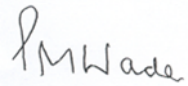
SUNNICA ENERGY FARM

Appendix 8G: Report on Surveys for Bats

Sunnica Ltd

August 2020

Quality information

Prepared by	Checked by	Verified by	Approved by
			
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	August 2020	For Issue	August 2020	Max Wade	Technical Director

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Tables, Charts and Figures

1. Introduction

1.1.1 In March 2019, AECOM undertook a Preliminary Ecological Appraisal (PEA) of the Sunnica Energy Farm site on behalf of Sunnica Ltd (Ref 8G-1). This PEA identified the need for follow-up ecological surveys and assessments to determine a baseline and potential impacts of the proposed Sunnica Energy Farm (hereafter referred to as 'the Scheme') on protected and, or notable species[1]. As part of this work, AECOM undertook bat surveys within the Scheme boundary (the Development Consent Order (DCO) Site (the Site)) (see **Figure 8G-1**).

1.2 The Scheme

1.2.1 Sunnica Energy Farm is a new solar farm scheme proposal that would connect to the national electricity transmission network. Sunnica will use ground mounted solar photovoltaic (PV) panel arrays to generate electricity energy from the sun and combine these with a Battery Energy Storage System (BESS). The Scheme will be connected to the national electricity transmission network by an underground cable.

1.2.2 The BESS will consist of a compound and battery array to allow for the storage, importation and exportation of energy to the National Grid. Details of the design of the BESS elements, including their power and energy ratings, and their dimensions and appearance, are currently in development.

1.2.3 Supporting electrical infrastructure will include an on-site substation and on-site cabling between the different electrical elements of the Scheme. The generating equipment of the Scheme will be fenced and be protected via security measures such as CCTV and lighting. Inside the fenced areas, in addition to the generating equipment will be, internal access tracks, landscaping and habitat management and drainage.

1.2.4 The Scheme will be connected to the existing Burwell National Grid Substation, most likely using 132kV cables buried underground. The cables will run between Sunnica West and Sunnica East (Grid Connection Route A), and then on from Sunnica West to the Burwell National Grid Substation (Grid Connection Route B). Details of the cable route, dimensions of the cables, the depth and method of burial, and numbers of joints required are currently in development.

1.2.5 The Scheme qualifies as a Nationally Significant Infrastructure Project (NSIP) and will require a DCO from national government, due to its generating capacity. It is expected to be an Environmental Impact Assessment (EIA) development.

1.2.6 The Scheme therefore comprises the following key areas:

- Solar Farm Sites:

[1] A notable species is a species with a conservation designation, but no legal protection

  - Sunnica East Site A;
  - Sunnica East Site B;
  - Sunnica West Site A; and
  - Sunnica West Site B.
- associated electrical infrastructure for connection to the national transmission system comprise:
  - Grid Connection Route A (connecting the Sunnica East Site A with the Sunnica East Site B and then connecting to the Sunnica West Site A);
  - Grid Connection Route B (connecting the Sunnica West Site A and Sunnica West Site B and the Burwell National Grid Substation); and
  - Burwell National Grid Substation Extension.

1.2.7 **Figure 8G-1** shows the locations of these key areas.

1.1 Site Description

1.1.1 A summary description of the habitats within the Scheme boundary (made up of the three Sites) is provided below and a more detailed description of the habitats is provided in the PEA report (**Ref 8G-1**). The extent of the Scheme is shown in Figure 8G-1.

Sunnica East Site

1.1.2 The Sunnica East is split into two sub-sites, one to the north of Freckenham (referred to as Sunnica East Site A) and the other to the south of Worlington (referred to as Sunnica East Site B). These two sites are approximately 1 km apart and are separated by agricultural fields. The Sunnica East Site A encompasses an area of approximately 231.7 ha and includes land within the county of Suffolk and Cambridgeshire. Sunnica East Site B lies within Suffolk and encompasses an area of approximately 323.1 ha (**Figure 8G-1**).

1.1.3 The landscape features within the Sunnica East Site A and Sunnica East Site B consist of arable agricultural fields interspersed with individual trees, hedgerows, linear tree belts, small woodland blocks, farm access tracks and local roads.

1.1.4 The landscape features immediately surrounding the Sunnica East Site A and Sunnica East Site B comprise small rural villages, including Worlington to the north, Barton Mills to the north-east, Red Lodge and Freckenham to the south and Isleham to the west. Industrial land uses adjoin the A11 to the south of the Sunnica East Site with an industrial installation of a 7.5 MW solar farm situated adjacent to the south-eastern extent of the Sunnica East Site and an anaerobic digestion (AD) plant located to the south of the Sunnica East Site.

Sunnica West Site

1.1.5 The Sunnica West Site is located within the East Cambridgeshire District Council administrative area, approximately 3 km north east of Newmarket and 6.5 km east of Burwell.

1.1.6 Sunnica West is split into two sub-sites, one to the south-east (referred to as Sunnica West Site A) and the other to the north-west of Snailwell (referred to as Sunnica West Site B). These two sites are approximately 1 km apart, separated by agricultural fields and Chippenham Road. The Sunnica West Site A encompasses an area of approximately 485.5 ha and includes land to the east and west of the A11, consisting of agricultural fields bounded by trees, managed hedgerows, linear tree shelter belts, small woodland and copses and farm access tracks. Sunnica West Site B encompasses an area of approximately 68.8 ha and comprise of agricultural fields, grassland, small woodland and copses, farm access tracks and irrigation ditches fed by the River Snail which runs along the western and northern boundaries of the Site (**Figure 8G-1**).

1.1.7 The surrounding landscape comprises regularly shaped arable fields interspersed with managed hedgerows, tall shelter belts of trees and in the Chippenham Hall area, a parkland landscape with mature individual trees. Much of the area is also characterised by grazed paddocks, horse gallops and exercise tracks.

Cable Route Corridors

1.1.8 The Scheme will connect to the existing Burwell National Grid Substation via a cable route corridor. The cable route corridors under consideration are Grid Connection Route A, which connects the Sunnica East Site A with the Sunnica East Site B and then runs between the Sunnica West Site A and the Sunnica East Site B; and Grid Connection Route B, between the Sunnica West Site A and Sunnica West Site B and the Burwell National Grid Substation.

Grid Connection Route A

1.1.9 Grid Connection Route A connects the Sunnica East Site A with Sunnica East Site B and crosses two minor roads and arable farmland (**Figure 8G-1**).

1.1.10 Heading south from the Sunnica East Site B, the cable route corridor for Grid Connection Route A crosses the River Kennett, pastoral farmland, the Chippenham footpath 49/7 (a Public Right of Way (PRoW)) and B1085 (**Figure 8G-1**).

Grid Connection Route B

1.1.11 Heading east from the Burwell National Grid Substation, the cable route corridor for Grid Connection Route B crosses agricultural fields and a number of roads including the B1102 and A142. Grid Connection Route B also crosses a number of watercourses, including the Burwell Lode, New River, and the River Snail, as well as a number of drainage ditches associated with Burwell Fen, Little Fen, the Broads, and agricultural drains (**Figure 8G-1**).

1.1.12 The cable route corridor for Grid Connection Route B crosses a PRoW (footpath 92/19) before crossing the railway line and the A142 Newmarket / Fordham Road. The Route then runs alongside Snailwell Road and across the River Snail into Sunnica West Site B.

Burwell National Grid Substation Extension

1.1.13 The habitat within the Burwell National Grid Substation Extension (surrounding the existing substation) comprises small grassland fields to the east of the existing substation (bordered by hedgerows and mature trees) and arable land to the south and west of the existing substation (**Figure 8G-1**).

1.2 Scope of Report

1.2.1 The PEA Report (Ref 8G-1) identified bat species that are protected under UK and European legislation and are species of principal importance (listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006). It was identified that bat species could be potential constraints to the works or influence the design and implementation of the Scheme.

1.2.2 This report includes the following information:

- relevant legislation and policy;
- methods for desk and field-based assessments undertaken between 2019 and 2020;
- limitations to the surveys undertaken and any assumptions made as a result of any incomplete data;
- survey results including preliminary roost appraisal and bat activity surveys;
- biodiversity importance of the bat species and sites designated for bat species (where applicable); and
- recommendations, including outline mitigation (*i.e.* avoidance, compensation), any further surveys and enhancement.

1.2.3 This report is a technical appendix to accompany the Preliminary Environmental Information report, reporting on and evaluating the baseline data collected as of August 2020.

2. Legislative and Policy Framework

2.1 Legislative Framework

2.1.1 The following wildlife legislation is potentially relevant to bats in relation to the Scheme:

- Wildlife and Countryside Act 1981 (as amended) (the WCA);
- Countryside and Rights of Way (CRoW) Act 2000;
- Natural Environment and Rural Communities (NERC) Act 2006; and
- Conservation of Habitats and Species Regulations 2017 (as amended).

2.1.2 The above legislation has been considered when planning and undertaking the commissioned survey work using the methods described in Section 3; when identifying potential constraints to the Scheme; and when making recommendations for further survey, design options and mitigation, as discussed in Section 6. Compliance with legislation may require the attainment of relevant protected species licences prior to the implementation of the proposed development.

2.1.3 All bat species and their roosts are legally protected in the UK under the Conservation of Habitats and Species Regulations 2017 (as amended), which implements the EC Directive 92/43/EEC (the Habitats Directive). In addition, barbastelle (*Barbastella barbastellus*), lesser and greater horseshoe bats (*Rhinolophus hipposideros* and *Rhinolophus ferrumequinum*) and Bechstein's bat (*Myotis bechsteinii*) are listed in Annex II of the Habitats Directive, which requires sites to be designated in member states for their protection. Bats and their roosts are also protected under the WCA.

2.1.4 Taken together, the Conservation of Habitats and Species Regulations 2017 (as amended) and the WCA make it illegal to:

- deliberately capture or intentionally take a bat;
- deliberately or intentionally kill or injure a bat;
- be in possession or control of any live or dead bat or any part of, or anything derived from a bat;
- damage or destroy a breeding site or resting place of a bat;
- intentionally or recklessly obstruct access to any place that a bat uses for shelter or protection;
- intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection; and
- deliberately disturb bats, in particular any disturbance which is likely to (i) impair their ability to survive, breed, reproduce or to rear or nurture their young; or in the case of hibernating or migratory species, to hibernate or migrate; or (ii) affect significantly the local distribution or abundance of the species to which they belong.

2.1.5 A bat roost is defined as any structure a bat uses for breeding, resting, shelter or protection. It is important to note that since bats tend to re-use the same roost sites, current legal opinion is that a bat roost is protected regardless of whether or not the bats are present at a specific point in time.

2.1.6 Section 40 of the NERC Act 2006 places a legal obligation on public bodies in England to have regard to particular living organisms and types of habitat which are of the greatest conservation importance whilst carrying out their functions, whilst also having a general regard for protecting all biodiversity. The NERC Act 2006 Section 41 includes seven bats as species of 'principal importance': barbastelle, Bechstein's bat, noctule (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), lesser and greater horseshoe bats.

2.1.7 Local Planning Authorities must be satisfied that favourable conservation status of bats (and other European Protected Species) can be maintained before granting planning permission. Demonstrating the maintenance of 'favourable conservation status' is one of three Habitats Directive "derogation tests" relating to European protected species that the Local Planning Authority must be satisfied are met in order to be able to grant planning permission.

2.1.8 The three "derogation tests" as set out in paragraph 53 of Conservation of Habitats and Species Regulations 2017 (as amended) are that:

- *"the development must be either for "public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment";*
- *"that there is no satisfactory alternative"*; and
- *"that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".*

2.1.9 Favourable conservation status is defined in Article 1(i) of the Habitats Directive as when:

- *"population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats";*
- *"the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future";* and
- *"there is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis".*

2.2 European Protected Species Mitigation Licences

2.2.1 Although the law provides strict protection for bats, it also allows this protection to be set aside (derogated) under Regulation 53 of the Conservation of Habitats and Species Regulations through the issuing of European Protected Species Mitigation Licences (EPSMLs) for the purpose of preserving public health; public safety; other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences

of primary importance for the environment. However, in accordance with the requirements of the Conservation of Habitats and Species Regulations a licence can only be issued where the following requirements are satisfied:

- there is no satisfactory alternative; and
- the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

2.2.2 The process of obtaining an EPSML from Natural England will normally take two months (Natural England's standard determination period is 30 working days). In addition, Natural England would normally expect any bat EPSML application to be accompanied by the data collected from the detailed bat surveys, which are used to determine the status of the structure or tree with regard to bats; specifically, the location of roost sites, the bat species utilising the roost and the type of roost (such as maternity, or transitional).

2.2.3 The application for an EPSML would need to include the production of a detailed method statement for the proposed works. This document would include details of working practices and mitigation measures to ensure that the favourable conservation status of the bats using the structure or tree is not adversely affected.

2.3 Planning Policy

2.3.1 National and local planning policy relevant to nature conservation is provided in detail in the PEA for the Scheme (Ref 8G-1).

2.4 Local Biodiversity Action Plans (LBAP)

2.4.1 Thirteen species of bats are listed in the Suffolk BAP (Ref 8G-2). These comprise barbastelle, Brandt's bat (*Myotis brandtii*), brown long-eared bat, common pipistrelle (*Pipistrellus pipistrellus*), Daubenton's bat (*Myotis daubentonii*), Leisler's bat (*Nyctalus leisleri*), lesser horseshoe bat , Nathusius' pipistrelle (*Pipistrellus nathusii*), Natterer's bat (*Myotis nattereri*), noctule, serotine (*Eptesicus serotinus*), soprano pipistrelle , and whiskered bat (*Myotis mystacinus*). Information is provided on their conservation status, current factors causing loss or decline and current action for their conservation. Four of these species are also listed as Cambridgeshire and Peterborough priority species (Ref 8G-3): barbastelle, brown long-eared bat, noctule and soprano pipistrelle.

3. Methods

3.1 Introduction

3.1.1 All field surveys were led by competent ecologists, familiar with bat ecology and surveying, with the relevant Natural England bat class licences for the survey type, and full or associate members of the Chartered Institute of Ecology and Environmental Management (CIEEM).

3.1.2 Prior to the start of the surveys in each new location, a daytime site visit was undertaken for each location by the lead surveyor in order to plan the works, assess any health and safety issues on site, and record the context of the survey locations.

3.2 Desk Study

3.2.1 A desk study was undertaken in December 2018 through Cambridgeshire & Peterborough Environmental Records Centre (CPERC) and Suffolk Biodiversity Information Service (SBIS), to obtain relevant bat records within the last ten years and within a 2 km radius of the Scheme. This desk study also identified any international nature conservation designations (including those of relevance to bats) within 10 km of the Scheme Boundary and other statutory or non-statutory nature conservation designations within 2 km of the Scheme.

3.2.2 A search was undertaken of freely available resources including Environmental Statements of other local development with relevant desk study data (*e.g.* Ward Associates, 2017 (Ref 8G-4)) and Magic.gov.uk (Ref 8G-5) for bat designated Special Areas of Conservation (SACs) within 30 km of the Scheme; other statutory sites designated for bats within 10 km of the Scheme and any relevant non-statutory sites within 2 km of the Scheme.

3.3 Preliminary Roost Appraisal

3.3.1 A preliminary roost appraisal (PRA) survey was carried out on all relevant features identified within the Scheme on 15th, 16th and 23rd May 2019. Additional, land added to the Scheme was surveyed on 19th June and 25th September 2019. Land at Burwell National Grid Substation Extension was surveyed 24th August 2020. Where access was permitted, a licensed bat ecologist (with a minimum Natural England Level 1 Class Licence) and an assistant undertook an initial assessment of relevant buildings/structures, woodland blocks and trees at ground level for their suitability for roosting bats (see **Sub-Appendix A**, **Figure 8G-2**).

3.3.2 The aim of the survey was to undertake a rapid assessment to identify (a) the presence of bats or their roost(s), and/or (b) features that were suitable for roosting bats, but for which the presence/absence of bats or their roosts could not be determined.

3.3.3 Use of a GPS was made to accurately record the location of trees, woodlands and structures along with photos and notes recorded in line with guidance in the Bat Surveys: Good Practice Guidelines for Professional Ecologists 3rd Edition (Ref 8G-5) (see **Sub-Appendix B**, **Tables 8G-A1** and **8G-A2**). Any

trees and structures were viewed from the ground. During the surveys, signs of bats such as staining and droppings were searched for and recorded (see full method in **Sub-Appendix B**, **Table 8G-A1**).

