commence 30 minutes before sunset and until 30 minutes after sunrise, recording for the first survey was mistakenly set to record at 20 minutes before sunset until 20 minutes after sunrise. To remain consistent, the recording times remained as this for the remainder of the surveys. It is highly unlikely this would have much of an impact on the results, considering there are no structures for bats to roost within on site, or in the vicinity.

Weather forecasting was checked prior to static bat detector deployment to ensure that surveys took place during suitable weather conditions.

Due to issues with the detector hardware, there were a few occasions where only three nights of data were collected. There were other occasions where the detectors were deployed for far greater than five nights and on all of these nights the detectors were collecting data in suitable weather conditions.

5. Results

Table 1. Transect survey dates for and weather conditions on the north site.

Transect Number	1	2	3
Date	29-05-24	21-07-24	25-09-24
Weather conditions	16°C, clear, light NE breeze	18°C, clear, light SE breeze	13°C, clear spells, light to moderate SW wind
Surveyors	Sarah Barry / Robert Woods	Sarah Barry / Mark Morris	Sarah Barry / Morgan Robson- Young

Table 2. Transect survey dates and weather conditions on the south site.

Transect Number	1	2	3
Date	27-05-24	17-07-24	24-09-24
Weather conditions	14°C, cloudy, light E breeze	18°C, lightly cloudy, light N breeze	13°C, clear, moderate W wind
Surveyors	Sarah Barry / Ian Bond	Sarah Barry / Phil Roxby	Sarah Barry / Morgan Robson- Young

Elekon M2 hand held bat detectors were used to record bats along each transect route with the following summary of bat recordings;

Table 3. Summary of bat recording data for the north site transects.

Transect Number	1	2	3
Month surveyed	May 29-05-24	July 21-07-24	September 25-09-24
Total bat recordings (note: call quality filtered to >60%)	0	0	0
Survey time frame	21:26-22:29	21:18-22:30	18:45-20:28
Total number of species identified	0	0	0

Table 4. Summary of bat recording data for the south site transects.

Transect Number	1	2	3
Month surveyed	May 27-05-24	July 17-07-24	September 24-09-24
Total bat recordings (note: call quality filtered to >60%)	1 Noctule observed but too far to detect with Bat Logger	0	0
Survey time frame	21:14-22:19	21:37-22:36	18:45-20:18
Total number of species identified	1	0	0

The raw data from the detectors was imported into the Elekon BatExplorer software programme (Version 2.3.2.0) which was used to analyse the data and produce mapping.

4.3 Static Detector Deployment

To supplement the bat transect surveys Batlogger S2 static bat detectors were also deployed at various locations across the site. These locations were chosen based on where bat activity would be expected based on the habitat present. The location of each detector is shown in the appendix.

The detectors were deployed on the following dates:

Table 5. Static detector deployment locations and dates

Figure Ref.	Grid Reference	Location	Spring Deployment	Summer Deployment	Autumn Deployment
1	NZ 52835 24558	N of INEOS	23 rd - 25 th May	23 rd to 29 th July	25 th Sep – 5 th Oct
2	NZ 52399 24273	NW INEOS	13 th to 22 nd May	17 th to 22 nd July	Not deployed
3	NZ 52707 24312	NE INEOS	Not deployed	24 th to 29 th July	25 th Sep – 3 rd Oct
4	NZ 52259 23898	CW INEOS	23 rd - 26 th May	17 th to 22 nd July	25 th Sep – 1 st Oct
5	NZ 52151 23636	S INEOS	23 rd - 25 th May	17 th to 22 nd July	25 th Sep – 3 rd Oct
6	NZ 52428 23751	CS INEOS	23 rd - 26 th May	17 th July to 23 rd	Not deployed

The raw data collected (WAV files) is to be analysed by ARUP with no further discussion within this report.

6. Discussion and Recommendations

Despite the lack of bats on site, a high number of small flying insects were observed during the Spring and Summer surveys. The only bat observed was a single Noctule bat during the survey of the southern site on the 27th May. This bat was flying high commuting from the north towards Dorman pools (Saltholme pools) and across the end of the south west end of the site to the south. This bat was not detected on the Batlogger M2.

