Boxted Solar Farm

Skylark Mitigation Strategy

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Contents

1 Introduction

Background to commission

1.1 BSG Ecology was commissioned by RES Limited in April 2022 to carry out a series of ecological surveys and, based on that survey information and a desk study, to prepare an Ecological Assessment on the proposal for the construction and operation of a solar farm with all associated works, equipment, necessary infrastructure and biodiversity net gains (the 'Proposed Development') on land within the Boxted Estate, located west of Boxted, Suffolk (central OS grid reference TL819509) (the 'Site').

1.2 The Ecological Assessment identified that the population of skylark *Alauda arvensis* nesting in the arable fields within the Site would be deterred from nesting there following the construction of the solar farm and that to avoid an adverse impact on this population that arable fields elsewhere within the Boxted Estate should have their ability to support nesting skylark enhanced.

1.3 This Skylark Mitigation Strategy describes how the scale of the mitigation was determined and how it will be implemented.

Site description

1.4 The Proposed Development is located on 6 fields of varying sizes covering approximately 44 ha. The fields are in arable cultivation divided by hedgerows and are in a landscape of rolling hills, woodland and river valleys.

The Proposed Development

1.5 The Proposed Development is for the construction and operation of a solar farm with all associated works, equipment, necessary infrastructure and biodiversity net gains.

Personnel involved

1.6 The Skylark Mitigation Strategy has been prepared by Dr Roger Buisson, Associate Director, BSG Ecology. Roger is a suitably qualified ecologist and has over 30 years' professional ecology experience. Roger worked for the RSPB over a period of 15 years, on reversing the declines of farmland birds, leading the team that advised on habitat management for wildlife and advocating for changes to land use, water and coastal management policies. For five of those years, he worked on the development of techniques to increase the nesting population of skylark conducted at the RSPB's Hope Farm in Cambridgeshire.

1.7 Further details of his experience and qualifications can be found at https://www.bsg-ecology.com/portfolio_page/roger-buisson-director-of-ecology-cambridge/.

2 Skylark ecology and the population on the Site

Skylark ecology

2.1 Skylarks are birds of open habitats occurring on heathland, moorland, meadows, grassland, edges of marshes and dunes but with a particularly strong association with farmland which, because of its large area, supports the majority of the skylark population in western Europe (despite the sometimes low densities found in some cropping systems). Breeding occurs from late March or early April to July or August. Skylarks are monogamous. The female builds the nest alone, creating a thick layer of grass lined with finer vegetation in an excavated scrape or natural depression on the ground. The clutch is normally three to five eggs. Adult skylarks feed on invertebrates, seeds and plant leafy material but nestlings are fed almost exclusively on invertebrates.

2.2 In optimal circumstances, skylarks can have up to four broods per year but in winter-sown cereal crops the rapid spring extension growth of the crop means that the crop height exceeds the maximum of 60 cm sought by skylark (Donald and Vickery, 2000) and at most two broods are raised. The response of skylarks in such circumstances is to cease breeding, or seek out another field with a lower height and/or more open structure (where they will be competing against skylarks already occupying territories there) or persist in the field and enter the crop and locate their nest at its most open points - along the 'tramlines' - parallel pairs of thin strips of unsown crop at regular intervals across the field created for farm machinery to move through and spray or fertilise the crop. Those skylarks opting to persist in the taller crop and nest on, or adjacent to, a tramline are subject to high levels of predation, particularly by foxes (Donald *et al*., 2002).

Skylark conservation status

2.3 The widespread and large decline in the skylark population has led it to it being given the following conservation status in England:

- Species of Principal Importance (SPI) for the Conservation of Biodiversity in England as listed in accordance with Section 41 of the Natural Environment and Rural Communities Act 2006.
- Species of high conservation concern (listed as a 'Red' category species) in Birds of Conservation Concern (BOCC) 5 (Stanbury et al., 2021).

The population on the Site

2.4 The population of skylark nesting on the Site was determined by a breeding bird community characterisation survey undertaken over three survey visits in April to June 2022. Further details of the survey visits and recording method are provided in the Ecological Assessment.