3.3.4 Based on the overall suitability for use as a roost each tree, woodland or structure was classified as negligible, low, moderate or high roost suitability, or as a confirmed roost, in accordance with best practice guidelines (Ref 8G-6). The results helped to inform the layout of the Proposed Scheme and any requirement for more detailed survey work to confirm the presence or likely absence of bat roosts if roost features are likely to impacted. Note that it is currently assumed that none of these features will be impacted by the Scheme due to the embedded mitigation, on the basis of habitats being retained and a suitable buffer zone provided around potential roosting features to avoid roost loss or any significant disturbance. As such these assessments were carried out on a precautionary basis to inform any future amendments to the Scheme that may require further survey where roost disturbance or loss is requirement.

3.4 Bat Activity Surveys

3.4.1 The survey effort for the bat activity surveys was based on the proposed Scheme footprint located in mainly low value suitability habitats for foraging and commuting, comprising large open arable or pig fields and some smaller areas of grassland/set-aside, with the retention of woodland and hedges that are normally more frequently used by foraging and commuting bats.

3.4.2 Bat activity surveys were undertaken in 2019 in accessible and suitable foraging and commuting bat habitat at four transect locations covering each of the four Sunnica Solar Sites; Sunnica East Site A (transect East 1), Sunnica East Site B (transect East 2), Sunnica West Site A (transect West 1 and 2) and Sunnica West Site B (transect West 1). Transect routes were surveyed in spring, summer and autumn (May, July and September to early October) covering representative habitat within the Sites (see **Sub-Appendix A**, **Figures 8G-3** to **8G-5).**

3.4.3 In accordance with the bat survey guidelines (Ref 8G-6), habitats assessed as being of low value for foraging and commuting bats require three activity transects surveys within a year capturing spring, summer and autumn.

3.4.4 Each activity survey involved two surveyors walking a transect route which included a series of ‘spot counts’ at pre-determined points along the transect (shown as Waypoints on **Figures 8G-3** to **8G-5**). These ‘spot count’ points were located at potentially higher value features with regards to foraging and, or commuting bats. At each point surveyors stopped and recorded bat activity for three minutes using bat echolocation detectors. All activity encountered whilst walking between points was also noted. The survey route was designed to include potential flight paths or foraging areas within the Scheme and potential roost sites. The starting points and walked direction of the transects were varied during each survey visit in order to ensure different areas of the transect were walked close to dusk or dawn.

3.4.5 Surveyors carried full spectrum bat echolocation detectors (Batlogger M or Anabat Swift) to help determine which species were present. In accordance with survey guidelines (Ref 8G-6), dusk surveys were carried out from sunset

to at least 2 hours after sunset. The time, location, numbers, species (where possible) and direction of flight were recorded for each bat pass (a discrete burst of echolocation heard, or bat activity observed) during the survey. Echolocation calls detected were analysed with specialist software comprising Batsound, Kaleidoscope or Analook W to verify bat calls where required. Survey visits were conducted in this way where weather conditions allowed, with surveys scheduled to avoid nights with cold (>7°C), wet or windy conditions.

3.4.6 In addition to the transect surveys, eight automated static bat detectors (Anabat Swift or Express with the same standard microphones) were placed across the Scheme in representative habitats to record bat activity over a longer period of time (two on each transect). This is double the recommended number of detectors required (normally one per transect for low value habitat) and ensured better coverage of the Scheme due to the large geographic spread and the ability to consider small areas of higher value habitat within each transect location. The locations of the static detectors are shown in **Sub-Appendix A**, **Figures 8G-3** to **8G-5**.

3.4.7 All microphones were located at least 1 m above the ground on trees, and clear of vegetation between the adjacent habitats and the microphone. All detectors were set on default settings to record in zero-crossing format. The static detectors were set up to record bat calls from sunset to sunrise for the recommended minimum of five consecutive nights per season in spring, summer and autumn (see deployment dates and weather in **Sub-Appendix D**).

3.4.8 Weather conditions were recorded, using the temperate log files on each static detector and rain/wind conditions recorded at the nearest weather station using online resources (*i.e.* https://www.timeanddate.com/weather/uk/ (Ref 8G-7). Weather data were taken into consideration in the analysis. Where any prolonged period of strong wind >25mph or rain was experienced the static detectors were left for longer on site to obtain sufficient data during optimum weather conditions for bat activity.

3.5 Advanced Licence Bat Survey Techniques (ALBST)

Survey Rationale

3.5.1 Standard survey inspection and acoustic survey methods are limited when trying to gather information on the presence of rare or cryptic species of bats (e.g. myotis species or barbastelle), nor do these methods inform of the sex, age and their reproductive status. As such ALBST, comprising bat trapping and use of acoustic lures was used to supplement the other survey data collected.

3.5.2 The aim of the was to provide the following information on the species on the Scheme in suitable woodland:

- confirmed identification of species;
- sex;
- age of bats; and

- reproductive status.

3.5.3 ALBST were used in one woodland in Sunnica West A and in a woodland/hedgeline in Sunnica East B, identified as being suitable for trapping of rare/cryptic species, based on initial transect/static detector records (see **Sub-Appendix A**, **Figures 8G-4** and **8G-5**) within the Scheme. Badlingham Lane at Sunnica East B was also considered, but due to use at night by motorbike riders it was not considered possible to safely trap bats there. Another woodland considered suitable for trapping close to Freckenham was removed from the Scheme prior to surveys.

Bat Trapping and Biometrics

3.5.4 The surveys used a combination of suitably placed Austbat 3 bank harp traps, and 6 m double or triple high mist nets and acoustics lures (AT-100). Surveys were led on site by a suitably licensed bat ecologist (Class Licence Level 3 (CL19) and 4 (CL20)). Surveys avoided the time when bats were giving birth during the maternity season and were undertaken on 1st, 7th August and 12th September 2019 in suitable weather conditions.

3.5.5 When bats were captured within the traps (harp or mist net) the bats were extracted by the licence holder using gloves suitable to handle bats and immediately transferred into a clean cloth bat bag. The bat, within the bag, was then be taken to the processing area which will be located immediately adjacent to the trapping locations. The biometrics of each individual bat was recorded, including species, sex, weight, forearm measurement, age, reproductive status and the general condition of the bat. If the identification of the bat was questionable (particularly for myotis species) then a DNA sample was taken, either in the form of bat droppings or fur sample (fur clipping taken from the back of the neck between the shoulder blades) if required.

3.6 Bat Data Analyses

Activity Surveys

3.6.1 The transect data were described in relation to species, number of passes (and where possible number of bats), observed behaviour, temporal and spatial trends. The static bat detector data collected were analysed to determine the total number of bat passes for each species or species group (depending on the level of identification possible from the recordings made) and then used to derive a metric - the Bat Activity Index (BAI) for the bat activity at each survey location.

3.6.2 These analyses provide an indication of:

- seasonal variation in species activity and composition at each survey location;
- relative levels of bat activity across the Scheme; and
- potential roosting sites, important foraging areas and commuting routes.

Bat Activity Index (BAI)

3.6.3 BAI values were calculated by averaging the total number of bat passes per hour for each static detector unit at each location per month. The term 'pass' is defined as a single file made up of bat pulses of a single species i.e. this may be one bat in a file or many bats in a single file.

3.6.4 Limited guidance is available on what constitutes low to high bat activity on a site/scheme based on number of passes. As such a relative scale is used by AECOM that follows the protocol recommended by Ecobat (Ref 8G-8) in this report where:

- 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.

3.6.5 For transect data relative bat activity levels were described to aid the discussion. No guidance is available on what constitutes low, moderate or high bat activity based on number of passes during a transect. As such a relative scale is used by AECOM in this report where:

- very low activity is up to 5 passes per survey;
- low activity is 6 to 25 passes per survey;
- moderate activity is 26 to 99 passes per survey; and
- high activity is 100 passes per survey.

3.6.6 Reference to surveyor observations, including numbers of individual bats seen, flight routes and behaviour and detectability of individual species are also made to inform the overall evaluation.

Bat Roost Categorisation

3.6.7 Where bat roosts were found these were categorised as follows based on standard guidance (Ref 8G-6):

- day roost - A place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer;
- night roost - A place where bats rest or shelter in the night but are rarely found in the day and may be used by a single individual occasionally or it could be used regularly by the whole colony;
- feeding roost - A place where individual bats or a few individuals rest or feed during the night but are rarely present by day;
- transitional/occasional roost - Used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation;
- swarming site - Where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites;

- mating site - Where mating takes place from late summer and can continue through winter;
- maternity roost - Where female bats give birth and raise their young to independence;
- hibernation roost - Where bats may be found individually or together during winter, which has a constant cool temperature and high humidity; and
- satellite roost - An alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.

3.7 Biodiversity Evaluation

3.7.1 A hierarchical geographical approach used to assign biodiversity importance (*i.e.* sensitivity) of any bat roosts, and bat foraging and commuting habitat associated with the site is based upon Guidelines of Ecological Impact Assessment in the UK and Ireland (Ref 8G-9), and Valuing Bats in Ecological Assessment (Ref 8G-10) and professional judgement. It is acknowledged that in the Guidelines of Ecological Impact Assessment guidelines 'Importance' is used as opposed to Valuing Bats in Ecological Assessment which uses 'Value'. These geographical frames of reference and method of determination used in the assessment is similar and therefore the use of 'Importance' and/ or 'Value' for ecological features is interchangeable. Refer to **Sub-Appendix C** for full details on the methodology used to determine biodiversity importance.

3.7.2 Reference has also been made where required to:

- Natural England Joint Publication JP025: A Review of the Population and Conservation Status of British Mammals. (Ref 8G-11);
- NERC Act Section 41 list of species of principal importance
- Local Biodiversity Action Plans (Ref 8G-12);
- Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals (Ref 8G-13); and
- The State of the UK's Bats 2017: National Bat Monitoring Programme Populations Trends (Ref 8G-14).

3.7.3 The importance presented reflects the currently known distribution within the Scheme.

3.8 Assumptions and Limitations

Desk Study

3.8.1 The information collected from the desk study background record search represents only those records submitted to records centres and is therefore not a definitive list of all records of bat species identified within the Desk Study Area. If records have not been provided, this does not confirm absence from the Scheme.

Field Survey

Survey areas and access

3.8.2 Survey areas were chosen to provide a representative sample of the Scheme, based on the best quality in terms of potential bat roosting/foraging habitat which could be impacted as a result of the Scheme (*i.e*. mainly arable/livestock fields). Note that since the surveys, the Scheme boundary has changed slightly, resulting in some PRF survey results and one bat activity transect that were undertaken in land that is now just outside the Scheme (at the Sunnica East Sites). This is not a significant limitation as similar habitats are present close to the Scheme and the data are still useful for assessing landscape scale effects on bats.

3.8.3 Not all habitats were surveyed in detail. No woodland, wetlands or hedgerows were surveyed in detail, as they were either outside the footprint of the Proposed Scheme (*i.e*. retained and buffered from the Scheme) or access was not possible to land outside the Scheme Boundary. No access was granted for land within the Cable Route Corridors (apart from a short section of Cable Route B between Sunnica West A and B), and therefore no surveys were carried out within these areas. There will be temporary habitat disturbance along a haul road and cable trenching works within the Cable Route Corridors and bat surveys will be required in these areas prior to a formal assessment of the Scheme where impacts to potential roosting features or foraging/commuting habitat are likely.

Data interpretation limitations

3.8.4 It is accepted that myotis bat species are difficult or impossible to identify from echolocation alone, therefore these species are sometimes aggregated as 'Myotis species'. This aggregation, where undertaken, is widely accepted and does not affect the evaluation of the results of activity surveys. This is not a significant limitation as other survey methods, such as ABLST and other field observations were aimed at identifying cryptic myotis species wherever possible.

3.8.5 The preliminary roost appraisal surveys undertaken were aimed at determining the presence/likely absence of roosts, therefore there would be a need for further surveys on potential roosts if they are likely to be impacted by the Scheme. Sufficient robust roost survey data are required to be collected for any future licence application (EPSML) for roost loss and, or modification and significant disturbance and to allow the Local Planning Authority to evaluate the planning submission and discharge its legal biodiversity duty in accordance with Natural England's standing advice.

3.8.6 Bats are highly mobile and may roost in different locations each year where suitable roost features are present. As such a precautionary approach for mitigation is proposed for trees or buildings assessed with roost suitability but where roosts were not found.

3.8.7 There were no other limitations that affected the survey results.

4. Results

4.1 Desk Study

4.1.1 There are no international statutory site designations for bats within 30 km of the Scheme. There are no national statutory site designations for bats within 10 km of the Scheme or relevant non-statutory sites within 2 km of the Scheme.

4.2 Bat Species

4.2.1 There were 216 desk study individual record entries of bats within 2 km of the Scheme, comprising the following species: common pipistrelle, soprano pipistrelle, barbastelle, noctule, Leisler's bat, serotine, Natterer's bat, Brandt's bat, whiskered bat, and Nathusius' pipistrelle (Ref 8G-1).

4.2.2 There is one record of a serotine bat from the 1 km square covering Freckenham and part of the Sunnica East Site A. A bat activity survey of trees at Bay Farm, carried out for a development in 2017 (Ref 8G-4), south of the Sunnica East A Site (within 500 m) found activity of barbastelle, a Myotis species, noctule, brown long-eared bat, serotine and common and soprano pipistrelles.

4.2.3 There are records of common pipistrelle, Brandt's bat, Daubenton's bat, Natterer's bat, Whiskered bat, soprano pipistrelle, serotine and brown long-eared bat from outside but within 500 m of the boundary of the Sunnica East Site A. This includes possible serotine, common pipistrelle and brown long-eared maternity roosts.

4.2.4 There are records of eight species recorded at Chippenham Fen immediately adjacent to Sunnica West Site B. These comprise common pipistrelle, soprano pipistrelle, serotine, noctule, Daubenton's bat, Leisler's bat, Natterer's bat and brown long-eared bat.

4.2.5 There are no bat records within the Sunnica West Sites A, but there are at least three species within 500 m of this site, comprising brown long-eared bat, soprano pipistrelle, an unknown pipistrelle species and serotine.

4.2.6 The Cable Route Corridors included records of eight species within 2 km, including records of brown long-eared bat, common pipistrelle, soprano pipistrelle, barbastelle, noctule, serotine and Natterer's bat within the area of Cable Route Corridor B2. At Burwell National Grid Substation Extension Site there are nearby records (within the same 1 km grid square of brown long-eared bat, common pipistrelle, Natterer's bat, noctule, barbastelle and soprano pipistrelle.

4.3 Preliminary Roost Appraisal

4.3.1 The results of the preliminary roost appraisal are shown in **Sub-Appendix A**, **Figure 8G-2** and in **Sub-Appendix D**.

4.3.2 In summary, this initial assessment has found one confirmed roost (based on bat activity data) at Woodland 612 (now outside the Scheme boundary), 50 features with high suitability for roosting bats, 34 features with moderate

suitability, 30 with low suitability and 10 features with negligible suitability. Many of the woodlands, particularly those with moderate to high suitability are likely to contain roosting bats, however none of the features identified with roost suitability are currently likely to be directly impacted by the Scheme (see discussion in Section 5).

Table 8G- 1 Summary of Preliminary Roost Appraisal Results

Feature Type	*Negligible*	*Low*	*Moderate*	*High*	*Confirmed*
Trees, Woodland/ copse	8	24	31	47	1 (mixed woodland)
Buildings	2	3	3	3	0
Bridges	0	3	0	0	0

4.4 Bat Activity Surveys

4.4.1 The results of these surveys and the Bat Activity Index (BAI) (see section 3.6.2) are summarised below, with full results in **Sub-Appendix D**. Transect mapping and static bat detector locations are shown in **Sub-Appendix A, Figures 8G-3** to **8G-5**.

Transect Surveys

4.4.2 A total of 12 transects were surveyed during 2019 to provide a representative coverage of the habitats within the Scheme. This included hedges/tree lines, woodland edge, arable field margins and livestock fields (mainly pigs). Transects covered each of the four Sunnica Solar Sites; Sunnica East Site A (Transect East 1), Sunnica East Site B (Transect East 2), Sunnica West Site A (transect West 1 and 2) and Sunnica West Site B (Transect West 1).

4.4.3 Species recorded during the bat transect survey comprised at least eight species: common pipistrelle, soprano pipistrelle, brown long-eared bat, serotine, noctule, barbastelle, Leisler's bat and Myotis species (Daubenton's and/or other Myotis species).

