Springwell Solar Farm

Environmental Statement Appendix 7.6: Bat Activity Survey Addendum

Volume 3

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

EN010149/APP/6.3
November 2024
Springwell Energyfarm Ltd

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1. Introduction

1.1. Purpose of this report

1.1.1. This report describes the results of static detector bat surveys undertaken to obtain baseline ecological information on bat activity at the location of the Proposed Development of Springwell solar farm. This information has been used to inform the Environmental Statement (ES) Biodiversity Chapter for the proposed Springwell Solar Farm.

1.1.2. Static bat detector surveys were previously carried out over most of the area within the Order Limits plus wider survey area by RSK Biocensus in August 2022, October 2022 and April 2023, detailed in **ES Volume 3, Appendix 7.5: Bat Activity Survey [EN010149/APP/6.3]**. In spring 2023, the survey area was updated to include two additional areas - two field parcels at the north-west edge of the survey area (field parcels known as Field Tb1 and Field Tb2, adjacent to Gorse Hill covert) and several field parcels near Brauncewell at the south-west edge of the survey area. The whole survey area is shown in **Figures 1** to **5**.

1.1.3. This report presents the methods and results of the static detector bat surveys of these two additional areas. Surveys were undertaken in April 2023; July 2023 and September 2023. This report should be read as an addendum to the previous bat activity report (**ES Volume 3, Appendix 7.5: Bat Activity Survey [EN010149/APP/6.3]**) which covers the rest of the survey area.

1.1.4. The purpose of the surveys was to obtain detailed information regarding bat activity of the additional areas which were added to the survey area.. The aims of the surveys were to:

- identify the bat species present;
- assess relative activity levels;
- assess relative abundance.

1.1.5. At the time of writing, detailed design information is not confirmed, so assessment of likely significant effects is therefore not included in this report.

1.2. Proposed Development

1.2.1. The Proposed Development comprises the construction, operation and maintenance of Solar Photovoltaic (PV) generating modules, energy storage facilities, and grid connection infrastructure, across a proposed site in North Kesteven, Lincolnshire.

1.2.2. The Proposed Development is located within the administrative of North Kesteven District Council and Lincolnshire County Council.

1.3. Ecological context

1.3.1. The survey area is located close to the villages of Blankney, Scopwick, and Ashby de la Launde in the district of North Kesteven, Lincolnshire. The central section of the survey area is centred on OS National Grid Reference TF 06151 56947.

1.3.2. The survey area is dominated by agricultural land, broadleaved woodland, and hedgerows, and includes a number of ponds, stream and ditches.

1.3.3. The surrounding landscape is largely arable with a mixture of villages, farm complexes, an RAF base, pockets of woodland and some scattered residential properties. Arable fields are bounded by a mixture of hedgerows, lines of trees, stone walls and fences.

1.3.4. A preliminary ecological appraisal (PEA), including a background data search (BDS), was completed by RSK in April and May 2022, with additional parcels surveyed in January 2023 (Details are shown in **ES Volume 3, Appendix 7.5: Bat Activity Survey [EN010149/APP/6.3].** Records for at least nine species of bat were received from the BDS.

1.3.5. Habitats within the survey area were identified as suitable for foraging, commuting and roosting bats during the PEA. However, the overall survey area was considered to have low suitability for bats.

2. Legislation

2.1. General

2.1.1. This section briefly describes the relevant legal protection afforded to bats. It is for information only and is not intended to be comprehensive or to replace specialised legal advice. It is not intended to replace the text of the legislation but summarises the salient points.

2.2. Bats

2.2.1. All species of bats are protected by The Wildlife and Countryside Act (WCA) 1981 (as amended) **[Ref-1]**, extended by the Countryside and Rights of Way Act 2000 **[Ref-2]**. Under Section 9 of the WCA, for 'European Protected Species' (EPS; see below) listed on Schedule 5, which includes bats, it is an offence to:

- intentionally or recklessly obstruct any place that a wild bat uses for shelter or protection;
- intentionally or recklessly disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection; or
- publish, or cause to be published, any advertisement likely to be understood as conveying that they buy or sell, or intend to buy or sell, any live or dead wild bat or any part of, or anything derived from a wild bat.

2.2.2. Bats are also EPS listed on The Conservation of Habitats and Species Regulations 2017 (as amended) **[Ref-3]**. This legislation makes it an offence to:

- deliberately capture, injure or kill such a bat;
- deliberately disturb bats, including in particular any disturbance which is likely (a) to impair their ability – (i) to survive, to breed or reproduce, or to rear or nurture their young; or (ii) hibernate or migrate, where relevant; or (b) to affect significantly the local distribution or abundance of the species to which they belong;
- damage or destroy a breeding site or resting place of a bat; or
- possess, control, transport, sell, exchange, or offer for sale or exchange any live or dead bat or part of a bat or anything derived from a bat or any part of a bat.

2.2.3. Additionally, certain species are afforded additional protection as an Annex II species (under the Habitats Directive) for which Special Areas of Conservation (SACs) may be designated. Of these, only barbastelle (*Barbastella barbastellus*) are present in Lincolnshire.

3. Methodology

3.1. General

3.1.1. The work described below was undertaken following current best practice guidance within Bat Conservation Trust: Good Practice Guidelines 3rd edition (Collins, 2016) **[Ref-4]**. Where methodologies deviate from guidelines then this has been detailed and fully justified below.

3.2. Background Data Search

3.2.1. To provide context for the results of the bat surveys, a background data search (BDS) was carried out for biological records from the Greater Lincolnshire Nature Partnership. The BDS was undertaken in 2022 and 2023 for the production of the PEA report found at **ES Volume 3, Appendix 7.1: Preliminary Ecological Appraisal [EN010149/APP/6.3]**. A search was made for information on statutory designated sites and non-statutory designated (local wildlife) sites within 2km of the survey area. The search was extended to 10km for internationally designated sites i.e., Ramsar sites, Special Areas of Conservation (SAC), Special Protection Areas (SPA). The search included a 2km radius for notable species such as bats.

3.3. Static Detector Surveys

3.3.1. The survey area was determined to have ‘low’ suitability to support foraging and commuting bats during the PEA and therefore surveys were timed to cover the three active seasons of spring (April – May), summer (June – August), and Autumn (September - October).

3.3.2. Due to the size of the survey area and project proposals, it was determined that the emphasis of the survey should be on collecting data across as much of the survey area as possible; therefore the detector locations changed during each deployment.

3.3.3. Full spectrum Wildlife Acoustics Song Meter 4 (SM4) detectors with omnidirectional microphones were deployed within the study area. Each microphone was mounted at a minimum height of 2 m to maximize the probability of recording bat calls and reduce the likelihood of noise interference from insects and moving vegetation.