2.5 The information gained on the presence and behaviour of skylark on the Site was evaluated to determine the number of skylark territories present. The principle behind the evaluation of the results is that over the course of the programme of survey visits a skylark that is displaying its presence by singing over its nesting territory is likely to be recorded there over several visits either singing or showing other territorial behaviour (nests are not searched for in this method). The observation of a singing skylark in suitable habitat and clusters of observations of skylarks showing other breeding behaviour such as carrying food or alarm calling were identified as a territory.

2.6 This evaluation identified that there were 9 skylark territories on the Site. The location of these territories is illustrated on Figure 1.

Skylark territory mapping survey on-Site and off-Site

2.7 In order to inform the development of this Skylark Mitigation Strategy three additional visits were made to the Site and to a series of arable fields within the Boxted Estate in May to June 2023 to survey for, and quantify the territory numbers of, skylark. Further details of the survey visits, recording method and territory evaluation are provided in the Ecological Assessment. The survey and mapping of skylark territories in 2023 on the Site and across the Boxted Estate identified 17 fields that were either of high suitability or moderate suitability for breeding skylark off-Site.

3 Impact assessment and the required scale of mitigation

Effects on skylark

3.1 The construction of the solar array on arable farmland will reduce the available nesting habitat for skylark. Skylark are deterred from locating their nest in areas that are overlooked by tall structures, both natural ones such as woods, mature trees and tall hedges and man-made ones such as buildings and, in this case, arrays of solar panels. This arises from their predator avoidance behaviour – such tall structures can either conceal ground predators or provide perches for avian predators (Donald *et al*., 2001). The evidence available on the use of solar farms by breeding skylark is that while they may be deterred from nesting beneath solar arrays (Solar Energy UK, 2023) they will continue to forage there amongst the sown grassland (Shotton, 2018).

3.2 As a result of this deterrence effect of structures, it is predicted in the Ecological Assessment that all of the 9 skylark territories identified from the field survey will not nest within the Site post-construction.

3.3 To avoid completely an adverse impact on the local skylark population, mitigation is required at the scale that will provide suitable nesting habitat for 9 skylark territories.

4 Objective for, and delivery of the Skylark Mitigation Strategy

Objective for the Skylark Mitigation Strategy

4.1 The objective is:

- To provide each year suitable additional habitat features to support nine skylark territories.

Identification of fields to deliver the Skylark Mitigation Strategy

4.2 The results of the survey of off-Site arable fields across the Boxted Estate were evaluated to identify those fields of suitable size (>5 ha), an absence of deterrent boundary features and evidence of a current use by a low density of skylark. This identified that there were 12 fields judged to be of high suitability for skylark. This was considered to be in excess of what would be required to mitigate for the loss of 9 skylark territories from the Site and the Applicant and the landowner have agreed that two blocks of arable fields become part of the Skylark Mitigation Strategy. Those fields are identified on Figure 2 and for each field the number of skylark territories recorded in 2023 is noted.

Method for the delivery of suitable habitat features

4.3 The method to be applied to increase the ability of the six off-Site fields to support nesting territories of skylark is the inclusion of 'skylark plots'. These are small undrilled patches within cereal fields that provide access for skylark into tall, dense, winter cereal crops to nest and forage. The published evidence is that skylark plots at a density of 2 plots/ha in winter cereal crops grown on calcareous clay soils (as is the case at Boxted) will increase the population of skylark in each field with plots by a factor of three (Donald & Morris, 2005).

4.4 These plots will be created following the RSPB promoted guidance to farmers[1] and in a manner that has been delivered by farmers across lowland England as Countryside Stewardship AB4 Skylark Plots[2]. Each plot will be located at least 50 m from a field boundary with a hedge or tree (open farm tracks acting as boundaries are discounted as there will be no deterrent effect) and at least 50 m from any adjacent woodland. Each plot will be at least 3 m wide, will have a minimum area of 16 square metres, will not be connected to the tramlines and will be created by turning off the drill during sowing.