Spring

4.4.4 Surveys were undertaken on 15th, 22nd, 23rd and 28th May 2019. Activity on both East transects was low (6 to 25 passes).

4.4.5 Species recorded on Transect East 1 comprised common and soprano pipistrelle bats recorded passing and foraging. Relatively higher activity was recorded close to a block of woodland between Waypoints 4 and 5.

4.4.6 Species recorded on Transect East 2 comprised common and soprano pipistrelle bats, two brown long-eared passes and single passes of a noctule, barbastelle and a Myotis species. These records were fairly evenly spread along the transect mainly close to woodland edge and hedges.

4.4.7 Activity on Transect West 1 was low with several noctule passes along the central north/south hedges, with common and soprano pipistrelles and a single myotis bat pass.

4.4.8 Activity on Transect West 2 was moderate with up to four bats comprising common and soprano pipistrelles foraging to the south west on the site along a woodland shelterbelt. A single myotis bat (probably Daubenton's bat) was recorded.

Summer

4.4.9 Surveys were undertaken on 24th, 25th, 30th and 31st July 2019. Activity on all transects was moderate (26 to 99 passes).

4.4.10 At Transect East 1, species comprised mainly common and soprano pipistrelles with relatively high activity of up to three common pipistrelles foraging close to farm buildings at Waypoint 9. Noctules were recorded occasionally passing high over the site to the north and west of the site. A single Daubenton's bat was recorded over the reservoir at Waypoint 9 and a single brown long-eared bat along a hedge nearby.

4.4.11 At Transect East 2, there were passes of mainly common and soprano pipistrelles, with a couple of noctule passes and one undetermined noctule or Leisler's pass. These were located mainly along Badlingham Lane and a treeline to the east of this.

4.4.12 At Transect West 1, there were passes of common and soprano pipistrelles and noctule bats. Two common pipistrelle bats were recorded foraging in and around the shelterbelt woodland at Waypoint 3.

4.4.13 At Transect West 2, common and soprano pipistrelles, noctule, serotine and possible Leisler's bats. This is included possible emergence of a soprano pipistrelle in woodland at Waypoint 2. The serotine was recorded foraging close to the barns at Waypoint 1. Other activity was recorded along the hedges/roads and the central tree line to the east of the site. This included regular passes of common and soprano pipistrelles, noctule, and a possible Leisler's bat.

Autumn

4.4.14 Surveys were undertaken on 25th September 4th, 8th, 15th October 2019. Activity on all transects was moderate (26 to 99 passes).

4.4.15 At Transect East 1, there were occasional passes of common and soprano pipistrelles, and noctule bats. There were a single passes Daubenton's and Leisler's bats were recorded along a hedges. Relatively higher activity of foraging bats was recorded at Waypoint 1 close to woodland and Lee Brooks and at Waypoint 8 close to farm buildings.

4.4.16 At Transect East 2, foraging passes of noctule were recorded shortly after sunset over the reservoir to the south of this area. Along Badlingham Lane there were occasional passes of common and soprano pipistrelles, and a single pass of a brown long-eared bat and a barbastelle. Further along the transect a few passes of common pipistrelle were recorded close to a woodland at Waypoint 6.

4.4.17 Activity on Transect West 1 was highest along the central north-south hedge between Waypoints 5 and 9 with several noctule passes and frequent common and soprano pipistrelles foraging passes with at least three individual bats recorded. There were occasional passes elsewhere close to hedges.

4.4.18 At transect West 2, regular noctule passes and foraging activity were recorded to the east of the site along a tree line (Waypoint 10). Occasional passes of a single common pipistrelle were recorded close to La Hogue Farm. At Sounds Plantation (Waypoint 2) there was frequent foraging activity of common and soprano pipistrelle, a single pass of a brown long-eared bat and three barbastelle passes.

Static Bat Detector Surveys

4.4.19 Species recorded on the static bat detectors at the eight locations across the four sites surveyed in 2019 comprised at least eight species; common pipistrelle, soprano pipistrelle, brown long-eared bat, serotine, noctule, barbastelle, Leisler's bat and Myotis species (Daubenton's and/or Natterer's bat). Full results are provided in **Sub-Appendix D** with static locations in **Sub-Appendix A**, **Figures 8G-3** to **8G-5**. A summary is provided as **Table 8G-2** and **Chart 8G-1**.

4.4.20 This highest activity (a BAI of 67.6 passes per hour) was recorded in the summer at Static West 1, located on the main north-south hedgerow with mature trees adjacent to a track and grazing marsh to the west. This was closely followed by summer activity at Static East 1, located along a woodland strip close to the Lee Brook.

4.4.21 In total 19,368 bat passes were recorded across the whole site based on 162 nights of data, from the 8 static detectors. The most commonly recorded species by far were common and soprano pipistrelles with 12,092 and 5,662 passes respectively, with 372 passes of either of these two species (as their calls overlap). The highest number of calls during one season was 2,453 passes of soprano pipistrelle at Sunnica West 1.

4.4.22 Noctule and Leisler's bats were the next most frequently recorded with 267 and 244 passes respectively and 117 of either of these two species spread throughout the site, throughout the year. 240 passes of barbastelle were recorded mainly at Sunnica East 1 and 3 (Lee Brook and Badlingham Lane) in the spring and autumn. 141 passes of brown long-eared bats were recorded with a notable peak of 53 passes in a woodland shelterbelt in the summer at Sunnica West 2.

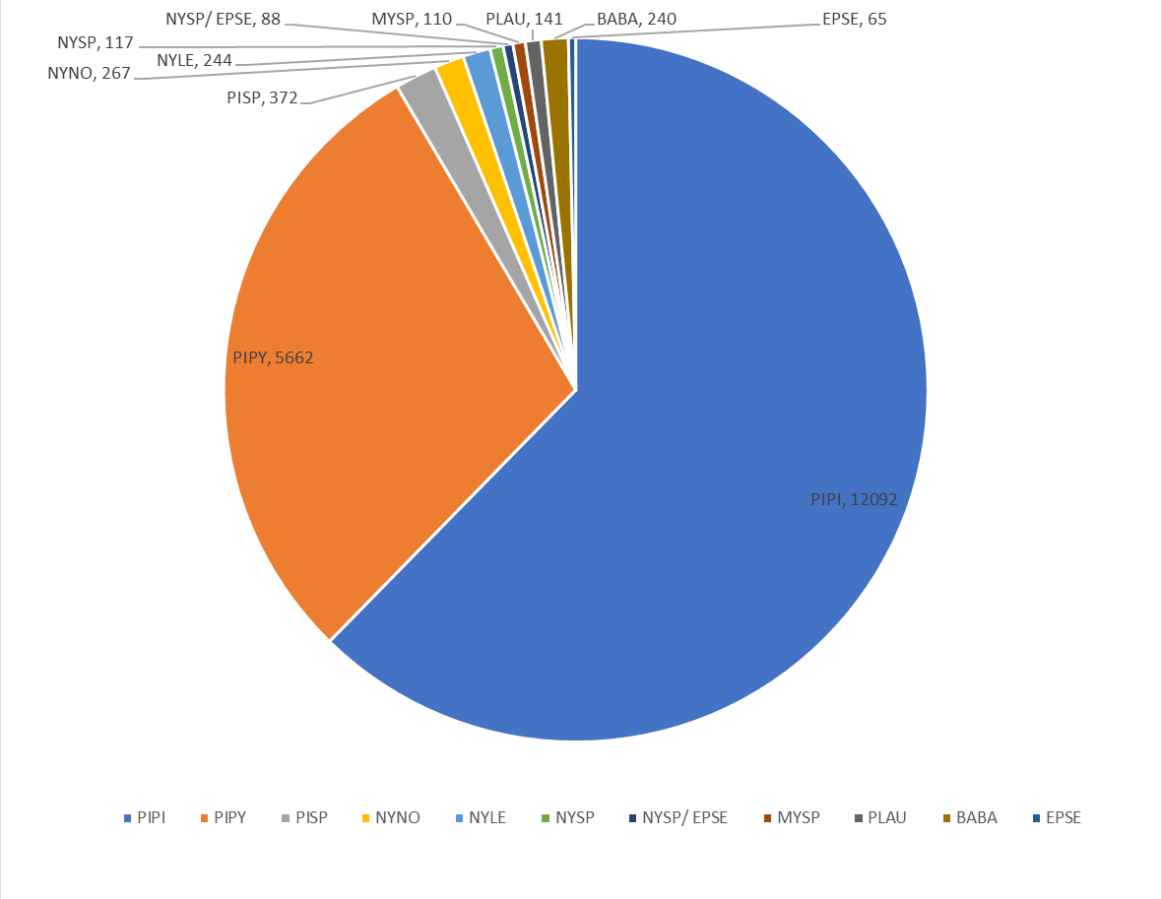
4.4.23 There were 110 passes in total of Myotis species scattered across the site in low numbers throughout the year. Based on direct field observations, including activity transects and captured bats these are most likely attributable to Daubenton's and/or Natterer's species. 65 passes of serotine were recorded across the site and 88 passes as either serotine and/or Nyctalus species (Noctule and/or Leisler's). There was a notable peak of 38 serotine passes of this species in a woodland shelterbelt in the summer at Sunnica West 2.

Table 8G- 2 Summary of Bat Activity Index (BAI) from static detector surveys

Date 2019 / Location	*BAI* per hr*	*Activity Level*	*Date 2019 / Location*	*BAI* per hr*	*Activity Level*	*Date 2019 / Location*	*BAI* per hr*	*Activity Level*
Summer West 1	**67.6**	High	Autumn West 1	**9.8**	Moderate	Autumn East 3	**2.4**	Low
Summer East 1	**63.2**	High	Summer West 4	**8.0**	Moderate	Spring East 3	**1.8**	Low
Summer West 3	**22.3**	High	Autumn East 1	**7.8**	Moderate	Spring West 4	**1.4**	Very Low
Autumn West 2	**19.8**	High	Summer East 2	**7.7**	Moderate	Autumn West 4	**1.3**	Very Low
Spring West 1	**17.7**	High	Summer East 3	**5.2**	Low	Spring West 2	**0.9**	Very Low
Summer West 2	**12.3**	High	Summer East 4	**4.9**	Low	Spring East 2	**0.8**	Very Low
Spring West 3	**11.3**	Moderate	Spring East 1	**4.5**	Low	Spring East 4	**0.6**	Very Low
Autumn West 3	**10.3**	Moderate	Autumn East 4	**2.9**	Low	Autumn East 2	**0.4**	Very Low

* BAI = Bat Activity Index (overall number of bat passes per hour) listed in descending order

Chart 8G-1 Total individual bat passes for each species



** Key to species: PIPI - common pipistrelle (blue), PIPY - soprano pipistrelle (orange), PISP – common or soprano pipistrelle (grey, NYNO - noctule (yellow), NYLE – Leisler's (light blue), NYSP/EPSE – noctule or Leisler's bat (green), MYSP - Myotis species purple), PLAU - brown long eared bat (lilac), BABA – barbastelle (brown) and EPSE - serotine (dark blue), .*

4.5 Advanced Licence Bat Survey Techniques (ALBST)

4.5.1 Full results are shown in **Sub-Appendix D** and the survey sites in **Sub-Appendix A**, **Figures 8G-4** and **8G-5**.

4.5.2 Three trapping sessions were undertaken on 1st, 8th August and 12th September 2019 to gather additional information on cryptic bat species and detail on breeding status of bats using the Scheme, in particular woodland habitats immediate adjacent to the Scheme. Species caught and released comprised brown long-eared bats, common and soprano pipistrelles and a Natterer's bat. This included a mix of male and female bats, including a female Natterer's, a brown long-eared bat, three common pipistrelles and two soprano pipistrelles that were either had bred (or were still lactating) this year, indicating nearby breeding roosts of those species.

5. Discussion

5.1 Introduction

5.1.1 An evaluation of the biodiversity importance of bat species in relation to Scheme in terms of potential roosts, foraging and commuting habitats is described below. This evaluation considers each of the Sites (Sunnica East Sites A and B, Sunnica West Sites A and B). Potential outline impacts and effects on bat species are discussed.

5.2 Designated Sites

5.2.1 No designated sites of relevance to bats were identified or are likely to be impacted by the Scheme.

5.3 Roosts

5.3.1 There are no relevant roosts within the Scheme identified in the desk study. Based on the records there are likely to be nearby roosts, particularly in nearby villages/churches and these bats are likely to use the Sites for foraging. Based on the field data collected from a preliminary roost appraisal, bat activity and trapping, there are likely to be roosts within all the Sites of common and soprano pipistrelle, noctule, Leisler's bat, serotine, Myotis bat species (Daubenton's and/or Natterer's bat), brown long-eared bat and barbastelle. This includes the timing of observations in relation to expected emergence times (from static and transect data) and captures of Natterer's bat, brown long-eared bat, common and soprano pipistrelle within woodland/hedge lines at Sunnica West Site A and Sunnica East Site B.

5.3.2 As roosts and potential roost features are outside the current footprint of the Scheme (due to avoidance of potential roosting features) no detailed roost presence/absence or characterisation has been undertaken to determine roost importance and therefore no specific biodiversity importance has been assigned. As a precautionary approach based on the data collected bat roosts have been assigned of up to **County Importance** based on potential maternity roosts of common species and small numbers/individual roosts of rarer species such as barbastelle.

5.4 Commuting and Foraging Habitats

5.4.1 Species recorded on the activity surveys (activity transects, static bat detectors and trapping) in 2019 comprised nine species: common pipistrelle, soprano pipistrelle, brown long-eared bat, serotine, noctule, barbastelle, Leisler's bat, Daubenton's bat and Natterer's bat.

5.4.2 Biodiversity importance of foraging and commuting bats is based on species rarity, numbers, presence of nearby roosts and type/complexity of community/foraging features (see **Sub-Appendix C**). This also considers the lower detectability on bat detectors of species such as barbastelle, brown long-eared and Myotis bats compare to species such as common and soprano pipistrelle and noctule (Ref 8G-15).

5.4.3 There was a range of activity (including foraging, commuting and social calling) with multiple bats often recorded. The species and areas of highest bat activity recorded on the transects were mirrored in the static detector results.

5.4.4 Foraging and commuting habitat with the highest relative bat activity, were present in the following locations:

- Sunnica East Site A (Transect East 1); Lee Brook (e.g. Waypoint 1, 5 and Static 1) and the unnamed farm buildings near Beck Bridge (Waypoint 8), a north-south hedgerow/track (Waypoint 3) linking woodland/fen to the north of the site to habitats further south.
- Sunnica East Site B (Transect East 2); Badlingham Lane (Waypoint 7 to 10, Static 3), unnamed woodland block (Waypoint 6), north south double hedgerow and track (Waypoint 2, Static 4).
- Sunnica West Site A (Transects West 1 and 2); a woodland strip (Waypoint 3), barn complex (Waypoint 1), Sounds Plantation (Waypoint 2), unnamed woodland strip (Waypoint 4 to 5) and Half-moon plantation to The Willows (Waypoint 10).
- Sunnica West Site B (Transect West 1); north-south mature hedge and trees and track (Waypoint 5 and 9) and the River Snail (Waypoint 8).

5.4.5 Whilst most of these areas with highest activity were located along linear features such as running water, hedges and woodland edges, foraging and commuting was also observed particularly by noctule bats high over open fields and occasional foraging by pipistrelle species over some crops (such as maize) in open fields (e.g. Sunnica East B, Transect 2 Autumn).

5.4.6 Based on the data collected in 2019 the commuting and foraging habitat for bats is assessed as of up to **County/District Importance** (depending on the species, see **Table 8G.3** and guidance in **Sub-Appendix C**).

5.4.7 The habitat is assessed as of **County/District Importance** for barbastelle (a Red List Near Threatened and classed as a ‘rarest’ species) based on the presence of individual or small numbers of bats throughout the Scheme, with possible small numbers of nearby roosts, and suitable foraging and commuting habitats comprising, isolated woodland patches, less intensive arable and villages, hedgerows and moderate to large field sizes.

5.4.8 The habitat is assessed as of **County/District Importance** for foraging/commuting soprano and common pipistrelle (both common species) based on the presence of large numbers of bats, with numerous roosts/potential within and close to the Scheme, suitable habitats and their use of the habitats described above.

5.4.9 The habitat is assessed as of **Local Importance** for all other species; Daubenton’s bat, noctule, Leisler’s bat, serotine, brown long-eared bat, and Natterer’s bat, based on the presence of individual bats/small numbers, with unknown/single roosts within or close to the site and their use of the habitats as described above.