3.3.4. Detectors were deployed across the study area to cover different habitats and topographical features including improved grassland, arable crop, hedgerows and woodland edges. Detectors were deployed in suitable weather conditions for bats where possible. Each detector recorded bats from sunset to sunrise with detectors starting 30 minutes before sunset and finishing 30 minutes after sunrise. **Table 1** provides dates of deployments, **Table 2** provides weather conditions during deployments and **Figure 1** shows the location of the monitoring points.

3.3.5. Detectors were deployed for a minimum of five complete nights of good weather, (in line with Collins, 2016 **[Ref-4]**). Survey dates were spaced out where possible between deployments at each monitoring point. In addition, detectors were deployed when the predicted weather forecast indicated suitable weather conditions for foraging and commuting bats (i.e. air temperature above 8°C, wind speed below 5m/s and light or no precipitation).

3.3.6. Collins (2016) **[Ref-4]** states the minimum level of pre-application survey required using static detectors is five nights in each of: spring (April-May), summer (June-mid-August) and autumn (mid-August-October). Dates and environmental conditions are set out in **Table 1** below.

Table 1 Survey dates for each static detector deployment

Month	Start date	End date	Notes
April	19/04/2023	24/04/2023	3 detectors deployed
July	07/07/2023	14/07/2023	3 detectors deployed
September	22/09/2023	29/09/2023	3 detectors deployed

Table 2: Weather conditions for each static detector deployment

Month of monitoring	Minimum temperature at sunset (C)	Maximum temperature at sunset (C)	General weather during monitoring period	Number of nights with rain
April 2023	7	9	Clear and dry at start of deployment, scattered light showers in last two nights	3
July 2023	12	17	Cloudy with warm spells	1
September 2023	9	14	Cloudy with warm spells	1

3.4. Data analysis and quality assurance

3.4.1. Due to the large volume of static data, the manual identification of recorded calls was not considered a practicable or efficient use of time. Consequently, the British Trust for Ornithology's Acoustic Pipeline (BTO AP) auto-identification software was used with additional manual auditing applied as necessary.

3.4.2. The BTO AP recommends that recordings with probabilities lower than 0.5, as discussed by Barré *et al.* (2019) **[Ref-5]**, are discarded (after checking as appropriate) and are therefore not included within this report.

3.4.3. Manual quality assurance was undertaken on all calls that were auto-identified as being from non-pipistrelle or *Myotis* species, with the exception of Nathusius' pipistrelle *Pipistrellus nathusii* calls, which were also manually checked.

3.4.4. The BTO pipeline software is highly efficient at identifying bat calls from the genus *Pipistrellus* due to the extensive library of bat calls stored within the software. It is also currently the only system that considers the sound identification of bat social calls, reducing the chance of social calls being mis-identified as the wrong bat species.

3.4.5. Echolocation calls were identified down to species wherever possible; however, depending on the type of bat encountered and call recorded, it is not always possible to reliably identify all bats beyond their genus. In particular, because of the similarities of their frequency-modulated calls, *Myotis* bat species cannot always be reliably separated.

3.4.6. For this reason, *Myotis* calls were not manually checked, as they are difficult to accurately differentiate.

3.4.7. All manual quality assurance (QA) of recorded calls was carried out by experienced bat ecologists using sound analysis software (R Shiny).

3.4.8. Note that it can also be difficult to separate some calls of *Plecotus* (long-eared) bats as well as separating some *Plecotus* calls from *Myotis* bats - although only one species of *Plecotus* (*P. auratus)*, the brown long-eared bat) is present in Lincolnshire. It can also be difficult to distinguish between the two bats in the *Nyctalus* genus (noctule *N. noctula* and Leisler's bat *N. leisleri*), with those of serotine (*Eptesicus serotinus*). Some calls of common pipistrelle (*Pipistrellus pipistrellus*) also overlap with either Nathusius' pipistrelle or soprano pipistrelle (*P. pygmaeus*). Analysis of cryptic calls can also be more difficult with faint or poor-quality recordings.

3.4.9. It should be noted that there are a number of variables that affect the 'detectability' of a bat call, ranging from their biology and ecology, to the environmental conditions and condition of the equipment, and so there are limitations in drawing certain conclusions about bat activity on a site from the use of bat detectors / sound analysis alone. Given the different detectability between different species of bats i.e. from a few meters (for the quietest species such as brown long-eared bats) up to 100m (for noctule), the percentage distributions of units of activity (recordings containing a particular species' calls) detected should not be extrapolated to estimate abundance or compare levels of relative activity between species groups.

3.4.10. Caution should be exercised when reviewing the results as the number of recordings does not equate to the number of individual bats, and therefore assumptions cannot be made about species populations.

3.5. Validity of Data

3.5.1. Data collected is usually valid for two years following the field survey, to provide evidence that is material to the planning determination. Should consent not be awarded within two years of the completed surveys, then it may be necessary to confirm that there have not been material changes before planning is determined.

3.6. Survey Constraints

3.6.1. It was not considered that walked transect surveys would provide data of value for this project given the low suitability of the habitat, scale of the survey area and lack of suitable roosting locations within majority of the survey area. This is a deviation from the current survey guidance **[Ref-4]**, but it is justified by significant levels of remote monitoring data, and the subsequent findings. This is discussed in **ES Volume 1, Chapter 7: Biodiversity [EN010149/APP/6.1]**.

3.6.2. As the detectors moved location each month, it was not possible to do a direct seasonal comparison of locations. However, moving the detectors allowed for a greater coverage of the survey area and the results collected are considered sufficient to inform a robust risk assessment when required.

3.6.3. While presence/ absence of different species in the genera *Myotis*, *Plecotus* and *Nyctalus* is now becoming easier to ascertain where high-quality calls have been collected, there are always calls where certainty is not possible and therefore levels of bat activity by species (rather than genus) must be interpreted with a degree of caution.

3.6.4. *Myotis* spp. and some large bat calls were only identified to genus level. It is possible that some of these recordings could represent species not identified in the analysis of the recorded data.

3.6.5. Due to passive (static) monitoring methodologies depending on sound reaching the microphone, the detection rate of bat calls varies with a bias towards loud bat calls; with quieter calls, namely brown long-eared bats potentially being under-recorded.

4. Results

4.1. Background Data Search

4.1.1. There were no internationally protected nature conservation sites within 10km of the Order Limits nor nationally protected statutory designated nature conservation sites within 2km.

4.1.2. The results of the 2km search for bat species are provided in **Table 3** below.

4.1.3. At least nine species of bats have been recorded within 2km of the survey area, with additional records also returned which were not identified to species level. All species have been recorded within the past 10 years, although number of records includes all records for the species / genus held by the records centre.

