

Biodiversity Survey Report



Southill Solar Farm

2016 - 2018

Report to Southill Community Energy



Summary

This biodiversity survey report presents the results of the third annual biodiversity survey of Southill Solar Farm and was carried out in the second year following the solar farm's construction. Southill has adopted an ambitious plan for biodiversity enhancement, and in the past year the site has undergone further habitat creation, including the sowing of a limestone wild flower meadow in the south field, the sowing of a small area of traditional grazing in the north of the site and the re-sowing of the pollinator mix and the winter bird seed mix. The field margins were sown with tussock grassland and wild flowers the previous year. The north field remains as a reverted wheat crop which hosted 4 pairs of breeding skylarks again in 2018. This phased sowing of the south and north fields has allowed the skylarks that flourish on this site to continue to breed here.

The site is separated into 3 main areas for monitoring purposes: the mid-field, which is the main field area of the site, formerly under arable crop production, the field margins, a 6m strip bounding the entire site, and the old wild flower meadow to the north of the site. Using systematic methods this annual biodiversity survey assesses botany, selected invertebrates and breeding birds across the site.

At Southill, the number of botanical species has risen from 39 in 2016 to 57 in 2017 to 65 in 2019, largely due to the creation of new grassland habitats, the establishment of a wild bird seed mix and the persistence of a wide range of common agricultural herbs and grasses. The proportion of bare soil (23%) has fallen from 35% in 2017 as the new habitats in the field margins and mid-field establish.

For butterflies and bumblebees, a small number of common species were observed at relatively high abundance, with the encounter rate for both groups having increased annually since 2016. The greatest abundance of butterflies occurred in the old wild flower meadow, whereas bumblebees were observed in the greatest abundance in the newly sown wild flower meadow to the south, and the reverted wheat crop to the north of the site.

In total, 67 species of bird were observed on Southill, a high diversity, but slightly lower than observed during 2016. This decrease may be related to the large-scale habitat clearance undertaken by Network Rail along the rail embankment adjacent to the site. The mature hedgerows, open field with multiple seed sources and large area of scrub in the adjacent rail embankment are likely to contribute to the high bird diversity.

It is recommended that the biodiversity management plan for Southill continues to be implemented. Annual biodiversity monitoring should continue to be undertaken to track the changes to biodiversity over time, and to influence management decisions. This is especially important in the early years of the site being established.

Introduction

Wychwood Biodiversity has been commissioned by Southill Community Energy to undertake annual biodiversity surveys of Southill Solar Farm, as part of an ongoing engagement to significantly improve biodiversity on this site. Southill's management team and community shareholders have committed to delivering an ambitious biodiversity management planⁱ which will result in new species-rich grassland habitats being established across the site as well as hibernacula and bird and bat boxes.

The annual biodiversity surveys are designed to provide information that can track changes in biodiversity over time, and specifically to track changes in biodiversity relating to the biodiversity management plan.