Table 8G- 3 Summary of Biodiversity Importance of Commuting and Foraging Habitat

Species	*Rarity*	*Number of bats*	*Roosts/ potential roosts nearby*	*Type and complexity of linear features*	*Commuting Importance*	*Foraging habitat characteristics*	*Foraging Importance*
Common pipistrelle	2	20	4	3	County/District	3	County/District
Soprano pipistrelle	2	20	4	3	County/District	3	County/District
Noctule	5	10	2	3	Local	3	Local
Leisler's	5	5	2	3	Local	3	Local
Serotine	5	5	2	3	Local	3	Local
Brown long-eared bat	2	5	2	3	Local	3	Local
Barbastelle	20	5	2	3	County/District	3	County/District
Myotis species*	5	5	2	3	Local	3	Local

* Daubenton's /Natterer's

5.5 Potential Impacts and Significance of Effects

5.5.1 The primary purpose of this report is to provide an assessment of the biodiversity importance of the bat population identified within the Scheme (see Section 1.1). An assessment of potential impacts (taking into account embedded mitigation), any additional mitigation and residual effects will be undertaken in an Environmental Statement (ES) and form part of the DCO submission. As all UK bat species are protected by European legislation, they must be considered in the Environmental Impact Assessment (EIA) for the Scheme and any unavoidable adverse impacts must be mitigated. Where avoidance is not possible then appropriate mitigation and habitat compensation would be provided.

5.5.2 The impact assessment process will involve:

- identifying and characterising impacts and their effects;
- incorporating measures to avoid and mitigate negative impacts;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset; and
- identifying opportunities for ecological enhancement.

5.5.3 The assessment of impacts will consider the baseline conditions for bats reported in this technical appendix (pending any updates) to allow:

- a description of how the baseline conditions will change as a result of the project and associated activities; and
- the identification of cumulative impacts arising from the proposal and other relevant developments.

5.5.4 There is currently no scientific literature available on the impacts to bats from solar farms (Ref 8G-16). Small schemes have not been routinely monitoring and the first large scale (Nationally Significant Infrastructure Project (NSIP)) solar scheme Cleve Hill in Kent only received planning consent in May 2020 (Ref 8G-17). However, construction impacts are likely to be similar to other large-scale developments with habitat changes and losses, potential noise, dust, and lighting disturbance during construction and decommissioning works. Operational impacts and resulting effects will be based on the changes to habitats over time and the likely response of individual bat species. This will also require monitoring to improve confidence in the assessment of residual adverse or beneficial effects, to feedback into the landscape management plan and to provide a data for future large scale solar schemes.

5.5.5 The potential impacts are summarised as follows:

- disturbance to habitats used by bats for roosting, foraging and commuting from noise, dust and lighting;
- loss of habitats (mainly agricultural land) to the Scheme infrastructure (i.e. solar panels, substation, control/junction boxes, access roads);
- changes to bat foraging and commuting habitats, e.g. from agriculture (arable crops/pigs) to grassland (potentially cut or grazed);

- potential attraction or avoidance of bats to the solar panels from potential increases in prey (i.e. flying insects), potential noise attraction/disturbance, barrier effects;
- potential for roosting in new infrastructure; and
- indirect beneficial impacts through a possible reduction of agriculture chemical inputs to watercourses/, reduction in pesticide use on crops within the local area resulting in an increase in prey availability.

5.5.6 Whilst all potential/confirmed roosts are likely to be retained, as they are either located outside the boundary of the Scheme or retained and avoided as part of the embedded mitigation, there will be some temporary or permanent loss of habitats resulting in adverse effects to foraging/commuting bats associated with nearby roosts and in the wider area. It is anticipated that mainly low value habitats for foraging or commuting bats will be impacted by the Scheme and that any losses will be compensated through habitat creation and enhancement elsewhere within the Scheme. Precise figures from the Biodiversity Net Gain Calculations of habitat losses/gains will be used in this assessment. Newly created habitats and a change from intensive agriculture to may be beneficial to bats.

5.5.7 If the footprint of the final Scheme results in any features that are likely to be directly impacted (e.g. from the cable routes/access) then further more detailed bat roost surveys will be required at specific features (i.e. structures with low to high roost suitability and trees with moderate to high roost suitability) to inform mitigation and potential licence application in accordance with best practice guidance (Ref 8G-6). Where construction works are undertaken within these buffers zones there may be indirect impacts to roosts/potential roosts. These impacts would be avoided through use of a precautionary working method statement.

5.5.8 Effects from lighting have the potential to effect roosting bats within and close to the Scheme and bats commuting to and from foraging areas during the construction, operation and decommissioning phases. Some bat species are more sensitive to lighting (e.g. Myotis species and brown long-eared bats), and as the Sites are currently largely undeveloped, there is minimal artificial lighting. The lighting for the construction compound is likely to be of a temporary nature and used mainly during the construction and decommissioning phases. Security lighting where used during the operational phase is likely to be manually operated or on PIR sensors and will not be on continuously. Given the rural nature of the site, it is unlikely that any security lighting would be often triggered. Whilst security/compound lighting would be available for the lifetime of the Scheme, site activity will predominantly take place during daylight hours and is therefore not expected to cause significant disturbance to foraging or commuting bats.

5.6 Further Surveys

5.6.1 Currently, the following appraisals and surveys may be required in relation to bats.

Cable Corridor Sites

5.6.2 Where avoidance of potential roost features and foraging/commuting habitat is not possible a preliminary roost appraisal and more detailed roost presence/absence survey will be undertaken prior to development within these previously inaccessible sites (*i.e*. Grid Connection Routes A and B). This includes part of Havacre Meadows and Deal Nook CWS and Halfmoon Plantation Pit CWS, both of which have features with bat roosting/foraging potential.

Other Habitats

5.6.3 Prior to construction, if any tree, woodlands, or buildings with bat roost suitability identified are impacted as a result of the Scheme, then these should be surveyed to determine roost presence/absence and where required to characterise the roost/s. Based on the Scheme layout it is anticipated that impacts to potential roosts are likely to be avoided and that any further survey work where required is likely to be minor (i.e. possibly a few individual trees) and on a precautionary basis.

6. References

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Sub-Appendix A Figures

Figure 8G- 1 Scheme boundary and location

560000 565000 570000

275000

270000

265000

Sunnica East Site A

Sunnica East Site B

Sunnica West Site B

Sunnica West Site A

0 1,000 2,000 3,000 4,000 5,000m

N

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LEGEND

- Scheme Boundary
- Not Included in the DCO Site
- Public Highway within Scheme

NOTE:
Public highways run through the Sunnica East Site, which are not part of the site boundary. These have been digitised based on the 1:1250 scale OS Mastermap.

Purpose of Issue
PEIR

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Project Title
sunnica energy farm

Drawing Title
FIGURE 2-1
SCHEME BOUNDARY

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60589004_PEIR_SDS_001	0

File Name:C:\Users\Anna.Diliello\AECOM Directory\Sunnica Energy Farm - GIS - General\Layout\PEIR\Chapter_2_Site_Description_Surrounds\200902_SunnicaEnergyFarm_Figure2-1_SchemeBoundary.mxd

Figure 8G-2 Preliminary Bat Roost Appraisal

565000 566000 567000 568000

275000 274000 273000

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal Structure
- High
- Low
- Negligible

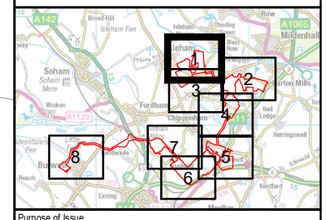
Tree
- Moderate
- Low
- Negligible

Tree line / Hedge
- High
- Moderate
- Low
- Negligible

Woodland
- High

Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible



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PRELIMINARY BAT ROOST APPRAISAL PAGE 1 OF 8

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FIGURE 1.1

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0 100 200 300m

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569000 570000 571000

274000 273000 272000

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal

Structure
- Moderate

Tree
- High
- Moderate
- Low
- Negligible to Low
- Negligible

Tree line / Hedge
- High
- Moderate
- Low

Woodland
- High
- Moderate
- Low
- Negligible

Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible

Purpose of Issue
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PRELIMINARY BAT ROOST APPRAISAL PAGE 2 OF 8

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FIGURE 1.2

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0 100 200 300m

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565000 566000 567000 568000

273000 272000 271000

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal Structure
- High
- Low

Tree
- Moderate
- Low

Tree line / Hedge
- Moderate
- Low
- Negligible

Woodland
- Confirmed roost
- High
- Low

- Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible

Purpose of Issue
FOR INFORMATION

Client
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Drawing Title
PRELIMINARY BAT ROOST APPRAISAL PAGE 3 OF 8

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FIGURE 1.3

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0 100 200 300m

N

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567000 568000 569000 570000

272000 271000 270000

611 573 575 587 2923 572 2921 2939 2922 570 571 1371 1370 1372 571 1373 589 2941 2942 590 2944 2943 592 591

0 100 200 300m

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal

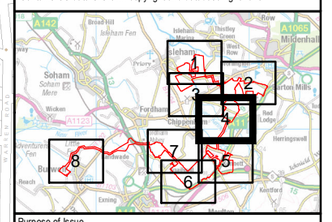
Tree
- Negligible to Low

Tree line / Hedge
- High
- Moderate
- Low

Woodland
- High
- Low

- Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible



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PRELIMINARY BAT ROOST APPRAISAL PAGE 4 OF 8

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FIGURE 1.4

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal

Structure
- High
- Moderate

Tree
- High
- Moderate
- Low

Tree line / Hedge
- High
- Low

Woodland
- High
- Negligible

- Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible

Purpose of Issue
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Drawing Title
PRELIMINARY BAT ROOST APPRAISAL PAGE 5 OF 8

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FIGURE 1.5

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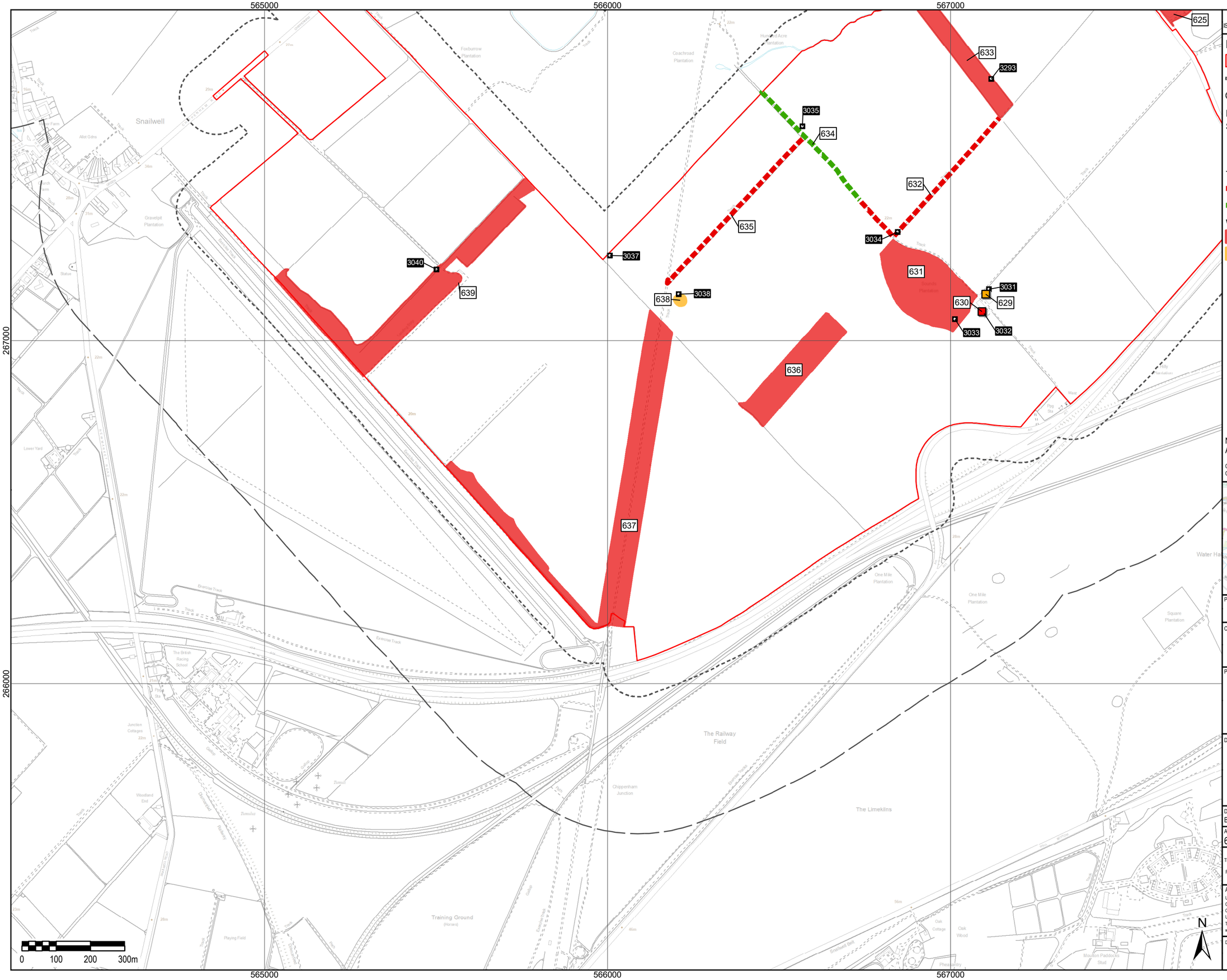
0 100 200 300m

N

565000
566000
567000
267000
266000



File Name:W:\Active Projects\Solar Associates\GIS\02_Maps\SEF_Bats - PRA.mxd

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

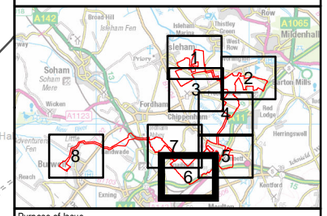
Preliminary Roost Appraisal Structure
- High
- Moderate

Tree line / Hedge
- High
- Low

Woodland
- High
- Moderate

- Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible



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PRELIMINARY BAT ROOST APPRAISAL PAGE 6 OF 8

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564000 565000 566000

269000

268000

621 620 3021 622 3022 623 3023 624 3025 3024 618 3020 639 3040 639 3037 3035 634 635 632 3034 631

0 100 200 300m

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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal

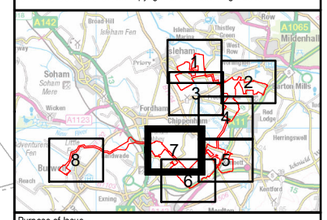
Tree
- High
- Moderate

Tree line / Hedge
- High
- Low
- Negligible

Woodland
- High
- Negligible

- Photo point (with reference identifier)

Note:
All other habitat features not mapped are negligible



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LEGEND

- DCO Boundary
- 100m scheme buffer
- 500m scheme buffer

Preliminary Roost Appraisal Structure
- Negligible

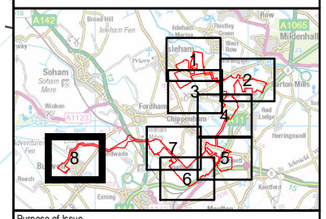
Tree
- High
- Moderate

Tree line / Hedge
- High
- Moderate
- Low
- Negligible

Woodland
- High
- Moderate

- Photo point (with reference identifier)
- No access

Note:
All other habitat features not mapped are negligible



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PRELIMINARY BAT ROOST APPRAISAL PAGE 8 OF 8

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FIGURE 1.8

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0 100 200 300m

N

Figure 8G-3 Spring Bat Activity Survey Results

566000 567000 568000 569000

274000

273000

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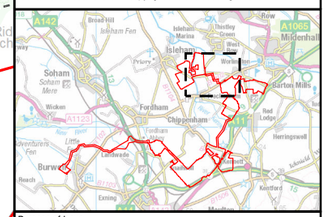
LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle sp.



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Drawing Title
BAT SURVEY
TRANSECT EAST 1
SPRING 15/05/2019

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FIGURE 2.1

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0 200 400 600m

N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Barbastelle
- Brown long-eared bat
- Common pipistrelle
- Noctule
- Soprano pipistrelle
- Myotis sp.