Table 3: BDS bat results

Scientific name	Common name	Number of records	Most recent record
Barbastella barbastellus	Western barbastelle	15	2016
Chiroptera	Unidentified bat	468	2020
Myotis daubentonii	Daubenton's	5	2015
Myotis mystacinus / brandtii	Whiskered / Brandt's	4	2019
Myotis nattereri	Natterer's	8	2016
Myotis species	Unidentified Myotis species	17	2017
Nyctalus noctula	Noctule	28	2019
Pipistrellus nathusii	Nathusius's pipistrelle	5	2017
Pipistrellus pipistrellus	Common pipistrelle	76	2019
Pipistrellus pygmaeus	Soprano pipistrelle	34	2020
Pipistrellus species	Unidentified pipistrelle species	108	2020

Scientific name	Common name	Number of records	Most recent record
Plecotus auritus	Brown long-eared bat	83	2019

4.2. Static detector results

4.2.1. **Tables 4** to **6** below show the combined static data recorded from each location. Locations for each deployment are show in **Figure 1**.

4.2.2. A total of 4,567 call registrations were recorded over the survey period, from at least nine species. These were common pipistrelle (80.4% of total call registrations), soprano pipistrelle (5.8%), species in the *Myotis* genus (6.5%), barbastelle (4.2%), noctule (1.2%), brown long-eared bat (1.4%), Leisler's (0.1%), Serotine large bat species (0.2%) and Nathusius' pipistrelle (0.04%).

4.2.3. Species within the *Myotis* genus were not counted separately during data analysis due to the similarity and overlapping parameters of their calls.

4.2.4. Common and soprano pipistrelle accounted for 86.3% of the total calls across the three months. Common pipistrelle was the species with the most call registrations in every month (April 44.9% of total calls, July 88.7% and September 58.4%).

4.2.5. *Myotis* species were second highest in April (43% of total) and third highest in September (14% of total).

4.2.6. Barbastelle was the only species recorded that is listed under Annexe II of the Habitats Directive, with 191 call registrations across the three survey months (4.2% of total call registrations). In September Barbastelle were the second highest (15%), in April (3.6%) and July (1.1%) of calls.

Table 4: April 2023 remote monitoring data

Static #	Bbar	Eser	Myotis sp.	Nlei	Nnoc	Ppip	Ppyg	Pnat	Paur	TOTAL
S1	-	-	52	-	2	16	8	-	-	**78**
S2	-	-	11	-	-	20	-	-	2	**33**
S3	6	-	9	-	-	39	-	-	2	**56**
Grand Total	**6**	**-**	**72**	**-**	**2**	**75**	**8**	**-**	**4**	**167**

Static #	Bbar	Eser	Myotis sp.	Nlei	Nnoc	Ppip	Ppyg	Pnat	Paur	TOTAL

Note: Bbar = Barbastelle. Eser = Serotine. Myotis sp = Species in Myotis genus. Nlei = Leisler's. Nnoc = Noctule. Ppip = Common pipistrelle. Ppyg = Soprano pipistrelle. Pnat = Nathusius pipistrelle. Paur = Brown long-eared.

Table 5: July 2023 remote monitoring data

Static #	Bbar	Eser	Myotis sp.	Nlei	Nnoc	Ppip	Ppyg	Pnat	Paur	TOTAL
S1	26	2	4	3	19	794	18	-	12	**878**
S2	-	-	1	-	-	1547	169	-	-	**1717**
S3	11	1	78	-	1	672	9	-	21	**793**
Grand Total	**37**	**3**	**83**	**3**	**28**	**3013**	**196**	**-**	**33**	**3396**

Note: Bbar = Barbastelle. Eser = Serotine. Myotis sp = Species in Myotis genus. Nlei = Leisler's. Nnoc = Noctule. Ppip = Common pipistrelle. Ppyg = Soprano pipistrelle. Pnat = Nathusius pipistrelle. Paur = Brown long-eared.

Table 6: September 2023 remote monitoring data

Static #	Bbar	Eser	Myotis sp.	Nlei	Nnoc	Ppip	Ppyg	Pnat	Paur	TOTAL
S1	-	-	-	-	-	261	5	-	1	**267**
S2	74	2	26	3	2	232	32	-	10	**381**
S3	74	3	118	-	23	93	25	2	18	**356**
Grand Total	**148**	**5**	**144**	**3**	**25**	**586**	**62**	**2**	**29**	**1004**

Note: Bbar = Barbastelle. Eser = Serotine. Myotis sp = Species in Myotis genus. Nlei = Leisler's. Nnoc = Noctule. Ppip = Common pipistrelle. Ppyg = Soprano pipistrelle. Pnat = Nathusius pipistrelle. Paur = Brown long-eared.

5. Evaluation

5.1. Activity levels

5.1.1. The surveys recorded a total of 4,567 call registrations across three months of deployment covering three seasons.

5.1.2. Bat activity (based on number of call registrations) peaked in July, with 74% of the total recordings from the three months.

5.1.3. September recorded 22% of total call registrations, whilst April was the quietest month with only 3.7% of call registrations.

5.2. Species assemblage

5.2.1. At least nine species were recorded across the survey area. Common pipistrelle had the highest number of call registrations across the survey period, with 80.4% of total calls, and was the most recorded species in each month (this is not unusual). April was the month with the fewest recorded call registration for this species (75 calls) and the lowest percentage of total calls (45%).

5.2.2. Soprano pipistrelle made up 5.8% of the total recordings, and was the second most recorded species in July.

5.2.3. Common pipistrelle and soprano pipistrelle account for 86.3% of total call registrations (this is number of bat calls and should not be conflated to individuals or individual species).

5.2.4. Call registrations from *Myotis* species were not attempted to be separated to species level. *Myotis* accounted for 6.5% of the total across the survey period. Activity for this group peaked in September, with 144 call registrations attributed to *Myotis* species, 14% of total calls for the month. In April, which was the month with the lowest level of activity recorded overall, 72 call registrations were attributed to *Myotis* species, 43% of total calls for the month.

5.2.5. Barbastelle was recorded in all three seasons. In September it was the second most recorded species. Barbastelle accounted for 4.2% of the total call registrations across the survey periods. The earliest record of Barbastelle was in September (Static 2), approximately 43 minutes after sunset. The latest barbastelle calls were approximately 90 minutes before sunrise.

5.2.6. Barbastelle can range up to 20km per night to forage, and emergence times are normally within 60 minutes of sunset (range of 12-36 minutes after sunset within woodland), whilst roost return times are highly variable (range of 194 – 59 minutes before sunrise) **[Ref-6]**.

5.2.7. The data shows that barbastelle are commuting across the survey area, and there will likely be at least one roosting location within the vicinity. The calls closest to sunrise at detector 2 in September would suggest a roost nearby, although roosting locations in or adjacent to other locations cannot be ruled out.

5.2.8. Low numbers of noctule registrations were recorded on all surveys months, representing only 1.2% of all bat recordings.

5.2.9. Leisler's bat was also recorded in low numbers in July and September, representing just 0.1% of all bat recordings.