It was difficult to determine the best location to deploy the bat detectors due to several factors:

- Light pollution was considerable. With only areas furthest from the roads and buildings not being affected.
- The seal sands road was used by large lorries that would travel fast creating extra noise and light pollution closer to this road.
- There was consistent background noise from operations to the west and south.
- Terrain in the south was very uneven under foot making it difficult to walk around, particularly in the dark.
- Vegetation in the south was very dense in places, with reeds and bramble, making it difficult to walk around site. The area to the south west of the southern were inaccessible due to the dense bramble. The bramble also grew considerably throughout the season making accessing the same areas difficult or not possible, despite taking tools to cut through vegetation.
- There were few suitable structures or trees to install the detectors on.

- There were a few issues with the hardware of the detectors, despite these being relatively new, which resulted in having to undertake two of the surveys twice.

The survey effort, however, was sufficient overall to determine if and where bats would be using the sites.

7. Conclusions

Levels of bat activity during the transects were nil except for one noctule bat observed commuting across the far south western corner of the southern site. This accords with previous knowledge of bat activity in these locations.

No bat roosts are known in the survey area and no potential bat roosts have been identified within the sites.

The numerous negative factors listed above, together with the lack of suitable structures for roosting and the likelihood that there are many more suitable places to roost in nearby Cowpen Bewley and Port Clarence, has resulted in an area devoid of bats.

Considering the data within this report the proposed development is considered unlikely to impact bats. However, these results need to also be considered alongside the results from the static detector data before final conclusions can be made.

8. References

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

Multi-Agency Geographical Information for the Countryside (MAGIC). Crown Copyright and database rights [2020]. Ordnance Survey 100022861. Available at: <http://www.magic.gov.uk/>

Russ, J. British Bat Calls. A guide to Species Identification. Pelagic publishing. 2013.

Appendices

Transects taken throughout each survey.



Figure 1: INEOS North. Spring, 29th May.



Figure 2: INEOS South. Spring, 27th May.

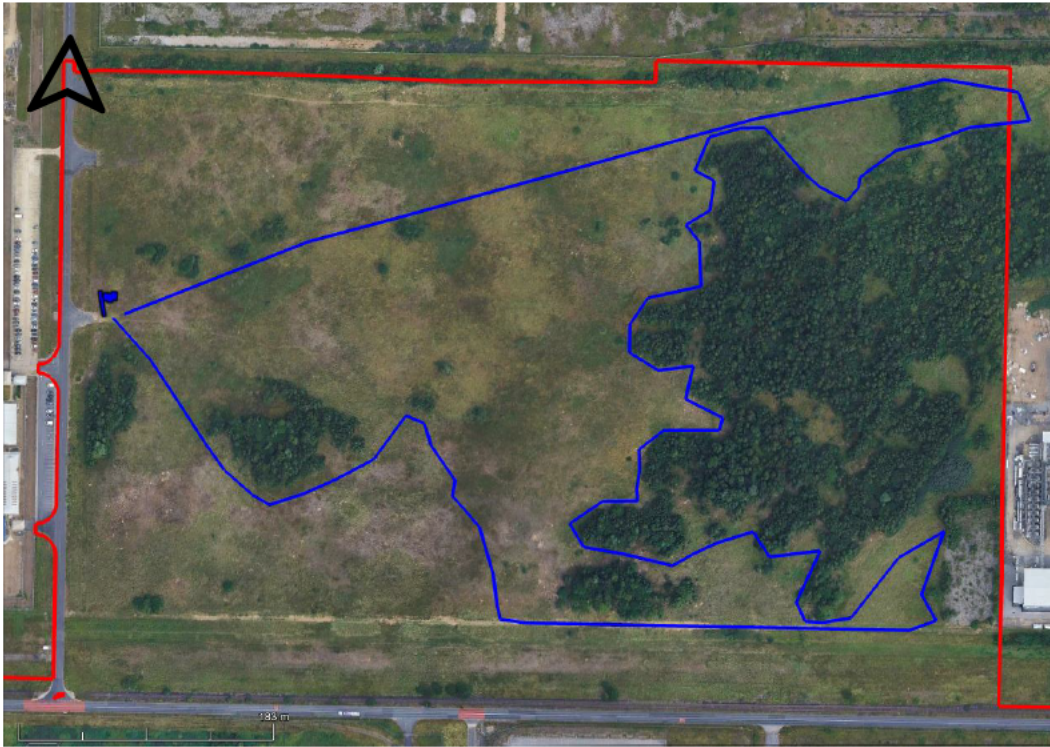


Figure 3: INEOS North. Summer, 24th July.