Purpose of Issue
FOR INFORMATION

Client
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Project Title
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Drawing Title
BAT SURVEY
TRANSECT EAST 2
SPRING 22/05/2019

Drawn	Checked	Approved	Date
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FIGURE 2.2

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568000 569000 570000 571000

273000 272000 271000

0 200 400 600m

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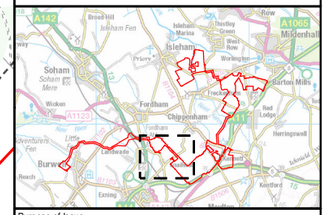
LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Brown long-eared bat
- Common pipistrelle
- Noctule
- Soprano pipistrelle



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Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT WEST 1
SPRING 23/05/2019

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FIGURE 2.3

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563000 564000 565000 566000

269000 268000 267000

0 200 400 600m

566000 567000 568000 569000

269000 268000 267000

Static 3

Static 4

0 200 400 600m

N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle sp.

Purpose of Issue
FOR INFORMATION

Client
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Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT WEST 2
SPRING 28/05/2019

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Figure 8G-4 Summer Bat Activity Survey Results (including bat trapping locations)

565000 566000 567000 568000 569000 570000

275000 274000 273000 272000 271000

Static 1

Static 2

0 200 400 600m

N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Brown long-eared bat
- Common pipistrelle
- Daubenton's bat
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

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Drawing Title
BAT SURVEY
TRANSECT EAST 1
SUMMER 24/07/2019

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT EAST 2
SUMMER 25/07/2019

Drawn	Checked	Approved	Date
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Rev: 0

File Name:W:\Active Projects\Solar Associates\GIS\02_Maps\SEF_Bats - Transects.mxd

568000 569000 570000 571000
273000 272000
0 200 400 600m
N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT WEST 1
SUMMER 30/07/2019

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FIGURE 2.7	0

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566000 567000 568000 569000

269000 268000 267000

Static 4

Static 3

0 200 400 600m

N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Noctule
- Serotine
- Soprano pipistrelle
- Pipistrelle sp.

Purpose of Issue
FOR INFORMATION

Client
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Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT WEST 2
SUMMER 31/07/2019

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FIGURE 2.8

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Figure 8G-5 Autumn Bat Activity Survey Results (including bat trapping locations)

565000 566000 567000 568000 569000 570000

275000 274000 273000 272000 271000

Static 1

Static 2

Freckenham

Badlingham

Worlington

Islehan Field

East Fen

River Lark

River Kennett

Dismtd Rly

Lee Brook

Beck Bridge

Hall Farm

Lee Farm

Rectory Farm

Red Lodge Warren

Red Lodge Landfill Site

Reservoir

Light Land Plantation

Home Plantation

Isleham Plantation

Fordham Moor

Brookside Farm

Bay Farm

Swale's Plantation

Black Belt

Motte and Bailey

Tumulus

0 200 400 600m

N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Daubenton's bat
- Leisler's bat
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

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Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT EAST 1
AUTUMN 25/09/2019

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Barbastelle
- Brown long-eared bat
- Common pipistrelle
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT EAST 2
AUTUMN 04/10/2019

Drawn	Checked	Approved	Date
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60589004	1:10,000

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Telephone (01223) 488000
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Drawing Number
FIGURE 2.10

Rev
0

File Name:W:\Active Projects\Solar Associates\GIS\02_Maps\SEF_Bats - Transects.mxd

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Common pipistrelle
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT WEST 1
AUTUMN 08/10/2019

Drawn	Checked	Approved	Date
BF	MP	NG	07/09/2020

AECOM Internal Project No.	Scale @ A3
60589004	1:10,000

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Drawing Number	Rev
FIGURE 2.11	0

File Name:W:\Active Projects\Solar Associates\GIS\02_Maps\SEF_Bats - Transects.mxd

566000 567000 568000 569000

269000 268000 267000

Static 4

Static 3

0 200 400 600m

N

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LEGEND

- DCO Boundary
- 100m DCO buffer
- Bat survey transect route
- Transect start/end point
- Way point
- Static detector

Bat species

- Barbastelle
- Brown long-eared bat
- Common pipistrelle
- Noctule
- Soprano pipistrelle

Purpose of Issue
FOR INFORMATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
BAT SURVEY
TRANSECT WEST 2
AUTUMN 15/10/2019

Drawn	Checked	Approved	Date
BF	MP	NG	07/09/2020

AECOM Internal Project No.	Scale @ A3
60589004	1:10,000

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FIGURE 2.12

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Sub-Appendix B Preliminary Bat Roost Appraisal Method

Table 8G-A1 Survey Methodology for Assessing the Potential Roost Features (PRFs) of Trees

Trees

Surveys can be undertaken at any time of year but should preferably be carried out when the trees are not in full leaf, to aid the viewing of PRFs. Any constraints to surveys should always be noted.

The scoping survey to identify the existence of PRFs should include checks for the presence of the following features that bats might be able to use to determine features with the potential to support bats in accordance with criteria in Table A2:

a. natural holes (e.g. knot holes) arising from naturally shed branches, or branches previously pruned back to the branch collar;
b. man-made holes (e.g. cavities that have developed from flush cuts) or cavities created by branches tearing out from parent stems;
c. woodpecker holes;
d. cracks/splits in stems or branches (both vertical and horizontal);
e. partially detached or loose, platy bark;
f. cankers (caused by localized bark death) in which cavities have developed;
g. other hollows or cavities, including butt rots;
h. compression forks with included bark, forming potential cavities;
i. crossing stems or branches with suitable space between for roosting;
j. ivy stems with diameters in excess of 50 mm with suitable roosting space behind (or where a roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk);
k. bird and bat boxes on trees; or
l. other features that offer a place of shelter.

NOTE Roosts of some species can occur very low on trees so PRFs can be found at all heights.

Buildings

Bats utilise many different features in buildings for places of shelter and roosting. Features that should be observed, noted and graded (in accordance with criteria in Table A2) during the external and internal survey of buildings includes:

External

- external features associated with each building are visually inspected for their suitability for use by roosting bats. Equipment includes close focusing binoculars and powerful spot-lamps are used to study the walls, eaves and roofs of the buildings. Inspection mirrors and endoscopes are used as required.
- bats are able to enter a roosting cavity through a small gaps at least 20mm wide. However, bats usually also require an area to land that is adjacent to the entrance hole and has a rough surface. Such features are looked for during the inspection.
- features include; gaps in ridge tiles (where mortar is missing) gaps under roof tiles or slates, lead flashing around chimney stacks and around dormer windows, gaps under the fascia's and soffits, weatherboarding, missing mortar from joints in stone/ brickwork, roof valleys and hips.
- special attention should be paid to the areas directly below any potential access/ egress point in an attempt to identify any accumulation of bat droppings.
- no work involving multi-sectional ladders over 5 m in height should be undertaken as part of the external survey.
- Internal (Not part of this survey)
- the most effective method of determining the presence of bat activity within a building is by the presence of their droppings. Bats deposit droppings in both roost and social areas, but the use of such sites by bats can change due to prevailing weather conditions or the time of year.

Table 8G-A2 Criteria used to describe the level of suitability of a Potential Roost Feature (PRF) to support roosting bats.

Suitability / Risk	*Description of Roosting Habitats*
NEGLIGIBLE	Structure or tree with no or very limited roosting opportunities for bats. Feature may be isolated from foraging habitat.
LOW	Structure or tree one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRF(s) but with none seen from the ground or features seen with only very limited roosting potential with a limited number of roosting opportunities. Low proximity and connectivity to low or moderate quality foraging habitat.
MODERATE	Structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed). Often will have some connectivity and proximity to moderate or high quality foraging habitat.
HIGH	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially longer periods of time due to their size, shelter one or more species of bat. With good connectivity to high quality foraging habitat.
CONFIRMED ROOST	**Presence of bats or evidence of bats. Confirmation of roost status may require further Roost Classification Survey.**

Notes:

- Collins, 2016 uses the terms negligible, low, moderate, etc. to assess habitat suitability for bats as per the levels of shown in the table above. The BS 8596:2015 Surveying for bats in trees and woodland uses the term 'Risk' when assigning these categories to PRFs. In the absence of an industry standard this table can be used to help the ecologist determine the level of Habitat Suitability/Level of Risk of a PRF to provide suitable roosting opportunities for bats.
- The **NEGLIGIBLE** category is used where a feature has been inspected and found not to contain any features of use to bats, and hence provides confirmation that a feature has been inspected or considered.
- For building/structures PRFs assessed at **LOW to HIGH** Risk further surveys are likely to be required (in accordance with standard survey guidance to attempt to determine roost presence/absence). For tree PRFs assessed at **MODERATE to HIGH** Risk further surveys are likely to be required (in accordance with standard survey guidance to attempt to determine roost presence/absence (see Ref 8G-6).
- **CONFIRMED ROOSTS** likely to require Roost Characterisation Surveys to inform planning/mitigation requirements.

Sub-Appendix C Valuing Bat Roosts Foraging and Commuting Habitats in Ecological Impact Assessment

Table 8G-A3 Categorising bats by distribution and rarity

Rarity within range	*England*
Rarest (popn. under 10,000)	Greater horseshoe (*Rhinolophus ferrumequinum*) Bechstein's (*Myotis bechsteinii*) Alcathoe (*Myotis alcathoe*) Greater mouse-eared (*Myotis myotis*) Barbastelle (*Barbastella barbastellus*) Grey long-eared (*Plecotus austriacus*)
Rarer (popn. 10,000 – 100,000)	Lesser horseshoe (*Rhinolophus hipposideros*) Whiskered (*Myotis mystacinus*) Brandt's (*Myotis brandtii*) Daubenton's (*Myotis daubentonii*) Natterer's (*Myotis nattereri*) Leisler's (*Nyctalus leisleri*) Noctule (*Nyctalus noctula*) Nathusius' pipistrelle (*Pipistrellus nathusii*) Serotine (*Eptesicus serotinus*)
Common (popn. Over 100,000)	Common pipistrelle (*Pipistrellus pipistrellus*) Soprano pipistrelle (*Pipistrellus pygmaeus*) Brown long-eared (*Plecotus auritus*)

Table A 4 Valuing Bat Roosts

Geographic frame of reference	*Roost Types*
District, Local or Parish	Feeding perches (common species) Individual bats (common species) Small numbers of non-breeding bats (common species) Mating sites (common species)
County	Maternity sites (common species) Small numbers of hibernating bats (common and rarer species) Feeding perches (rarer/rarest species) Individual bats (rarer/rarest species) Small numbers of non-breeding bats (rarer/rarest species)
Regional	Mating sites (rarer/rarest species) including well used swarming sites Maternity sites (rarer species) Hibernation sites (rarest species) Significant hibernation sites for rarer/rarest species or all species assemblages
National/UK	Maternity sites (rarest species) Sites meeting Site of Special Scientific Interest guidelines

Geographic frame of reference	*Roost Types*
International	Special Area of Conservation sites

Table 8G-A5 Valuing Commuting Routes

Species	*Number of bats #*	*Roosts/potential roosts nearby*	*Type and complexity of linear features*
Common (2)	Individual bats (5)	None (1)	Absence of (other) linear features (1)
		Small number (3)	Unvegetated fences/walls and large field sizes (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)
		Large number of roosts, or close to a nationally important/protected site for the species (5)	Well-grown and well-connected hedgerows/tree lines, small field sizes (4)
Rarest (20)	Large number of bats (20)	Close to or within an internationally important/ protected site for the species (20)	Complex network of mature well-established hedgerows, tree line, small fields and rivers/streams (5)

Individual bats 1 or 2, Small numbers 3 to 10, Large numbers>10 bats

Table 8G-A6 Valuing Foraging Areas

Species	*Number of bats #*	*Roosts/potential roosts nearby*	*Type and complexity of linear features*
Common (2)	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
		Small number (3)	Suburban areas or intensive arable land (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Isolated woodland patches, less intensive arable and/or small towns and villages (3)
		Large number of roosts, or close to a nationally important site for the species (5)	Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands and wetland areas (5)

Individual bats 1 or 2, Small numbers 3 to 10, Large numbers>10 bats

6.1.1 Scores in the four columns of each table above A5 and A6 are added up to provide an overall score to determine the value or importance of commuting routes and foraging areas as per Table A7.

Table 8G-A7 Scoring System for Valuing Commuting and Foraging Bats

Geographic frame of reference	*Score*
International	>50
National	41 – 50
Regional	31 – 40
County/District*	21 – 30
Local	11 – 20
Not important (Site Level only)	1 - 10

* Note that County and District has been combined to correspond to CIEEM 2018 based on guidance table below.

Importance of ecological features	*Typical descriptors and examples of criteria*
International or European	An internationally designated site or candidate site including Special Protection Area (SPA), potential SPAs (pSPAs); Special Area of Conservation (SAC), candidate or possible SACs (cSACs or pSACs[1]) and Ramsar sites (wetlands of international importance). Biogenetic Reserves, World Heritage Sites and Biosphere Reserves. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Resident or regularly occurring populations of species which may be considered at an international or European level[2] where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; • the population forms a critical part[3] of a wider population at this scale; or • the species is at a critical phase[4] of its life cycle at this scale.
UK or National	Sites designated at UK or national level e.g. Site of Special Scientific Interest (SSSI), Marine Protection Area (MPA) including Marine Conservation Zones (MCZ) and National Nature Reserve (NNR). Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key or priority habitats identified in the UK Post-2010 Biodiversity Framework i.e. UK Biodiversity Action Plan (BAP),

Importance of ecological features	*Typical descriptors and examples of criteria*
	including those published in accordance with Section 41 of the Natural Environment and Rural Communities Act (2006) and those considered to be of principal importance for the conservation of biodiversity. Areas of ancient woodland Resident or regularly occurring populations of species which may be considered at a UK or a national level[5] where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; • the population forms a critical part of a wider population at this scale; or • the species is at a critical phase of its life cycle at this scale.
Regional	Habitats or populations of species of value at a regional level (i.e. East Anglia). Areas of key or priority habitat identified as being of Regional value in the appropriate National Character Area (NCA). Key or priority habitat or species listed within the Highways England (HE) / Highways Agency (HA) BAP. Resident or regularly occurring populations of species which may be considered at a regional level[6] where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; • the population forms a critical part of a wider population at this scale; or • the species is at a critical phase of its life cycle at this scale.
County or Unitary Authority or District	Habitats or populations of species of value at a County (i.e. Cambridgeshire and Suffolk) level or District (e.g. Breckland). Designated sites, such as County Wildlife Site (CWS), Local Wildlife Site (LWS) or Sites of Importance for Nature Conservation (SINC) and Local Nature Reserve (LNR) designated in the county or unitary authority area i.e. District context. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key or priority habitats identified in the Local Biodiversity Action Plan (LBAP). Resident or regularly occurring populations of species which may be considered at a County (or District) level[7] where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; • the population forms a critical part of a wider population at this scale; or, • the species is at a critical phase of its life cycle at this scale.
Local	Habitats or species populations of value in a local (i.e. within ~ 5km of the site) context. Designated sites include LNRs designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat or populations and, or communities of species considered to appreciably enrich the habitat resource within the

Importance of ecological features	*Typical descriptors and examples of criteria*
	local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.
Site	Habitat that is of value in the context of the site only. Populations of common and widespread species. A degraded/ impoverished example of a common or widespread habitat in the local area.

1. pSACs are sites which have been formally advised by to UK Government but have not yet been submitted to the European Commission. These sites should be valued at an international (European) level on the basis that they meet the relevant selection criteria for a SAC but are not yet designated as such.
2. Such species include those listed within the Directive 2009/147/EC on the Conservation of wild birds (i.e. EC Birds Directive) (codified version of Council Directive 79/409/EEC as amended) or animal/ plant species listed within Council Directive 92/43/EEC on the Conservation of natural habitats and of wild flora and fauna (i.e. Habitats Directive).
3. Such populations include sub-populations that are essential to maintenance of metapopulation dynamics e.g. critical emigration/ immigration links between otherwise discrete populations.
4. Seasonal activity or behaviour upon which survival or reproduction depends.
5. Species which may be considered at the UK or national level means; birds, other animals and plants which receive legal protection in the basis of their conservation interest (those listed within the Wildlife and Countryside Act 1981 (as amended) Schedule 1, 5 and 8); species listed for their principal importance for biodiversity (in accordance with the Natural Environment and Communities Act 2006 Section 41 England); priority species listed within the UK Post 2010 Biodiversity Framework (i.e. UKBAP); or species listed within the Red Data Book.
6. Such species include those listed in the appropriate Natural Character Area and key/ priority species listed on the 2002 HABAP
7. Such species include those at county level (i.e. Cambridgeshire) including unitary authority area i.e. District level (i.e. South Cambridgeshire); as listed on the LBAPs; and listed as a county designated site.