5.2.10. Small numbers of brown long-eared calls were recorded across the survey periods, totalling 66 call registrations (1.4% of total registrations), mainly recorded in July and September. Brown long-eared bats are a very quiet bat with a directional call. It is therefore likely that this is an under-representation of their presence within the survey area.

5.2.11. Nathusius' pipistrelles were recorded at very low numbers only at static 3 in September. In total they accounted for 0.04% of the total call registrations.

5.2.12. Bat species diversity is shown at each static location for each season in **Figures 2** to **4**. Barbastelle activity is shown at each static location in **Figure 5**.

5.3. Site appraisal

5.3.1. The combined results of the static surveys confirm the survey area is of high importance for foraging and commuting bats. The surveys recorded a high diversity of species across the survey area; with at least nine of the 12 species considered to be present within Lincolnshire having been positively identified.

5.3.2. Although the landscape is mostly intensively farmed arable, which is normally considered to offer sub-optimal foraging habitat, the hedgerows (where bat activity was mostly recorded) are of value to bats.

5.3.3. In an agricultural landscape with limited natural features, those that are present can have greater importance. The hedgerows, woodland edges and watercourses in the survey area are used as foraging and commuting corridors for bats, and likely offer key commuting routes in between natural features such as pockets of woodland.

5.3.4. In line with the updated (published in September 2023) version of the Bat Mitigation Guidelines **[Ref-8]**, the assemblage of species within this geographic region of the UK could be considered of national importance (the likely low numbers of some species would indicate at least regional importance).

5.3.5. Given the relatively high barbastelle activity, the fact that this species was recorded across the survey area, it is considered that the area could be of regional importance for this species.

5.3.6. The survey area is assessed as of local value for the remaining species identified.

5.4. Solar farms and bat risks

5.4.1. There is limited UK-specific research into the impacts of solar farms on bats; however studies in other countries suggest that there are several potential impacts.

5.4.2. A study in Hungary **[Ref-9]** identified that solar farms had similar bat activity and species assemblages to intensely cultivated arable land, implying that they are similar to the poorest rural landscape for bats. In addition, solar farms appeared to have reduced species diversity when compared to natural habitats, with species found to use solar farms generally those that are also successful in urbanised or intensive agricultural habitats such as species from the genus *Nyctalus* and *Pipistrellus*. Species such as barbastelle and those from the *Myotis* genus were found to use solar farms less frequently.

5.4.3. It was noted that the presence of linear features such as hedgerows or lines of trees can have a positive effect on bat activity, when managed appropriately **[Ref-10]**.

5.4.4. Solar panels can horizontally polarize light and reflect sound in a similar way to water; this may lead to bats mistaking panels for waterbodies when using echolocating, encouraging them to attempt to drink from the panel surfaces, which can cause collisions and potential injuries (**[Ref-11]**). Fortunately, studies have found that bats tend to land on the panels to drink rather than colliding (i.e. non-fatal interaction), they also show signs of learnt behaviour by eventually avoiding the panels following several unsuccessful drinking attempts (**[Ref-11]** and **[Ref-12]**).

5.4.5. Collisions between bats and solar panels may also occur for other reasons. Vertically aligned plates can induce higher collision risk during flight as the smooth vertical surfaces can be interpreted as open flight paths due to acoustic mirror properties interfering with echolocation (echoes not returned to the bat but reflected between the panels). There is a possibility that bats could learn to navigate these ‘holes’ in the landscape; however tilting the panels is likely to provide a more effective preventative measure (**[Ref-11]**, **[Ref-13]** and **[Ref-14]**).

5.4.6. The horizontal polarization of light by solar panels could also impact a bat's insect prey, as several aquatic insect species show strong attraction to panels and subsequently exhibit oviposition on the surfaces, leading to inviable offspring and increasing predation risk (**[Ref-15]** and **[Ref-16]**, **[Ref-17]** and **[Ref-18]**). The population-level effects of solar farms on aquatic insects are currently unknown. If they do prove to lead to population declines, then UK bats could be at risk as several species are highly reliant on aquatic insects as a food source (e.g. *Myotis* spp., *Pipistrellus* spp. and *Nyctalus leisleri*) (**[Ref-19]**).

5.4.7. Other general potential impacts of solar farms on bats include disturbance during construction and operation of solar farms due to noise and light pollution, as well as habitat degradation and fragmentation as a result of water and soil pollution, tall panels interrupting flight paths, vegetation clearance and water body drainage, which can reduce bat insect prey availability, drinking water sources and bat socialising and commuting habitat (**[Ref-14]**). There may also be indirect effects to bats via solar farms inducing environmental change over the long-term, for example, the formation of microclimates, reductions in plant biomass (particularly under the panels) and top soil destabilisation (**[Ref-14]**, **[Ref-17]**, **[Ref-20]**, **[Ref-21]**, **[Ref-22]** and **[Ref-23]**).

5.4.8. Cumulative impacts, due to any number of the above reasons, may have the potential to impact an individual's ability to survive or breed in the long term, and could be significant to the local, regional and even national populations. This is because bats are long-lived, and their reproductive rate is low.

5.5. Potential impacts of the Proposed Development

5.5.1. The design details were not confirmed at the time of the survey and therefore it is not possible to fully assess likely significant effects. Potential impacts which may occur include removal of hedgerows, which could disrupt flight paths and foraging areas, removal of trees used as roosts or, if not mitigated, disturbance to roosts during works and installation of artificial lighting (if not mitigated). The impacts are assessed in **ES Volume 1, Chapter 7: Biodiversity [EN010149/APP/6.1]**.

6. Recommendations

6.1.1. As stated above, at this stage it is not possible to provide definitive recommendations for the Proposed Development in relation to mitigation for bats. The recommendations that are provided below are in relation to the observations noted during the surveys carried out to date, with the intention of supporting the development of the outline design and scoping for future work stages.

6.1.2. The recommendations detailed thereafter are high-level based on the current understanding of the bats' use of the survey area.

6.2. Hedgerow removal

6.2.1. Any hedgerow removal required to facilitate construction should be kept to a minimum. Where hedgerow removal is required, this should be of a temporary nature wherever possible, and artificial screens may need to be installed to ensure continuity of bat flight lines during construction.

6.3. Further surveys

6.3.1. Further targeted bat activity survey effort is recommended and should be completed on those areas where barbastelle activity was highest, and areas where greatest impacts are proposed (i.e. if any significant removal of hedgerows is required or other features used by commuting or foraging bat). These surveys should take place at times to match levels of peak bat activity recorded in the survey area.

6.3.2. Once further information is available on the proposed design, additional surveys may be required to inform on specific features. These surveys may include targeted nighttime walkovers, inspections of trees to be impacted (felled or disturbed) and additional remote monitoring of specific locations / features.