4.5 The maximum potential enhancement in skylark territories by the application of this prescription is quantified in Table 1 below, with the individual fields (i) to (iv) identified on Figure 2. A maximum of 12 additional territories can be provided with a minimum of 9 being provided each year when an allowance is made for a part of any one field not to have plots as part of a crop rotation and/or the management of crop pests/diseases.

Table 1: Delivery of skylark territories

Field number	Existing territories	Territories after enhancement	Contribution to mitigation
(i)	1	3	2
(ii)	1	3	2
(iii)	2	6	4
(iv)	2	6	4
Totals	**6**	**18**	**12**

4.6 In addition to the skylark plots, the wildflower rich grassland created on the Site will also offer significantly improved foraging opportunities for skylark nesting adjacent to the Site, as the grassland habitats will support a larger biomass of insect prey items than the arable land they will replace.

[1] https://farmwildlife.info/how-to-do-it/farmed-area/skylark-plots/
[2] https://www.gov.uk/countryside-stewardship-grants/skylark-plots-ab4

5 Supporting evidence base for the Skylark Mitigation Strategy

5.1 There is strong, peer reviewed, published evidence that skylark plots are a practical, sustainable and cost-effective means to increase the territory holding capacity of cereal fields and to increase the breeding productivity of those territory holding skylark. Initial proof of this technique came from research started by the RSPB in 1999 at their Hope Farm[3] site in Cambridgeshire and the testing of the technique has extended to the multi-farm level and also internationally. A summary of the evidence for the effectiveness of skylark plots is provide below.

Author(s)	**Summary of reports key findings**
Morris A.J., Holland J.M., Smith B. & Jones N.E. (2004) Sustainable Arable Farming For an Improved Environment (SAFFIE): managing winter wheat sward structure for Skylarks Alauda arvensis. *Ibis*, 146, s155-162.	A replicated, controlled study from April-August in 2002 to 2003 in 15 sites in northern, eastern and southern England found that Eurasian skylark *Alauda arvensis* breeding density, duration and success were higher in winter wheat fields with undrilled patches (4 x 4 m) than in fields with widely-spaced (25 cm apart) rows or under conventional management (0.3 nests/ha in fields with undrilled plots vs 0.2 for the other treatments). Fields with undrilled patches also lost fewer territorial and nesting birds over the breeding season and by the end of the breeding season nests in these fields produced an average of one more chick than control nests. Body condition of nestlings decreased in control nests over the breeding season but increased in experimental fields. The proportion of within-treatment foraging flights remained constant in fields with undrilled patches but decreased over time in other treatments. Three treatments were surveyed: winter wheat sown in wide-spaced rows, undrilled patches with a density of 2 patches/ha, and conventional control winter wheat fields.
Key findings	Skylark plots can help to increase breeding densities in crop.
Donald P.F. & Morris T.J. (2005) Saving the sky lark: new solutions for a declining farmland bird. *British Birds*, 98, 570-578.	A before-and-after study from 2000 to 2005 in Cambridgeshire, England, found that the population of Eurasian skylarks *Alauda arvensis* on an arable farm increased from 10 territorial males in 2000 to 34 in 2005, following the introduction of skylark plots in 2001. Nests were also aggregated in fields with skylark plots. The paper also reports that fields on 15 experimental farms with skylark plots had 30% more skylarks than control fields. In addition, nests in fields with skylark plots produced 0.5 more chicks/breeding attempt. This study was part of the SAFFIE – Sustainable Arable Farming For an Improved Environment research project [summarised above].
Key findings	Skylark plots can have a positive and significant impact on skylark nesting densities.
Ogilvy S.E., Clarke J.H., Wiltshire J.J.J., Harris D., Morris A. & Jones N. (2006) SAFFIE - research into practice and policy. Proceedings of the HGCA Conference, Arable crop protection in the balance: Profit and the environment, 14.1-14.12.	A replicated, controlled study in 2002 to 2003 on ten farms in England of skylark plots placed in winter wheat fields. At the start of the breeding season there was little difference in success between treatments, but by June fields with plots compared to controls had a greater density of nests - 1 nest/ha compared to 0.4 nest/ha - and more chicks per nest - 1.75 chicks/nest compared to 0.9 chicks/nest. Over the whole season nests in fields with skylark plots raised 0.5 more chicks per breeding attempt and considering just the later part of the breeding season, raised 1.5 more chicks per breeding attempt. This study was part of the SAFFIE – Sustainable Arable Farming For an Improved Environment research project [summarised above].
Key findings	Skylark plots deliver their benefit in winter cereal crops mostly later in the growing season.