*As well as assigning importance there is also a need to identify all legally protected species that could be affected by the Scheme in order that measures can be taken to ensure that adherence to the relevant legislation is observed. This may include the adoption of mitigation and appropriate licensing which is acceptable to Natural England.

Sub-Appendix D Survey Results

Table 8G-A8 Preliminary Roost Appraisal (see Figure 8G-2)

Name	*Feature/Species*	*Height m*	*DBH cm*	*Description*	*PRF Description*	*Bat signs*	*Roost Suitability*	*Photo ref:*	*Date / Time*
553	Elm	25	60	Thick ivy causing crevices.	Ivy cover. No visible features		Mod	2903	2019-05-15T10:29:00Z
554	Elm	25	60	Thick ivy causing crevices.	Ivy cover. No visible features		Mod	2904	2019-05-15T10:33:14Z
555	Sycamore	20	30	Thick ivy causing crevices.	Ivy cover. No visible features		Low	2905	2019-05-15T10:34:32Z
556	Sycamore and Beech	-	-	Woodland	-		Moderate	2906	2019-05-15T10:43:28Z
557	Building	-	-	Dilapidated timber and corrugated metal roof barn	Small crevice areas		Mod	2907, 2908	2019-05-15T10:46:59Z
558	Elm	20	40	Elm on east hedge	Ivy cover obscuring potential roost features.		Mod	2909	2019-05-15T10:54:57Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
559	Elm	12	40	Elm on west hedge	Ivy cover obscuring potential roost features.		Mod	2910	2019-05-15T10:58:08Z
560	Elm	12	30	Elm on east hedge	Ivy cover obscuring potential roost features.		Mod	2911	2019-05-15T11:02:47Z
561	Sycamore	15	30	sycamore on eastern hedge	Ivy cover obscuring potential roost features.		Low	2912	2019-05-15T11:05:53Z
562	Sycamore	20	30	Multi stemmed on west hedge	Ivy cover obscuring potential roost features.		Low	2913	2019-05-15T11:07:17Z
563	Beech		50	Beech on East hedge	Ivy cover obscuring potential roost features.		Mod	2914	2019-05-15T11:08:55Z
564	Woodland			Lime, Norway maple, and beech			High	2915	2019-05-15T11:12:33Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
565	Woodland/ hedge			Beech and maple			Mod	2916	2019-05-15T11:28:12Z
566	Building			Substation building			Mod	2917	2019-05-15T11:35:05Z
567	Conifer plantation			Corsican pine, scots pine			Low	2918	2019-05-15T11:39:09Z
568	Woodland			Bird cherry and sycamore plantation + hedge			Mod	2919	2019-05-15T12:02:40Z
569	Broad leaved woodland + hedge			Elm, ash, beech, and sycamore			High	2920	2019-05-15T12:06:40Z
570	Scots pine						Neg - Low	2921	2019-05-15T13:25:39Z
571	Hedge + mature grey poplar (20+ trees)						Low - Mod	2922	2019-05-15T13:28:35Z
572	Scots Pine 50+ trees						Low	2923	2019-05-15T13:34:36Z
574	Black poplar	30	90	Hybrid black poplar in hedge			High	2924	2019-05-15T13:46:25Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
575	Tree line			Hybrid black poplar in hedge			up to high	2925	2019-05-15T13:49:14Z
576	Woodland with path			Oak, elder, scots pine			Low	2926	2019-05-15T13:54:26Z
577	Scots pine tree line with oak			20 trees			up to high	2927	2019-05-15T14:09:07Z
578	Scots pine tree line			20 trees			up to high	2928	2019-05-15T14:12:30Z
579	Oak	15-20	100	Sessile oak on south of the track	Ivy cover		Mod	2929	2019-05-15T14:16:29Z
580	Oak	12	40				Neg	2930	2019-05-15T14:20:49Z
581	Hybrid black poplar	20	100	Multi stemmed black poplar			Neg	2931	2019-05-15T14:23:45Z
582	Mature poplar						up to high	2932	2019-05-15T14:28:04Z
583	Broad leaved woodland			Oak, elder, buckthorn			up to high	2933	2019-05-15T14:38:44Z
584	Broad leaved woodland	20-25		Dead elm, Beech			up to high	2934	2019-05-15T14:47:47Z
585	Line of hybrid poplar	30					up to mod	2935	2019-05-15T14:59:19Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
586	Scots pine	5 to 10					Neg	2936	2019-05-15T14:59:54Z
587	Scots pine	20 to 30		Scots pine plantation			Low	2937, 2939	2019-05-15T15:02:39Z
589	Blackthorn and scots pine						High	2940, 2941	2019-05-15T16:28:55Z
590	Poplar, scots pine						High	2942	2019-05-15T16:33:28Z
591	Poplar, scots pine						Mod	2943	2019-05-15T16:38:04Z
592	Scattered scots pine						Low	2944	2019-05-15T16:38:47Z
593	Hybrid black poplar, alder, oak, salix sp, elder			Reed and nettle understory			up to high	2949	2019-05-16T10:10:57Z
594	Building			Old pump station 5x3. brick with tin, and concrete building	No access and outside site		Low	2950	2019-05-16T10:28:29Z
595	Pill box				No features for bats		Neg	2951	2019-05-16T10:42:11Z
596	Oak	10	30	single oak	n/a		Neg	2952	2019-05-16T10:50:35Z
597	line of Beech and Oak trees			30 trees			up to high	2953	2019-05-16T10:54:05Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
598	Bridge			road bridge 10m long.	2 smaller holes, 1 deeper hole		Low	2954	2019-05-16T11:03:17Z
599	Pine plantation			scots pine , elder, Corsican pine, privet			up to high	-	2019-05-16T11:17:18Z
600	Shelter belt woodland			Oak, 50+ mature trees.			up to high	2955	2019-05-16T11:22:54Z
601	Lines of trees			oak, scots pine			Moderate	2956	2019-05-16T11:45:40Z
602	Line of semi mature oak						Neg	-	2019-05-16T11:50:39Z
603	Line of Beech trees by road						Moderate	2957	2019-05-16T11:54:10Z
604	Beech	25	80	beech next to the road	ivy cover. 2 feats N facing 10m up		Moderate	2958	2019-05-16T11:55:49Z
605	Dead Beech	12		dead beech, multi-stemmed	limb holes		Mod	2959	2019-05-16T11:57:49Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
606	Tree line			beech, scots pine			Moderate	2960	2019-05-16T12:00:35Z
607	Oak, sweet-chestnut			line of mature trees			High	2961	2019-05-16T12:38:07Z
608	Oak, scots pine, sycamore			mixed plantation			High	2962	2019-05-16T12:38:47Z
609	Scots pine						Moderate	-	2019-05-16T12:42:23Z
610	Sycamore, ash, field maple, Norway spruce			Small copse			Low	2963	2019-05-16T12:50:13Z
611	Scots pine, oak			mixed plantation			High	-	2019-05-16T12:52:27Z
612	Scots pine, birch, sycamore, hawthorn. Confirmed roost.			mixed woodland			Confirmed	2964, 2965	2019-05-16T12:58:29Z
613	Multi-stemmed sycamore, scots pine, birch			mixed woodland next to road			Moderate		2019-05-16T13:03:17Z
614	Scots pine			scots pine line			Moderate	2973	2019-05-16T13:06:10Z
615	Beech, crack willow, grey poplar			corps			High	2974	2019-05-16T13:15:46Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
616	Hawthorn, scots pine, sycamore, larch			mixed plantation			up to high	2975	2019-05-16T13:22:26Z
617	Sycamore, oak, beech			Broad leaved woodland			High	2976	2019-05-16T13:28:24Z
618	Ash	25	120	5 mature ash trees			High	3020	2019-05-23T09:56:06Z
620	Hedge			Hedge			Neg to Low		2019-05-23T10:00:14Z
621	Hedge			Hedge			Neg	3021	2019-05-23T10:11:39Z
622	Ash	25	50	Ash line along trainline			up to mod	3022	2019-05-23T10:44:17Z
623	Ash	20	70	hollow ash	hollow trunk and several knot holes.		High	3023	2019-05-23T10:47:01Z
624	Crack willow	25	150	willow in centre of the field.			High	3024, 3025	2019-05-23T10:53:31Z
625	Several buildings						High	3027	2019-05-23T11:46:57Z
626	Oak	15	120		thick ivy		High	3028	2019-05-23T12:00:57Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
627	Pine plantation						Low	3029	2019-05-23T12:07:36Z
628	Broadleaved woodland			oak and beech			up to high	3030	2019-05-23T12:12:47Z
629	Barn			gaps in timber beams.			Moderate	3031	2019-05-23T12:42:15Z
630	Enclosed barn						High	3032	2019-05-23T12:43:55Z
631	Broad leaved woodland.			oak, sycamore, beech , and elm			up to high	3033	2019-05-23T12:45:08Z
632	Woodland strip			sycamore, elm, hawthorn, beech,			High	3034	2019-05-23T12:49:51Z
633	Mixed plantation			scots pine, sycamore, elm			up to high	3293	2019-05-23T12:51:56Z
634	Mixed plantation			treeline and hedge. Elm, Black poplar			Neg to low	3035	2019-05-23T12:56:49Z
635	Hedge and trees			elm, field maple, sycamore, oak, and			up to high	3036	2019-05-23T12:59:58Z

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
				beech. 20 trees.					
636	Woodland			Birch, beech, scots pine			up to high	3037	2019-05-23T13:07:22Z
637	Woodland			Birch, beech, scots pine			up to high		2019-05-23T13:07:54Z
638	Willow copse			Salix sp			up to mod	3038	2019-05-23T13:13:50Z
639	Woodland			ash, sycamore, elm, scots pine, hawthorn			up to high	3040	2019-05-23T13:33:27Z
641	Barn			10 x 30m brick barn, concrete asbestos roof (broken)	Gaps under wood on top of wall, crack on north side in brickwork		Low	4232 to 4235	25-09-19
642	Barn			Timber and corrugated iron barn, unsafe structure imminent	Gaps between metal and wood on south side		Low	4243	25-09-19

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
				collapse likely					
643	Bridge			Disused railway bridge, 3 x 5m opening 6m span	one obvious crack on south side		Low	4244, 4245,	25-09-19
644	Bridge			Disused railway bridge, spanning stream	Nothing visible some ivy obscuring brickwork		Low	4247	25-09-19
645	Woodland			Woodland on disused railway embankment . c.50 to 60 trees. Species include ash, sycamore, hawthorn	Minor features such as dead wood high in canopy, no obvious features		Low	4248, 4249	25-09-19
646	Road bridge			Outside site not inspected			Low		25-09-19
647	Tree line			Outside site not inspected			Low		25-09-19

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
648	Farm building/house			Various buildings not surveyed	Numerous features and bat activity during transect survey		High		25-09-19
656	Grey poplar	20	30		No features visible		Neg	3285	19-06-20
657	Oaks	22	60	6 trees	dead wood, bark split, ivy obscuring		High		19-06-20
658	Oak	25	70	within small copse in field	lifted bark, cracks dead wood, ivy		High	3287	19-06-20
659	Oaks	25	50 to 80	multiple trees in woodland	lifted bark, cracks dead wood, ivy		High	3288	19-06-20
660	Grey poplar	25	30 to 50	c. 12 trees	a few minor holes on decaying limbs		Neg to Low	3289	19-06-20
661	Ash	15	30	Dying ash tree	knothole on north side, woodpecker hole to S,		High	3290	19-06-20

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
					compressio n fork				
662	Aspen and ash	30	30 to 80	woodland mainly ivy covered but potential roost features			High	3290	19-06-20
663	White willow	28	120		large cavity 12m high on west side, minor dead wood and ivy cover		High	3291	19-06-20
664	Grey poplar				pruning cut hole 10m high on south side	Med	3292	19-06-20	
665	2 x native black poplar	30	150	veteran trees	many features holes, bark fissures, decay, minor butt rot, trunk cavities		High	3293, 3295, 3296	19-06-20
666	Broadleaved plantation			multiple trees and potential			High	3297	19-06-20

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
				roosting features					
Burwell National Grid Substation Extension									
1	field maple	15	20 to 30	6 young trees	No features visible, but some ivy cover potentially obscuring roosting features	none	Low	2221	24-08-20
2	ash	20	70	single standard tree	Hazard beams, a few crevices under the ivy	none	Moderate	2222	24-08-20
3	white willow	30	110	single standard tree	Split trunk 10m high with potential feature, a few bark crevices	none	Moderate	2223	24-08-20
4	crack willow	30	100	single standard tree	A few minor crevices possible hidden under ivy.	none	Moderate	2224	24-08-20

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
5	ash	25	90	single standard tree	Crevices possible hidden under dense ivy, some dead wood high up on boughs.	none	High	2225 & 2226	24-08-20
6	ash	25	90	single twin stemmed tree	Crevices possible hidden under dense ivy, some pruning cut decay low down (c.3m) with suitability.	none	High	2227 & 2228	24-08-20
7	ash	20-25	20 to 40	3 x semi-mature ash trees	A few minor crevices possible hidden under ivy.	none	Low	2229	24-08-20
8	Elm (Ulmus minor agg.)	22	70	single standard tree	Crevices possible hidden under dense ivy, some dead wood high	none	High	2230	24-08-20

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
					up in canopy.				
9	line of various trees	n/a	n/a	14 mature trees with white willow, field maple, sycamore	Many ivy covered and dead wood on willows. Low to High suitability	none	High	2231 & 2232	24-08-20
10	line of field maple	15	30 to 40	6 x semi-mature field maple	negligible to low no obvious features	none	Low	2233	24-08-20
11	sycamore woodland	15 to 20	5 to 30	approx. 25 to 30 young to semi-mature trees	No obvious features, minor dead wood and some ivy cover	none	Low	2234	24-08-20
12	line of sycamore and weeping willow (Salix x sepulcralis)	15 to 20	20 to 60	16 tree mainly comprising semi-mature/matu re sycamore	A few potential decay features particularly on the willow.	none	Moderate	2235	24-08-20
13	line of sycamore	15	30 to 40	11 semi-mature sycamore	No obvious features negligible to low	none	Low	2236	24-08-20

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
14	line of willow and poplars	15-20	5 to 30	>30 trees/scrub with hybrid black poplar and crack willow	No obvious features negligible to low	none	Low	2237	24-08-20
15	woodland	15 to 25	30 to 60	Mature and semi-mature white willow/crack willow, sycamore and field maple	Willow with high suitability based on vertical split, dead wood and hole 2m. Other trees negligible suitability	none	High	2238	24-08-20
16	white willow	25	100	single standard tree	dead wood high up with a minor crevice	none	Moderate	2239	24-08-20
17	woodland	20	30 to 50	10 sycamore, alder and willow trees	Minor crevice features, nothing obvious but dense ivy cover in places.Negligible to Moderate suitability	none	Moderate	2249	24-08-20

Name	*Feature/Species*	*Height m*	*DBH cm*	*Description*	*PRF Description*	*Bat signs*	*Roost Suitability*	*Photo ref:*	*Date / Time*
18	line of ash trees	15 to 20	30 to 50	15 ash trees	Dead and live ivy, one tree with callus hole in young bough (see photo 2251). Negligible to Moderate suitability	none	Moderate	2250 & 2251	24-08-20
19	building	n/a	n/a	Livestock shelter, breeze block, metal roof.	No signs or features for roosting bats	none	Negligible	2252	24-08-20
20	hedgerow	n/a	n/a	mature hedges with some standard trees including field maple and ash	No obvious features negligible to low	none	Low	2255	24-08-20
21	line of mature ash	20	30 to 50	4 ash trees	Some dead wood on boughs on south side, lots of ivy cover obscuring potential	none	High	2256	24-08-20

Name	Feature/Species	Height m	DBH cm	Description	PRF Description	Bat signs	Roost Suitability	Photo ref:	Date / Time
					features, moderate to high suitability				
22	hedgerow	n/a	n/a	Managed hedge dominated by hawthorn	no suitable roosting features	none	Negligible	2253	24-08-20

Photographs

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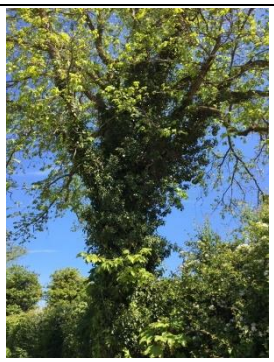