6.4. Lighting

6.4.1. All UK bat species are nocturnal and adapted to low-light conditions and the artificial lighting of areas in which they are active affects their activities. Artificial lighting can affect the entire composition of local bat communities at the ecosystem level **[Ref-24]** having a large impact on light-averse species (such as *Myotis*).

6.4.2. Ultimately, there is no "light threshold" where adverse effects on bats from artificial light are negligible **[Ref-25]** and so it is important to achieve the minimal possible illumination levels, particularly when bats are most active from April to October, and particularly where 'light-averse' species are recorded.

6.4.3. A full moon under clear, natural conditions is 0.1 to 0.3 lux, and so where complete 'natural' darkness cannot be ensured on a site, illumination levels should aim to fall within this range wherever possible.

6.4.4. It is understood that no permanent lighting is proposed and that any manually operated lighting would only be used infrequently, in welfare or compound areas when needed to work during the hours of darkness. This lighting would be directed downwards and away from hedgerows, woodland and watercourses to avoid impact to bats which may use them for foraging/commuting and any trees which they may use for roosting. Any such lighting, being of short-term and infrequent use, should also not cause significant loss of invertebrate prey from hedgerows (i.e. by causing them to be attracted to the light).

7. References

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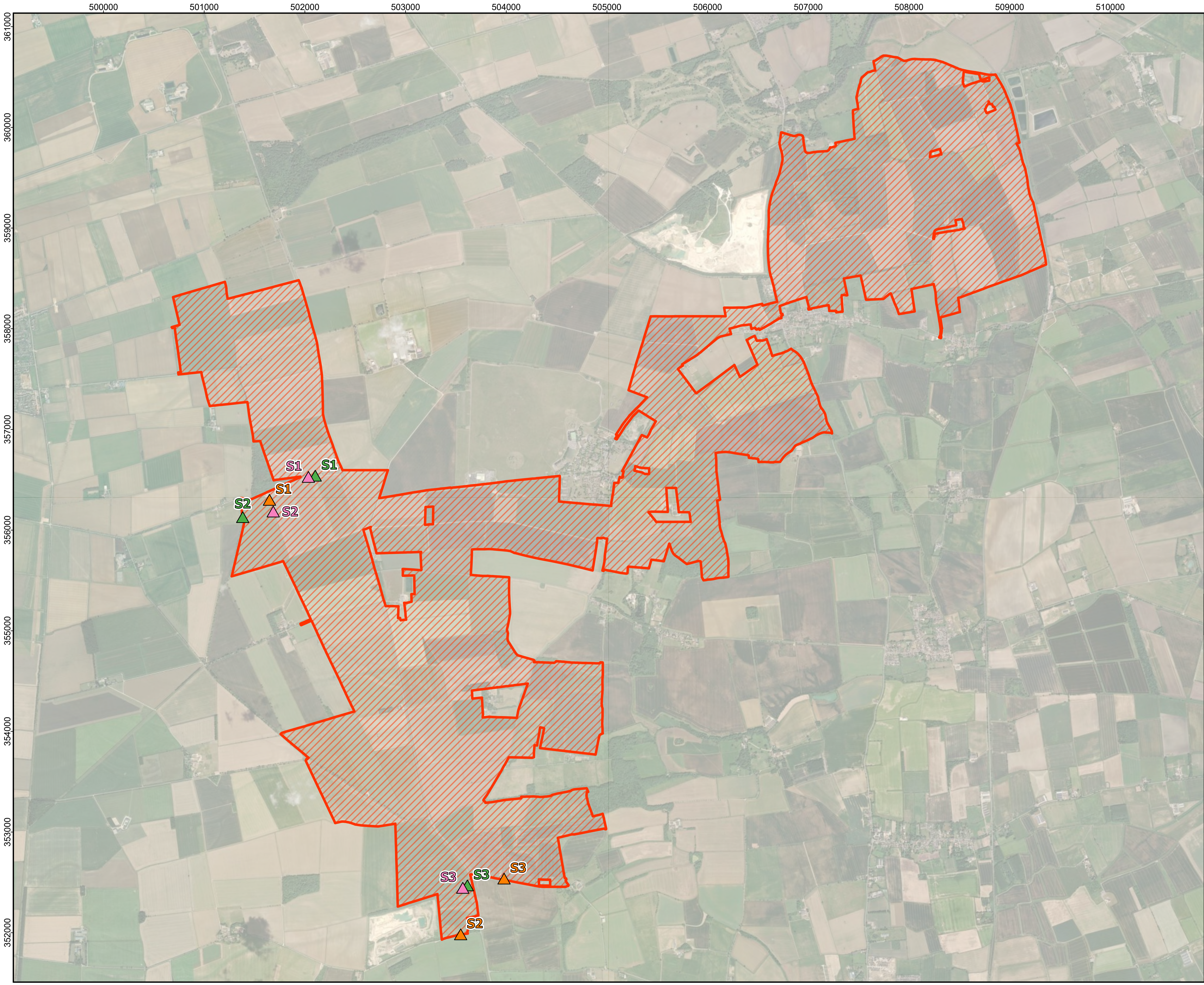
Figure 1 - Static Detector Locations

Application Document Ref: EN010149/APP/6.3
Planning Inspectorate Scheme Ref: EN010149



LEGEND:

Survey Area

Static Detector Location

April 2023

July 2023

September 2023

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

01	NOV 2024	DCO SUBMISSION	RSK	RSK	EDF
Rev	Date	Description	Drn	Chk	App

Springwell Solar Farm

DOCUMENT:
ENVIRONMENTAL STATEMENT VOLUME 3, APPENDIX 7.6: BAT ACTIVITY SURVEY ADDENDUM REGULATION 5(2)(a)