[3] https://www.rspb.org.uk/our-work/conservation/projects/hope-farm/

Author(s)	Summary of reports key findings
Stoate C. & Moorcroft D. (2007) Research-based conservation at the farm scale: development and assessment of agri-environment scheme options. *Aspects of Applied Biology*, 81, 161-168.	A 2007 study and literature review that found that Eurasian skylarks *Alauda arvensis* were able to raise 49% more young in fields with skylark plots, compared to fields without plots, by prolonging the length of the breeding season.
Key findings	Skylark plots can increase the ability of skylark to raise greater numbers of young.
Fischer J., Jenny M. & Jenni L. (2009) Suitability of patches and in-field strips for sky larks Alauda arvensis in a small-parcelled mixed farming area. *Bird Study*, 56, 34-42.	A replicated, controlled study from March-July 2006 in mixed farmland near Berne, Switzerland found that Eurasian skylarks *Alauda arvensis* with territories that included undrilled patches were significantly less likely to abandon their territory than birds without patches, and more likely to use the undrilled patches as nesting and foraging sites. Use of winter wheat fields by skylarks changed through the breeding season; from June to July, the percentage of control fields (without undrilled plots) in skylark territories decreased from 60% to 38%, whilst the percentage of undrilled patches in skylark territories remained approximately 55% from May to July.
Key findings	Skylark plots may lead to a reduced risk of nest abandonment and an increase in breeding success.
Defra (2021). Enhancing Arable Biodiversity. Six practical solutions for farmers.	In the first two years of testing skylark plots, average number of skylark chicks reared increased by up to 50%. Improvement resulted mainly from increased foraging access for adult birds. The plots provided a landing space and improved access to nesting and feeding areas. Wider testing confirmed this benefit, but there was increased nest predation in fields with margins. Therefore, where practical, plots should be placed at least 50 m from the field margin.
Key findings	Skylark plots can help to increase the number of chicks reared at each nest.

6 References

Donald, P.F. and Vickery, J.A. (2000). The importance of cereal fields to breeding and wintering Skylarks *Alauda arvensis* in the UK. pp140-150 of: Aebischer, N.J., Evans A.D., Grice P.V. and Vickery, J.A. (eds), *Ecology and Conservation of Lowland Farmland Birds*. British Ornithologists' Union, Tring.

Donald, P.F., Evans, A.D., Buckingham, D.L., Muirhead L.B. and Wilson J.D. (2001). Factors affecting the territory distribution of Skylarks *Alauda arvensis* breeding on lowland farmland. *Bird Study* 48: 271-278.

Donald P.F., Evans A.D., Muirhead L.B., Buckingham D.L., Kirby W.B. and Schmitt, S.I.A. (2002). Survival rates, causes of failure and productivity of Skylark *Alauda arvensis* nests on lowland farmland. *Ibis* 144:652–664.

Donald P.F. and Morris T.J. (2005). Saving the sky lark: new solutions for a declining farmland bird. *British Birds* 98: 570-578.

Shotton, R. (2018) https://community.rspb.org.uk/ourwork/b/biodiversity/posts/bird-use-of-solar-farms-interim-results

Solar Energy UK (2023). *Solar Habitat: Ecological trends on solar farms in the UK*. Solar Energy UK, London.

Figures

Legend

- Survey boundary
- Site boundary
- Skylark Territories

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PROJECT TITLE

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Figure 5: Skylark territories on the Site in 2022

DATE: 18/10/2023 CHECKED: RB SCALE: 1:4,500

DRAWN: BH APPROVED: RB VERSION:1.0

Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data

Graphics Ref. No.: 04772

Figure 2: Skylark mitigation fields and mitigation delivery