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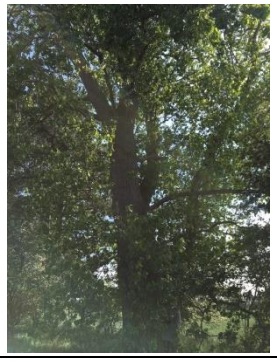
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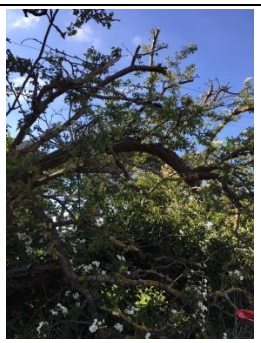
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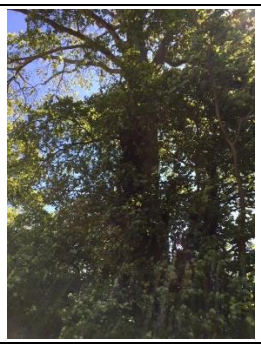
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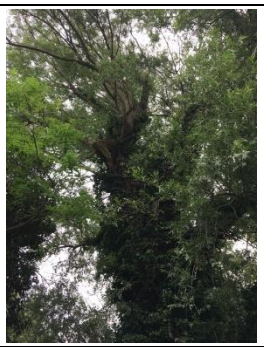

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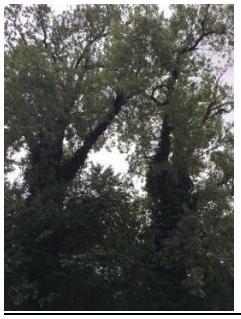

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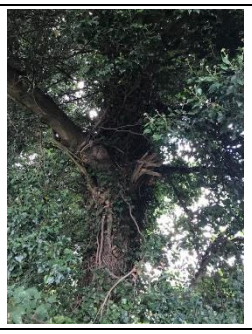

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Bat Activity Survey

Transect results

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
East 1	MP/SS	15-05-19	20:47	20:47	22:58	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry/cool	0	2	12.5	9	2	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:22	PIPY	1	y	n	pass HNS
2	21:25	PIPY	2	y	n	foraging and social calls
3	21:29	PIPI, PIPY	2	y	n	passing
4	21:40	PIPI	1	y	n	pass HNS
5	21:42	PIPI	1	y	n	foraging
6	22:04	PIPI	1	y	n	foraging
7	22:24	PIPI	1	y	n	pass HNS
8	22:27	PIPI	1	y	n	pass HNS

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
East 2	MP/SS	22-05-19	20:57	20:45	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry/warm	0	1	16	14	4	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:30	PIPI	1	y	n	passing
2	21:35	PIPI	1	y	n	foraging north to south
3	21:41	PIPI, NYNO	2	y	n	passing
4	21:42	PIPY	1	y	n	passing
5	21:55	PIPY	1	y	n	foraging along hedge
6	21:57	PIPY	1	y	n	foraging along hedge
7	22:01	PIPI	1	y	n	social calls
8	22:02	PLAU, PIPY	2	y	n	foraging
9	22:23	PIPI	1	y	n	passing HNS
10	22:25	PIPI	1	y	n	passing HNS
11	22:27	PIPI	1	y	n	passing HNS
12	22:31	BABA	1	y	n	passing HNS
13	22:53	MYSP, PLAU	2	y	n	passing MYSP max 80kHz
14	22:58	PIPI	1	y	n	passing HNS

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
West 1	MP/SS	23-05-19	20:59	20:50	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry/mild	0	0 to 1	18	17	2	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:37	NYNO	1	y	n	passing HNS
2	21:43	NYNO	1	y	n	faint pass HNS
3	21:46	PIPI	1	y	n	passing HNS
4	21:48	PIPY	1	y	n	foraging
5	21:59	NYNO	2	y	n	passing HNS
6	22:06	NYNO	1	y	n	passing HNS
7	22:06	NYNO	1	y	n	foraging HNS
8	22:08	PLAU	2	y	n	foraging
9	22:10	PIPI	2	y	n	passing HNS
10	22:16	PIPY	1	y	n	passing HNS
11	22:40	PIPI	1	y	n	passing HNS
11	22:50	PIPI	1	y	n	passing HNS

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
West 2	MP/SS	28-05-19	21:05	20:58	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
overcast, mild	0	2	14	12	4	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:50	PIPY	1	y	n	foraging
2	21:51	PIPI & PIPY	15	y	n	foraging, c.4 bats
3	21:57	PIPI & PIPY	12	y	n	foraging, c.4 bats
4	22:01	PIPI	2	y	n	foraging
5	22:14	PIPI	2	y	n	passing
6	22:28	PIPY	1	y	n	foraging
7	22:45	MYSP	1	y	n	HNS poss.MYDA
8	22:46	PIPY	2	y	n	passing HNS
9	22:50	PIPY	2	y	n	foraging & social calls
10	23:00	PIPY	1	y	n	passing HNS

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
West 1	MP/SS	23-05-19	20:59	20:50	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry/mild	0	0 to 1	18	17	2	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:37	NYNO	1	y	n	passing HNS
2	21:43	NYNO	1	y	n	faint pass HNS
3	21:46	PIPI	1	y	n	passing HNS
4	21:48	PIPY	1	y	n	foraging
5	21:59	NYNO	2	y	n	passing HNS
6	22:06	NYNO	1	y	n	passing HNS
7	22:08	MYSP	2	y	n	foraging HNS
8	22:10	PIPI	2	y	n	foraging
9	22:16	PIPY	2	y	n	passing HNS
10	22:18	PIPI	1	y	n	passing HNS

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
West 2	MP/SS	28-05-19	21:05	20:58	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
overcast, mild	0	2	14	12	4	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:50	PIPY	1	y	n	foraging
2	21:51	PIPI & PIPY	15	y	n	foraging, c.4 bats
3	21:57	PIPI & PIPY	12	y	n	foraging, c.4 bats
4	22:01	PIPI	2	y	n	foraging
5	22:14	PIPI	2	y	n	passing
6	22:28	PIPY	1	y	n	foraging
7	22:45	MYSP	1	y	n	HNS poss.MYDA
8	22:46	PIPY	2	y	n	passing HNS
9	22:50	PIPY	2	y	n	foraging & social calls

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
East 1	MP/SS	24-07-19	21:04	21:00	23:06	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry, hot,still	0	1 to 0	22	21	3	MP

Ref	Time	Species	No. of passes	Recording	Emerged ?	Description
1	21:27	NYNO	1	y	n	S to N over field
2	21:55	PIPI	1	y	n	pass near ditch
3	21:56	NYNO	1	y	n	distant pass high HNS
4	22:00	PIPI	5	y	n	foraging
5	22:05	PIPY	2	y	n	passing
6	22:10	PIPI, PIPY	5	y	n	foraging
7	22:18	PIPY	2	y	n	foraging
8	22:20	PIPI, PIPY	3	y	n	foraging
9	22:24	PIPI	6	y	n	>3 bats foraging near building
10	22:26	PIPI	6	y	n	>3 bats foraging near building
11	22:32	PIPI	1	y	n	passing
12	22:40	PIPI, PIPY	2	y	n	foraging
13	22:42	PIPI	1	y	n	foraging up and down hedge
14	22:52	MYDA, PIPY	2	y	n	foraging
15	22:58	PIPI, PLAU	2	y	n	passing
16	23:01	PIPI, PIPY	2	y	n	foraging along hedge

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
East 2	MP/SS	25-07-19	21:00	21:00	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry, hot	0	2 to 4	30	29	7	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged ?**	**Description**
1	21:38	NYNO	2	y	n	foraging nr woods/road
2	21:51	PIPI, PIPY	2	y	n	foraging
3	21:54	NYNO	1	y	n	passing in field
4	21:59	PIPI	1	y	n	passing in field
5	22:00	PIPY	1	y	n	passing in field
6	22:03	PIPY	1	y	n	passing in field
7	22:05	PIPI	1	y	n	passing in field
8	22:07	PIPI	1	y	n	passing
9	22:16	PIPI, PIPY	5	y	n	2 bats foraging along track
10	22:19	NYSP	2	y	n	pass NYNO or NYLE
11	22:22	PIPI	2	y	n	pass along track
12	22:23	PIPI	4	y	n	2 bats foraging
13	22:31	PIPI	2	y	n	passing

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
West 1	MP/SS	30-07-19	20:52	20:50	22:55	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
Dry, mild	0	4	18	17	8	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:17	PIPY	4	y	n	foraging along stream
2	21:32	PIPI, PIPY	5	y	n	foraging along hedge
3	21:35	NYNO	2	y	n	pass S to N
4	21:38	PIPI, PIPY, NYNO	3	y	n	foraging along hedge
5	21:47	NYNO	2	y	n	pass S to N over field
6	21:58	PIPI	2	y	n	foraging W of plantation
7	22:06	PIPI	10	y	n	2 to 3 bats foraging
8	22:18	PIPI	3	y	n	foraging near woods in field
9	22:44	PIPI	5	y	n	2 bats foraging

Transect	Surveyor	Date	Sunset/rise	Start	Finish	Equipment
West 2	MP/SS	31-07-19	20:52	20:50	23:00	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry, mild	0	2	19	17	5	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	21:28	PIPY	1	y	?	possible emergence from woods
2	21:30	PIPY	2	y	n	foraging
3	21:40	EPSE, PIPI, PIPY	3	y	n	foraging
4	21:47	PIPI	3	y	n	foraging
5	21:48	PIPI	1	y	n	foraging
6	21:49	PIPI	1	y	n	foraging
7	21:52	PIPI	1	y	n	foraging
8	21:54	PIPI	1	y	n	foraging
9	21:57	PIPI	3	y	n	foraging
10	21:58	NYSP	1	y	n	foraging
11	22:02	PIPY	1	y	n	foraging
12	22:07	PIPY	1	y	n	foraging
13	22:09	NYNO	2	y	n	passing HNS
14	22:10	PIPI, NYNO	2	y	n	foraging
15	22:11	PIPI	2	y	n	foraging
16	22:14	PIPI	2	y	n	foraging
17	22:18	NYSP	2	y	n	foraging

18	22:20	PIPI, PIPY	2	y	n	foraging
19	22:22	NYSP	2	y	n	possible NYLE
20	22:25	PIPI	2	y	n	passing along ditch
21	22:32	PIPI	1	y	n	passing
22	22:35	PIPI	2	y	n	passing
23	22:37	PIPI, NYNO	2	y	n	foraging near poplars
24	22:50	NYNO	2	y	n	passing by road

Transect	**Surveyor**	**Date**	**Sunset/rise**	**Start**	**Finish**	**Equipment**
East 1	MP/SS	25-09-19	18:51	18:50	20:50	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry, warm	0	1	18	17	1	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	19:18	NYNO	1	y	n	high pass near hedge
2	19:20	PIPI	1	y	Y	emerged and foraging
3	19:21	PIPI, NYNO	2	y	n	passing near hedge/track
4	19:27	PIPI, PIPY, NYNO	3	y	n	bats along road
5	19:28	PIPI, PIPY, NYNO	3	y	n	bats along road
6	19:29	PIPI, PIPY, NYNO	3	y	n	bats along road
7	19:30	NYLE, PIPI, PIPY	3	y	n	1 x NYLE
8	19:31	PIPI, PIPY, NYNO	3	y	n	bats along road
9	19:33	PIPI	1	y	n	passing
10	19:39	PIPI	1	y	n	passing
11	19:40	NYNO	1	y	n	passing
12	19:50	PIPY	1	y	n	2 bats foraging
13	19:51	PIPI, PIPY	2	y	n	passing
14	19:58	PIPI, PIPY	2	y	n	passing
15	20:03	unknown	1	n	n	HNS over field
16	20:07	PIPI	1	y	n	HNS over field
17	20:10	PIPI, PIPY, MYSP	3	y	n	Probably MYDA
18	20:21	PIPI	2	y	n	passing by cars
19	20:30	PIPI	2	y	n	bats along road
20	20:38	PIPI, PIPY, NYNO	3	y	n	bats along road
21	20:50	PIPI, PIPY, NYNO	3	y	n	bats along road

Transect	**Surveyor**	**Date**	**Sunset/rise**	**Start**	**Finish**	**Equipment**
East 2	MP/SS	04-10-19	18:30	18:25	20:30	Batlogger M/Anabat Scout

Weather	Rain	Wind	Temp start	Temp end	Cloud	Verified
dry, mild	0	1	13	13	5	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	18:35	NYNO	5	y	n	flew in from southwest, foraging over reservoir
2	18:52	NYNO	1	y	n	passing high overhead HNS
3	18:56	PIPI	1	y	n	passing along hedge
4	18:58	PIPY	1	y	n	passing along track/hedge
5	18:37	NYNO	1	y	n	passing along track/hedge
6	18:39	NYNO	1	y	n	passing along track/hedge
7	18:45	NYNO	1	y	n	passing along track/hedge
8	18:51	NYNO	1	y	n	passing along track/hedge
9	18:53	NYNO	1	y	n	passing along track/hedge
10	18:55	PIPI	1	y	n	passing along track/hedge
11	18:57	PIPY	1	y	n	passing along track/hedge
12	19:04	PIPY	1	y	n	passing along track/hedge
13	19:04	PIPY	1	y	n	passing along track/hedge
14	19:04	PIPY	1	y	n	passing along track/hedge
15	19:15	PIPY	1	y	n	passing along track/hedge
16	19:16	PIPY	1	y	n	passing along track/hedge
17	19:16	PIPY	1	y	n	passing along track/hedge
18	19:17	PIPY	1	y	n	passing along track/hedge
19	19:17	PLAU	2	y	n	passing along track/hedge
20	19:18	PIPI	1	y	n	passing along track/hedge
21	19:19	BABA	1	y	n	passing along track/hedge
22	19:34	PIPI	1	y	n	passing along track/hedge
23	19:35	PIPI	1	y	n	passing along track/hedge
24	19:37	PIPI, PIPY, MYSP	3	y	n	foraging along track/hedge
25	19:39	PIPI	1	y	n	passing along track/hedge
26	19:39	PIPI	1	y	n	passing along track/hedge

27	19:48	PIPI	1	y	n	passing along track/hedge

Transect	**Surveyor**	**Date**	**Sunset/rise**	**Start**	**Finish**	**Equipment**
West 1	MP/SS	08-10-19	18:20	18:20	20:20	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry, mild	0	3	14	12	3 to 0	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	18:49	PIPY	1	y	n	pass along track
2	18:54	PIPI, NYSP	2	y	n	foraging/pass
3	18:54	PIPI, NYSP	2	y	n	foraging/pass
4	18:55	PIPI, PIPY, NYSP	3	y	n	foraging/pass
5	18:55	PIPI	1	y	n	foraging/pass
6	18:55	PIPI	1	y	n	foraging/pass
7	18:55	PIPI	1	y	n	foraging/pass
8	18:56	PIPY	1	y	n	foraging/pass
9	18:56	PIPY	1	y	n	foraging/pass
10	18:56	PIPY	1	y	n	foraging/pass
11	18:57	PIPI	1	y	n	foraging/pass
12	18:57	PIPY	1	y	n	foraging/pass
13	18:57	PIPY	1	y	n	foraging/pass
14	18:58	PIPI	1	y	n	foraging/pass
15	18:58	PIPI	1	y	n	foraging/pass
16	18:59	PIPY	1	y	n	foraging/pass
17	18:59	PIPY	1	y	n	foraging/pass
18	18:59	PIPY	1	y	n	foraging/pass
19	18:59	PIPY	1	y	n	foraging/pass
20	19:00	PIPI	1	y	n	foraging/pass
21	19:00	NYNO	1	y	n	foraging/pass
22	19:00	NYNO	1	y	n	foraging/pass
23	19:01	NYNO	1	y	n	foraging/pass
24	19:01	NYNO	1	y	n	foraging/pass
25	19:01	NYNO	1	y	n	foraging/pass
26	19:02	PIPY	1	y	n	foraging/pass
27	19:02	NYNO	1	y	n	foraging/pass
28	19:03	PIPI, PIPY, NYNO	3	y	n	foraging/pass
29	19:04	PIPI	1	y	n	foraging/pass
30	19:05	PIPI	1	y	n	foraging/pass