TITLE:
FIGURE 1 STATIC DETECTOR LOCATIONS

PINS REFERENCE NUMBER:
EN010149/APP/6.3

0 0.5 1
Kilometers

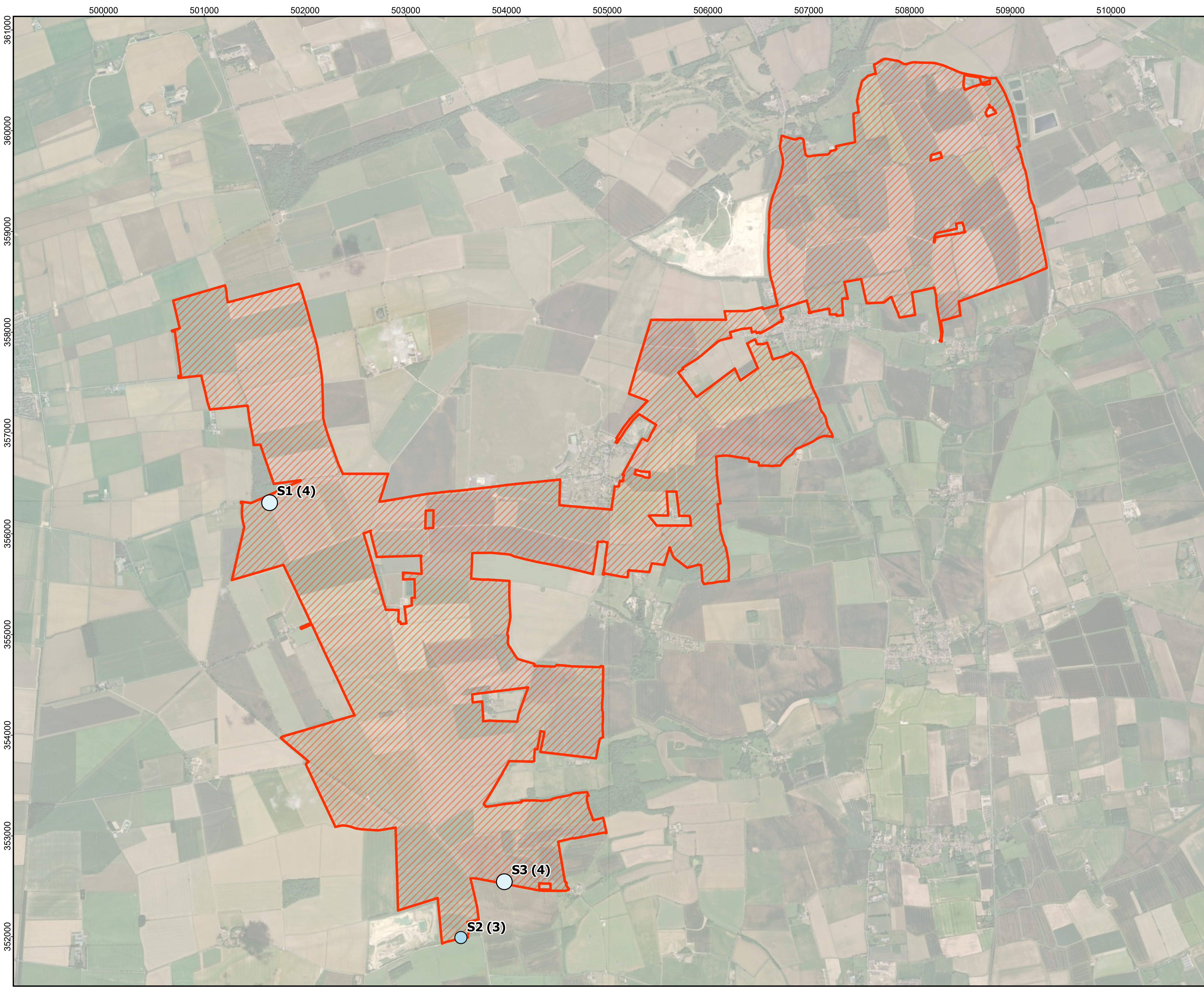
Scale: 1:35,000 @ A3

REV 01

Path: RSK Group \ RSK Biocensus - 06 GIS - 2483765 - EDF Solar Springwell \ 03 - APRX \ 2483765 - Springwell Solar - Fig 1 - Static Detector Locations - Rev 01.aprx

Figure 2 - Species Diversity
April 2023

Application Document Ref: EN010149/APP/6.3
Planning Inspectorate Scheme Ref: EN010149



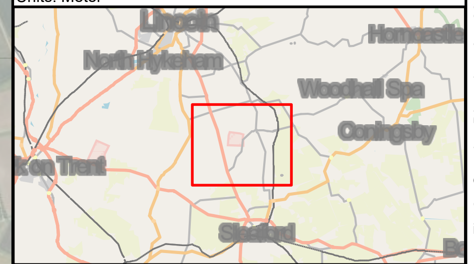
LEGEND:

Survey Area

Species Count

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
01	NOV 2024	DCO SUBMISSION	RSK	RSK	EDF

Springwell Solar Farm

Springwell Solar Farm

DOCUMENT:
ENVIRONMENTAL STATEMENT
VOLUME 3, APPENDIX 7.6: BAT ACTIVITY SURVEY ADDENDUM
REGULATION 5(2)(a)