Figure 4: INEOS South. Summer, 17th July. This figure shows an anomaly at the start. The survey commenced and finished in the car park to the east.



Figure 5: INEOS North. Autumn, 25th September.



Figure 6: INEOS South. Autumn, 24th September.

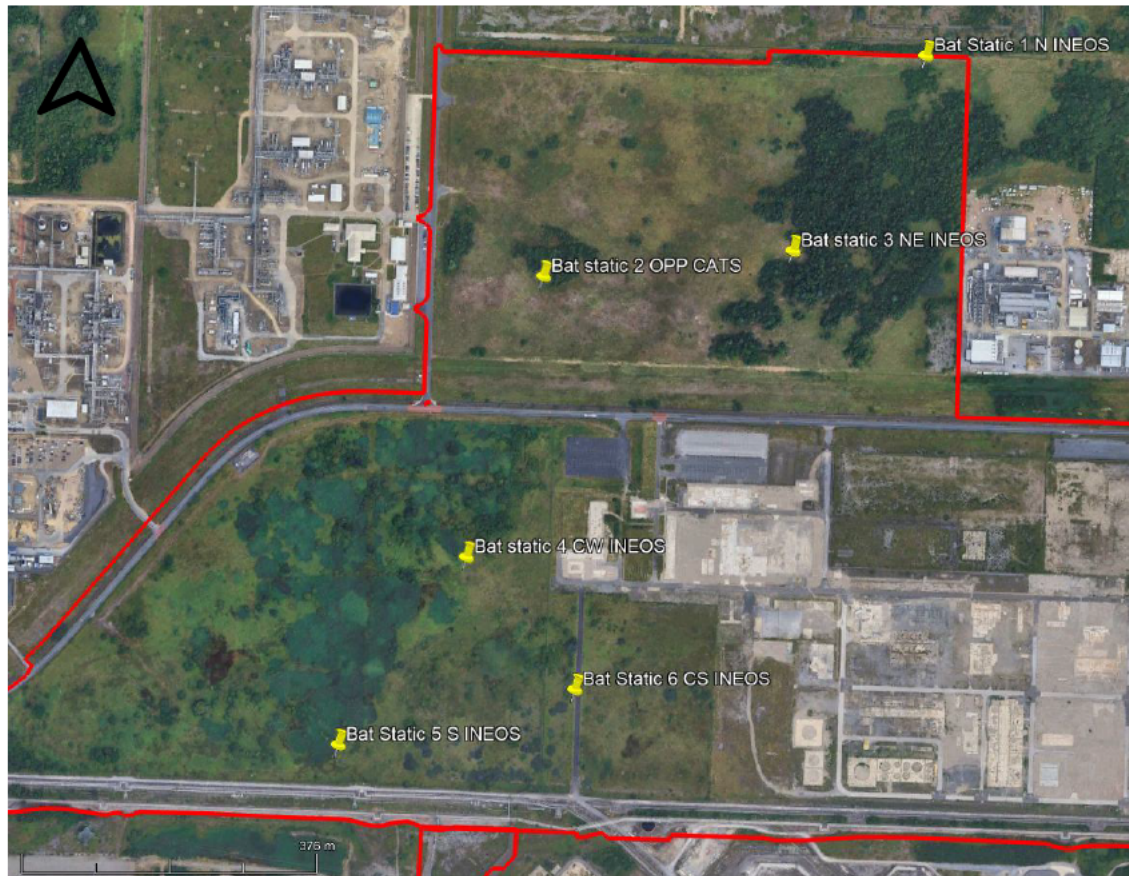


Figure 7. Static bat detector deployment locations