31	19:05	PIPI	1	y	n	foraging/pass
32	19:29	PIPY	1	y	n	foraging/pass
33	19:30	PIPI	1	y	n	foraging/pass
34	19:30	PIPI	1	y	n	foraging/pass
35	19:30	PIPI	1	y	n	foraging/pass
36	19:33	PIPI	1	y	n	foraging/pass
37	19:33	PIPI	1	y	n	foraging/pass
38	19:33	PIPI	1	y	n	foraging/pass
39	19:34	PIPI, PIPY	2	y	n	foraging/pass
40	19:34	PIPI, PIPY	2	y	n	foraging/pass
41	19:34	PIPY	1	y	n	foraging/pass
42	19:34	PIPY	1	y	n	foraging/pass
43	19:35	PIPY	1	y	n	foraging/pass
44	19:36	PIPI	1	y	n	foraging/pass
45	19:42	PIPY	1	y	n	pass entrance to cow field

Transect	**Surveyor**	**Date**	**Sunset/rise**	**Start**	**Finish**	**Equipment**
West 2	MP/SS	15-10-19	18:06	18:00	20:08	Batlogger M/Anabat Scout
Weather	**Rain**	**Wind**	**Temp start**	**Temp end**	**Cloud**	**Verified**
dry/mild	0	1	14	10	3	MP
Ref	**Time**	**Species**	**No. of passes**	**Recording**	**Emerged?**	**Description**
1	18:07	NYNO	2	y	n	foraging/pass
2	18:08	NYNO	2	y	n	foraging/pass
3	18:09	NYNO	1	y	n	foraging/pass
4	18:10	NYNO	2	y	n	foraging/pass
5	18:13	NYNO	1	y	n	foraging/pass
6	18:17	NYNO	1	y	n	foraging/pass
7	18:19	NYNO	1	y	n	foraging/pass
8	18:43	PIPI	1	y	n	foraging/pass
9	18:45	PIPI	1	y	n	foraging/pass
10	18:49	PIPI	1	y	n	foraging/pass
11	18:51	PIPI	2	y	n	foraging/pass
12	18:52	PIPI	1	y	n	foraging/pass
13	18:53	PIPY	3	y	n	foraging/pass
14	18:53	PLAU, PIPI	2	y	n	foraging/pass
15	18:54	PIPI	3	y	n	foraging/pass
16	18:55	PIPY	2	y	n	foraging/pass
17	18:55	PIPI	1	y	n	foraging/pass

18	18:56	PIPY	1	y	n	foraging/pass
19	18:56	BABA	1	y	n	foraging/pass
20	18:56	PIPY	4	y	n	foraging/pass
21	18:57	PIPI	1	y	n	foraging/pass
22	18:57	PIPY	2	y	n	foraging/pass
23	18:58	BABA	1	y	n	foraging/pass
24	18:59	PIPI	1	y	n	foraging/pass
25	19:00	BABA	1	y	n	foraging/pass
26	19:04	PIPY	1	y	n	foraging/pass
27	19:06	PIPY	1	y	n	foraging/pass
28	19:11	PIPI	6	y	n	foraging/pass
29	19:12	PIPI	2	y	n	foraging/pass
30	19:13	PIPI	6	y	n	foraging/pass
31	19:14	PIPI	2	y	n	foraging/pass
32	19:15	PIPI	3	y	n	foraging/pass
33	19:16	PIPI	6	y	n	foraging/pass
34	19:17	PIPI	8	y	n	foraging/pass
35	19:18	PIPI	1	y	n	foraging/pass
36	19:58	PIPI	1	y	n	foraging/pass

Key

Beaufort wind force scale: 0 = No wind, 1 = Light air *smoke drifts*, 2 = Light Breeze *leaves rustle*, 3 = Gentle Breeze *small twigs move*, 4 = Mod Breeze *small branches move,* 5 = Fresh Breeze *small trees sway*, 6 = Strong Breeze *large branches move*, 7 = Mod Gale *whole trees in motion*
Rain Scale: 0-none, 1-drizzle 2-shower 3-rain 4-downpour 5-flood.
Oktas cloud scale: 0 = complete absence of cloud (fine), 1 = cloud amount of 1 eighth or less, but not zero (fine), 2 = 2/8 of sky covered (fine), 3 = 3/8 of sky covered (partly cloudy), 4 = 4/8 of sky covered (partly cloudy), 5 = 5/8 of sky covered (partly cloudy), 6 = 6/8 of sky covered (cloudy), 7 = 7/8 of sky covered (cloudy), 8 = sky completely covered (overcast**).**
Species abbreviations: PIPI - common pipistrelle, PIPY - soprano pipistrelle, PISP – common or soprano pipistrelle, NYNO - noctule, NYLE – Leisler's, NYSP – noctule or Leisler's bat, PLAU - brown long eared bat, BABA – barbastelle, MYSP - Myotis species, MYDA - Daubenton's bat, NoID – unidentified bat.

Bat Trapping Results

Project name	Sunnica Solar Farm	**Weather Description**	Warm, dry, heavy showers in day, slight breeze, 17°C at start, 90% humidity
Surveyor Name	SCG, MP, EW, SS		
Date	01/08/2019	**Trap 1**	Harp – TL 66963 67213
Start	20:51	**Trap 2**	Harp – TL 66833 67261
Sunset	20:51	**Trap 3**	Net – TL 66825 67274
Finish	01:00	**Trap 4**	Harp – TL 66841 67287

Time	Trap	Species*	Sex (M/F)*	Age (A/J)*	Forearm (mm)	Weight (g)	Testes	Epi*	Reproductive Status (F)*	Comments
21:58	3	BLE	M	A	37.5	7.52	0	0	N/A	Black tipped Epi
22:33	2	S Pip	F	A	31.6	4.65	N/A	N/A	NB	Hairy Nipples
23:02	1	C Pip	F	A	34.0	6.00	N/A	N/A	BTS	Bare patch around nipples
23:09	1	C Pip	F	A	32.2	5.37	N/A	N/A	BTS	Bare patch around nipple
22:49	3	BLE	F	A	39.0	8.08	N/A	N/A	BTS	Para but not lactating
00:05	2	C Pip	Released without measurements as found when traps were being taken down							

*Table Key: Species: BLE (Brown-Long eared), S Pip (Soprano pipistrelle), C Pip (Common Pipistrelle), M nat (Natterer's bat); Sex: M (male), F (female); Age: A (Adult), SA (Sub-Adult), J (Juvenile); Epi (Epididymis); Reproductive Status: NB (Not bred), BTS (Bred this year)

Project name	Sunnica Solar Farm	**Weather Description**	Warm, dry, light wisps of cloud, light breeze, 21°C - 16°C, 71% humidity
Surveyor Name	MP, CV, EW		
Date	07/08/2019	**Trap 1**	Net – TL 70000 72780
Start	20:39	**Trap 2**	Harp – Tl 69997 72800
Sunset	20:39	**Trap 3**	Harp – TL 70002 72941
Finish	23:30		

Time	Trap	Species*	Sex (M/F)*	Age (A/J)*	Forearm (mm)	Weight (g)	Testes	Epi*	Reproductive Status (F)*	Comments
21:11	1	S Pip	F	SA	30.07	4.45	N/A	N/A	NB	Hair nipples
21:20	3	S Pip	F	A	30..02	4.31	N/A	N/A	BTS	Hairless nipples

Project name			Sunnica Solar Farm			**Weather Description**		Warm, dry, light wisps of cloud, light breeze, 21°C - 16°C, 71% humidity		
Surveyor Name			MP, CV, EW							
21:20	3	S Pip	M	SA	33.3	4.62	1	0	N/A	Epi pale
21:20	3	C Pip	M	A	31.1	4.20	1	0	N/A	Epi pale
21:54	1	BLE	M	A	36.5	7.19	1	0	N/A	Epi pale
22:11	1	S Pip	F	A	33.2	4.91	N/A	N/A	NB	Hairy nipples
22:21	1	C Pip	M	A	32.5	5.3	1	0	N/A	Epi pale

*Table Key: Species: BLE (Brown-Long eared), S Pip (Soprano pipistrelle), C Pip (Common Pipistrelle), M nat (Natterer's bat); Sex: M (male), F (female); Age: A (Adult), SA (Sub-Adult), J (Juvenile); Epi (Epididymis); Reproductive Status: NB (Not bred), BTS (Bred this year)

Project name			Sunnica Solar Farm			**Weather Description**		Mild, strong breeze, overcast, 22°C		
Surveyor Name			MP, CV, EW, TC							
Date			12/09/2019			**Trap 1**		Harp – TL 66817 67232		
Start			19:22			**Trap 2**		Harp – TL 66836 67257		
Sunset			19:22			**Trap 3**		Net - TL 66903 67235		
Finish			23:00			**Trap 4**				
Time	**Trap**	**Species***	**Sex (M/F)***	**Age (A/J)***	**Forearm (mm)**	**Weight (g)**	**Testes**	**Epi***	**Reproductive Status (F)***	**Comments**
20:18	3	S Pip	F	A	32.0	4.88	N/A	N/A	NB	Hairy Nipples
20:27	3	S Pip	F	A	32.6	6.0	N/A	N/A	BTS	Hairless Nipples
20:59	3	S pip	F	A	33.6	5.4	N/A	N/A	BTS	Hairless Nipples
22:24	2	M nat	F	A	41.1	8.3	N/A	N/A	BTS	Hairless Nipples

*Table Key: Species: BLE (Brown-Long eared), S Pip (Soprano pipistrelle), C Pip (Common Pipistrelle), M nat (Natterer's bat); Sex: M (male), F (female); Age: A (Adult), SA (Sub-Adult), J (Juvenile); Epi (Epididymis); Reproductive Status: NB (Not bred), BTS (Bred this year)

Static Detector Survey Results

Night temp. range	Date 2019 /Location	PIPI	PIPY	PISP	NYNO	NYLE	NYSP	NYSP/ EPSE	MYSP	PLAU	BABA	EPSE	Species no.	Total	Nights	hrs/nt	BAI per hr	Activity Level
10.0 - 19.5°C	Spring West 1	738	484	105	11	12	17	0	6	0	1	0	8	1374	5	15.50	**17.73**	High
10.0 - 19.5°C	Spring West 2	27	26	0	8	1	0	0	3	0	1	3	7	69	5	15.50	**0.89**	Very Low
10.0 - 19.5°C	Spring West 3	720	141	3	7	0	5	2	0	0	0	0	6	878	5	15.50	**11.33**	Moderate
10.0 - 19.5°C	Spring West 4	84	3	3	11	2	0	0	2	1	0	2	8	108	5	15.50	**1.39**	Very Low
4.5 - 19.75°C	Spring East 1	254	78	9	8	6	18	0	13	6	97	0	9	489	7	15.50	**4.51**	Low
4.5 - 17.0°C	Spring East 2	4	6	0	7	10	6	0	0	2	2	0	7	37	3	15.50	**0.80**	Very Low
4.5 - 19.75°C	Spring East 3	159	11	4	9	5	4	0	6	0	0	0	7	198	7	15.50	**1.82**	Low
4.5 - 19.75°C	Spring East 4	29	9	5	13	13	2	2	2	0	3	0	9	78	9	15.50	**0.56**	Very Low
12.4 - 22.1°C	Summer West 1	2045	2453	2	5	31	6	8	10	16	13	9	11	4598	8	8.50	**67.62**	High
12.4 - 22.1°C	Summer West 2	541	83	3	5	41	6	45	9	53	11	38	11	835	8	8.50	**12.28**	High
12.4 - 22.1°C	Summer West 3	926	497	17	10	47	11	3	4	1	0	0	9	1516	8	8.50	**22.29**	High

Night temp. range	Date 2019 /Location	PIPI	PIPY	PISP	NYNO	NYLE	NYSP	NYSP/ EPSE	MYSP	PLAU	BABA	EPSE	Species no.	Total	Nights	hrs/nt	BAI per hr	Activity Level
12.4 - 22.1°C	Summer West 4	456	46	4	6	8	4	6	0	7	0	6	9	543	8	8.50	**7.99**	Moderate
13.5 - 31.3°C	Summer East 1	2877	199	26	11	27	14	16	21	24	3	3	11	3221	6	8.50	**63.16**	High
13.5 - 31.3°C	Summer East 2	148	62	155	12	6	4	0	2	3	0	0	8	392	6	8.50	**7.69**	Moderate
13.5 - 31.3°C	Summer East 3	183	35	12	11	9	4	2	3	1	1	4	11	265	6	8.50	**5.20**	Low
13.5 - 31.3°C	Summer East 4	167	54	15	10	3	1	0	0	0	0	0	6	250	6	8.50	**4.90**	Low
5.8 - 17.6°C	Autumn West 1	285	309	1	42	1	1	0	0	0	0	0	6	639	5	13.00	**9.83**	Moderate
5.8 - 17.6°C	Autumn West 2	1130	88	0	33	14	11	0	1	6	2	0	8	1285	5	13.00	**19.77**	High
5.8 - 17.6°C	Autumn West 3	488	410	3	9	1	0	1	3	5	16	0	9	936	7	13.00	**10.29**	Moderate
5.8 - 17.6°C	Autumn West 4	99	6	1	3	0	0	1	2	3	3	0	8	118	7	13.00	**1.30**	Very Low
4.0 - 23.4°C	Autumn East 1	425	449	0	4	1	0	0	9	1	20	0	7	909	9	13.00	**7.77**	Moderate
4.0 - 23.4°C	Autumn East 2	6	25	1	6	0	1	0	2	6	1	0	8	48	9	13.00	**0.41**	Very Low
4.0 - 23.4°C	Autumn East 3	116	77	1	4	3	1	2	9	5	59	0	10	277	9	13.00	**2.37**	Low

Night temp. range	Date 2019 /Location	PIPI	PIPY	PISP	NYNO	NYLE	NYSP	NYSP/ EPSE	MYSP	PLAU	BABA	EPSE	Species no.	Total	Nights	hrs/nt	BAI per hr	Activity Level
4.0 - 23.4°C	Autumn East 4	185	111	2	22	3	1	0	3	1	7	0	9	335	9	13.00	**2.86**	Low

Key to species: PIPI - common pipistrelle, PIPY - soprano pipistrelle, PISP – common or soprano pipistrelle, NYNO - noctule, NYLE – Leisler's, NYSP – noctule or Leisler's bat, PLAU - brown long eared bat, BABA – barbastelle, MYSP - Myotis species.

Weather Conditions During Static Surveys

Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Minimum wind mph	Maximum wind mph	Rain
13-May	9.80	17.80	1	9	None
14-May	15.60	19.70	1	8	None
15-May	4.50	13.25	3	9	None
16-May	9.50	17.00	4	17	None
17-May	10.75	13.75	5	11	None
18-May	8.75	15.25	1	3	None
19-May	11.25	17.00	1	4	Light Rain
20-May	7.25	18.50	2	9	None
21-May	6.25	19.75	2	9	None
22-May	16.80	24.50	4	9	None
23-May	11.00	19.25	2	9	None
24-May	12.75	18.25	4	12	None
25-May	16.75	18.75	2	8	None
26-May	11.75	19.50	5	16	None
27-May	10.00	15.25	6	14	None
28-May	12.00	12.50	6	9	Light Rain
24-Jul	19.00	30.40	5	11	None
25-Jul	21.70	31.30	4	12	None
26-Jul	18.70	23.40	5	12	None
27-Jul	15.60	16.60	6	14	Heavy Rain
28-Jul	13.50	15.80	11	13	None
29-Jul	17.90	23.80	7	9	None
30-Jul	20.20	22.10	12	19	Light Rain
31-Jul	16.60	19.10	14	22	None
01-Aug	14.80	19.50	6	10	None
02-Aug	12.40	19.90	6	10	None
03-Aug	15.30	20.20	1	7	None
04-Aug	17.00	21.30	5	12	None
05-Aug	16.40	21.40	7	14	None
06-Aug	15.80	20.10	8	14	Light Rain
25-Sep	15.10	23.40	9	12	Light Rain
26-Sep	13.80	19.50	9	19	None
27-Sep	11.90	16.50	12	18	None
28-Sep	13.60	17.10	12	21	Light Rain
29-Sep	9.60	15.90	16	18	None

Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Minimum wind mph	Maximum wind mph	Rain
30-Sep	13.90	15.80	7	10	Light Rain
01-Oct	6.10	13.00	9	12	Light Rain
02-Oct	4.00	20.00	3	13	None
03-Oct	10.30	13.80	1	12	Light Rain
04-Oct	10.30	17.60	5	14	None
05-Oct	11.00	15.40	3	9	Light Rain
06-Oct	5.80	12.60	6	13	None
07-Oct	12.80	14.00	1	11	None
08-Oct	10.50	14.50	10	19	None
09-Oct	8.50	13.75	12	17	None
10-Oct	14.5	16.25	12	18	None
11-Oct	11	17.25	12	24	Light Rain