TITLE:
FIGURE 2 SPECIES DIVERSITY – APRIL 2023

PINS REFERENCE NUMBER:
EN010149/APP/6.3

0 0.5 1
Kilometers

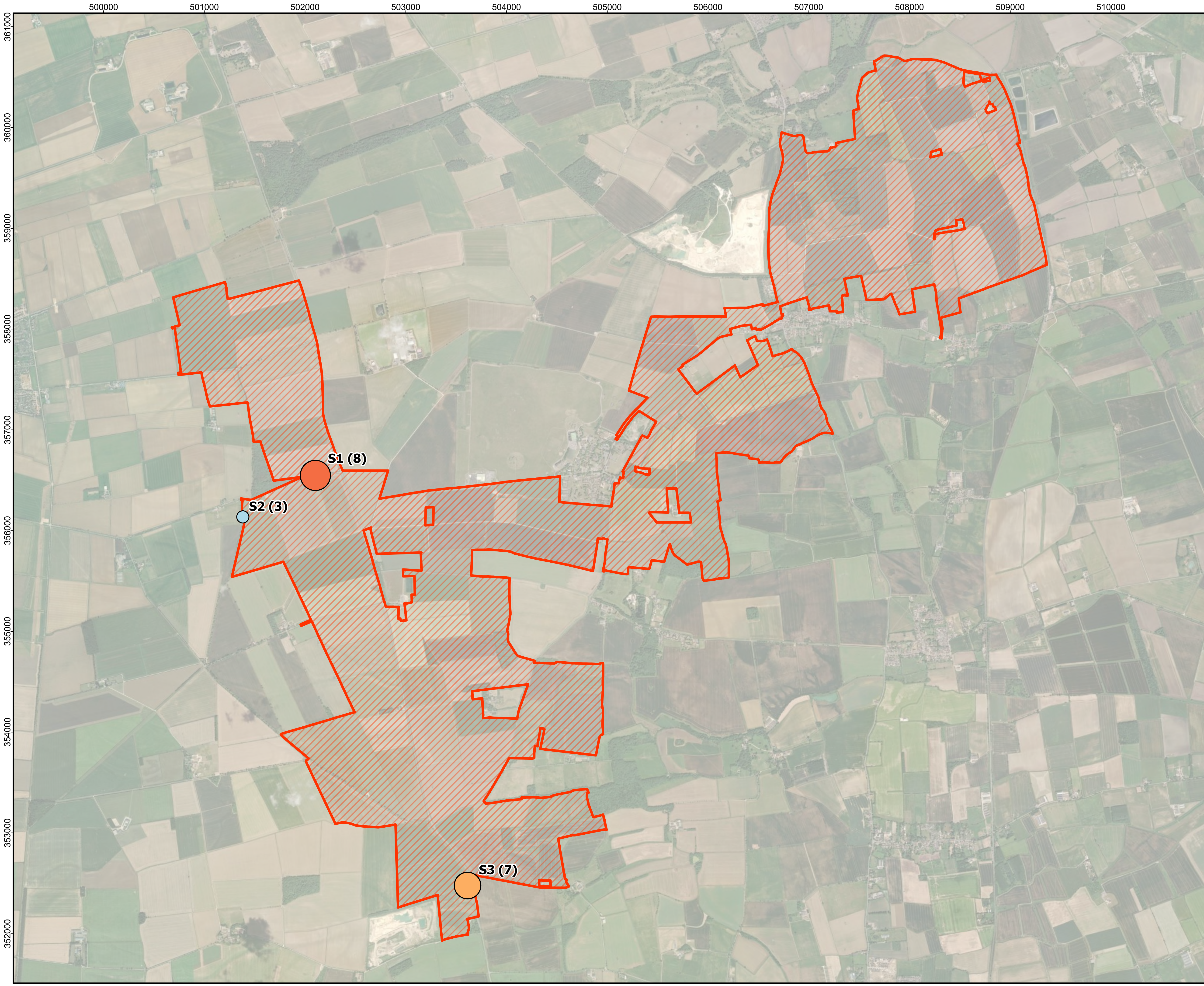
Scale: 1:35,000 @ A3

REV 01

Path: RSK Group \ RSK Biocensus - 06 GIS - 2483765 - EDF Solar Springwell \ 03 - APRX \ 2483765 - Springwell Solar - Fig 2 - Species Diversity - Apr 23 - Rev 01.aprx

Figure 3 - Species Diversity
July 2023

Application Document Ref: EN010149/APP/6.3
Planning Inspectorate Scheme Ref: EN010149



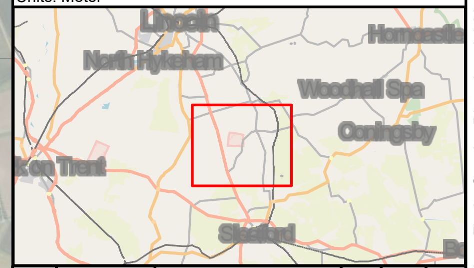
LEGEND:

Survey Area

Species Count

1
2
3
4
5
6
7
8
9

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



01	NOV 2024	DCO SUBMISSION	RSK	RSK	EDF
Rev	**Date**	**Description**	**Drn**	**Chk**	**App**

Springwell Solar Farm

Springwell Solar Farm

DOCUMENT:
ENVIRONMENTAL STATEMENT
VOLUME 3, APPENDIX 7.6: BAT ACTIVITY SURVEY ADDENDUM
REGULATION 5(2)(a)

TITLE:
FIGURE 3 SPECIES DIVERSITY – JULY 2023

PINS REFERENCE NUMBER:
EN010149/APP/6.3

0 0.5 1
Kilometers
Scale: 1:35,000 @ A3

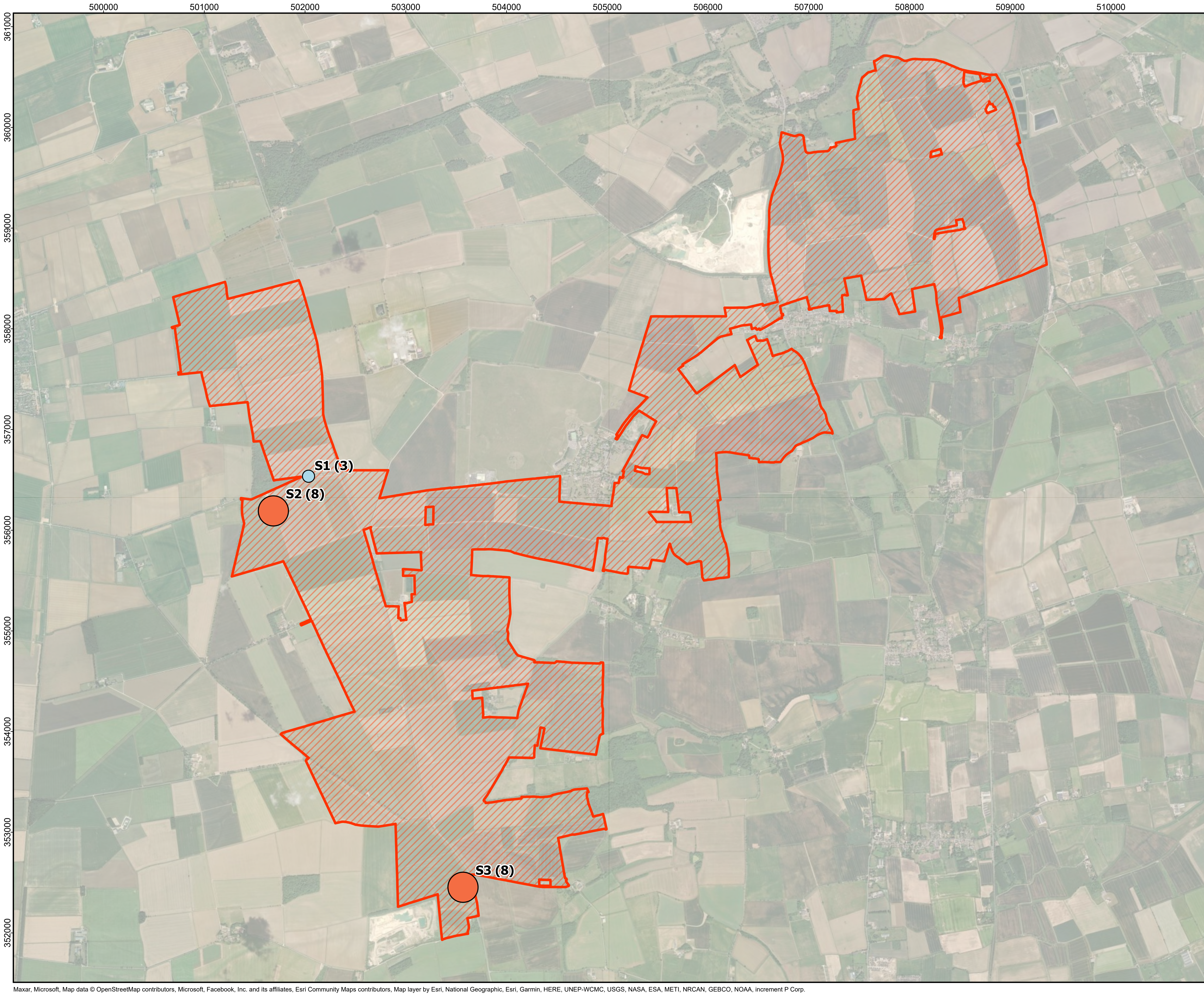
N E S W

REV 01

Path: RSK Group \ RSK Biocensus - 06 GIS - 2483765 - EDF Solar Springwell \ 03 - APRX \ 2483765 - Springwell Solar - Fig 3 - Species Diversity - Jul 23 - Rev 01.aprx

Figure 4 - Species Diversity September 2023

Application Document Ref: EN010149/APP/6.3
Planning Inspectorate Scheme Ref: EN010149



LEGEND:

Survey Area

Species Count

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

Rev	Date	Description	Drn	Chk	App
01	NOV 2024	DCO SUBMISSION	RSK	RSK	EDF

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DOCUMENT:
ENVIRONMENTAL STATEMENT
VOLUME 3, APPENDIX 7.6: BAT ACTIVITY SURVEY ADDENDUM
REGULATION 5(2)(a)

TITLE:
FIGURE 4 SPECIES DIVERSITY – SEPTEMBER 2023

PINS REFERENCE NUMBER:
EN010149/APP/6.3

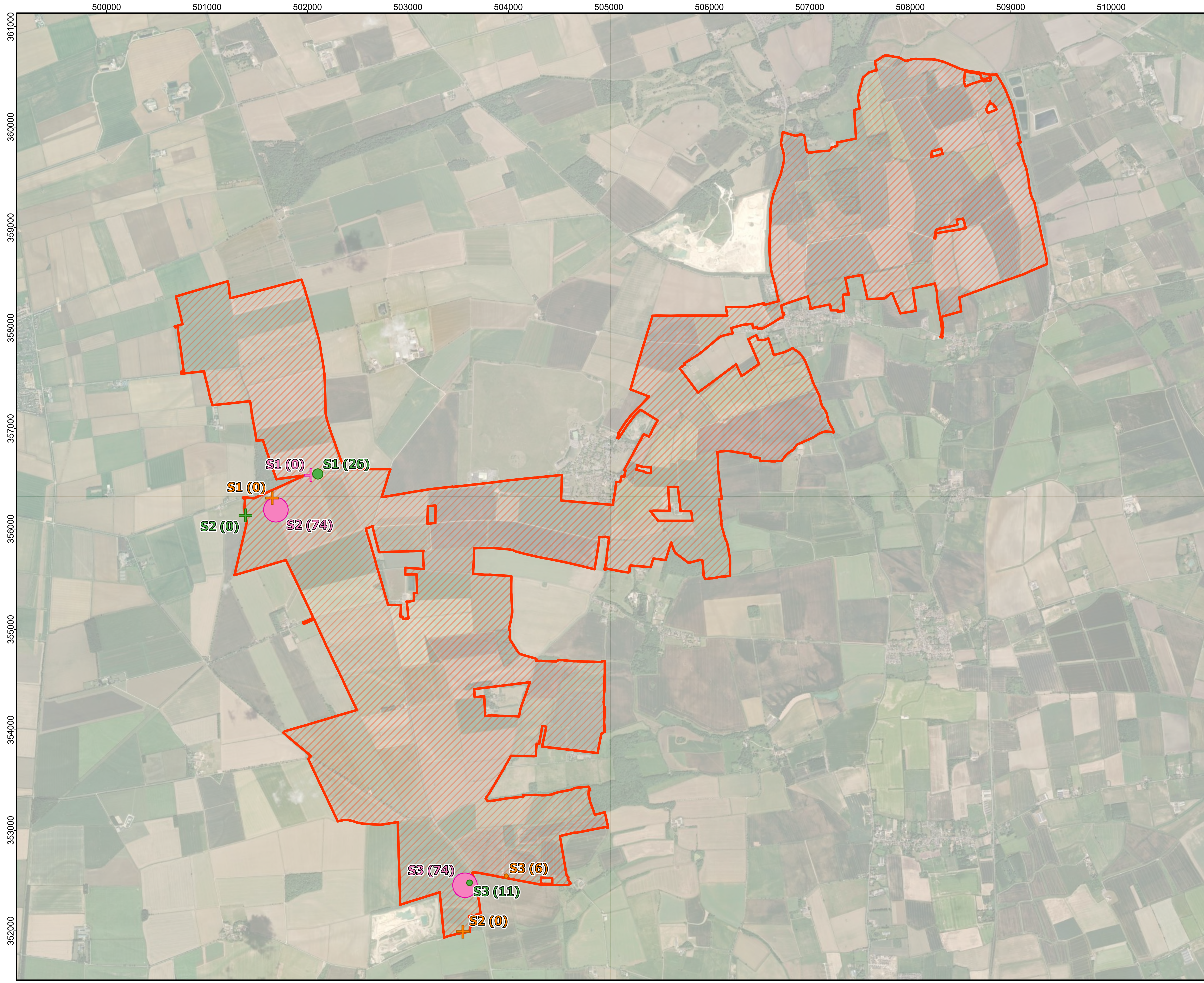
0 0.5 1
Kilometers
Scale: 1:35,000 @ A3

REV 01

Path: RSK Group \ RSK Biocensus - 06 GIS - 2483765 - EDF Solar Springwell \ 03 - APRX \ 2483765 - Springwell Solar - Fig 4 - Species Diversity - Sep 23 - Rev 01.aprx

Figure 5 -Barbastelle Activity

Application Document Ref: EN010149/APP/6.3
Planning Inspectorate Scheme Ref: EN010149



LEGEND:

Survey Area

Static Detector Location

April 2023

July 2023

September 2023

Call Registrations

- Proportional Symbology

1

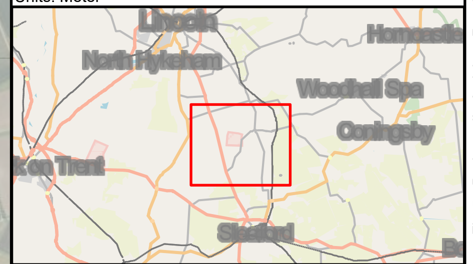
10

50

100

0 (no registrations)

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



01	NOV 2024	DCO SUBMISSION	RSK	RSK	EDF
Rev	Date	Description	Drn	Chk	App

Springwell Solar Farm

DOCUMENT:
ENVIRONMENTAL STATEMENT
VOLUME 3, APPENDIX 7.6: BAT ACTIVITY SURVEY ADDENDUM
REGULATION 5(2)(a)

TITLE:
FIGURE 5 BARBASTELLE ACTIVITY

PINS REFERENCE NUMBER:
EN010149/APP/6.3

0 0.5 1
Kilometers

Scale: 1:35,000 @ A3

REV 01

Path: RSK Group \ RSK Biocensus - 06 GIS - 2483765 - EDF Solar Springwell \ 03 - APRX \ 2483765 - Springwell Solar - Fig 5 - Barbastelle Activity - Rev 01.aprx

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Planning Inspectorate Scheme Ref: EN010149