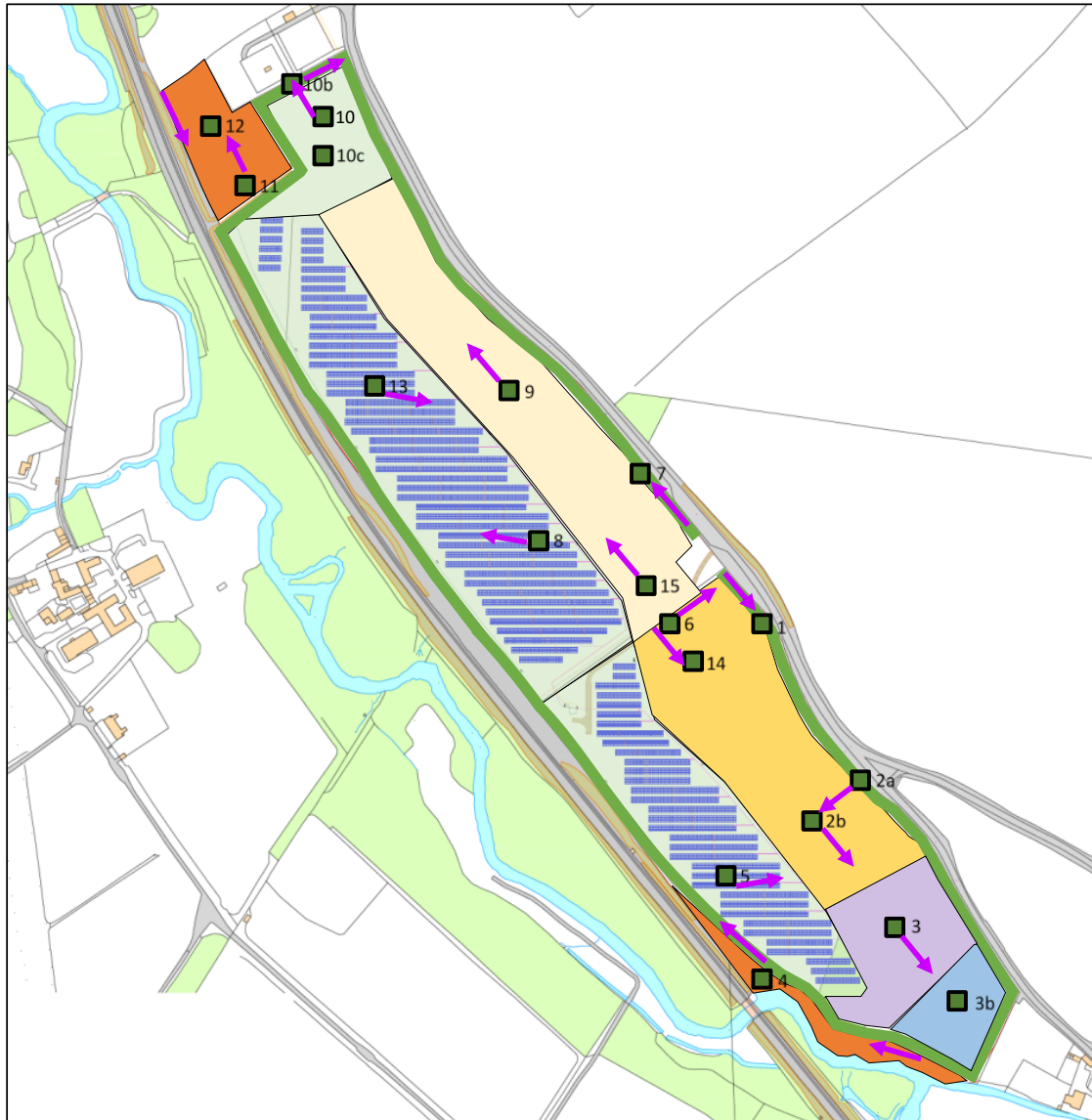
Biodiversity surveys are conducted using robust scientific methodology, focusing on the key biodiversity indicators of botany, bumblebees and butterflies and breeding birds. A baseline survey was undertaken in 2016ⁱⁱ prior to the solar farm being constructed, and was repeated in 2017ⁱⁱⁱ, when approximately 50% of biodiversity works had been completed, and in 2018, when 80% of biodiversity works were complete.

The purpose of this survey report is to present the results of the first 3 years of the site's development, and specifically to track changes in the key biodiversity indicators over time. This report also makes a preliminary assessment of ecosystem service provision, provides some general observations about the site and finishes with several recommendations for the management of the site going forwards.

Methods

Field methods for botanical, invertebrate and bird surveys are summarised in Figure 1 below. For further details, please see the Wychwood Biodiversity Survey Protocol^{iv}. Bird survey methods are described in a separate report^v.

Figure 1. Field survey methods for Southhill solar farm, showing mid-field areas of wild flower meadow (yellow in open field), traditional grazing beneath solar panels (light green within solar farm), pollinator area (purple), wild bird seed mix (blue); field margins with tussock grassland (green line), traditional orchard (red line) and pre-existing wild flower meadow (orange).



METHODS

Botany survey (June-August) Methods based on NVC survey methodology for grasses and herbs:

Study 1x1metre quadrats in pre-determined locations throughout the site (**Green squares**). Pairs of quadrats between rows of panels and underneath panels, single quadrats in margins.

Identify % cover of each plant species.

Convert % cover to DOMIN score (1%=1 2%=2 3%=3 4-10%=4 11-25%=5 26-33%=6 34-50%=7 51-75%=8 76-90%=9 91-100%=10).

Find abundance of species (no. quadrats with presence) and classify in groups (0=0 1-20%=I 21-40%=II 41-60%=III 61-80%=IV 81-100%=V)

Invertebrate survey (mid-June-mid August)

Walk 100m transects site (**purple arrows**) from each botany quadrat at a slow-steady pace.

Record numbers of all bumblebee and butterfly species encountered, including plant associations if possible.

Note any other invertebrates of interest.

Progress with BMP

The biodiversity management plan (BMP) for Southill sets out an ambitious plan for establishing habitats across the site. At the time of the survey in July 2018, progress had been made with establishing the majority of new grassland habitats (Table 1). The field margins had been sown with wild flowers and tussock grass in Autumn 2016, and at the time of survey were in full flower. The pollinator mix sown in Autumn 2016 was in flower in places but still quite weedy, and the 2nd sown wild bird seed mix was developing well, with some seed heads already developing. An orchard with traditional varieties of fruit trees was planted in January 2016. The traditional grazing mix beneath the solar panels had been sown in Autumn 2016, and was developing well, but the sward was quite gappy still. The open field area of the south field had been sown with limestone meadow mix in Autumn 2017 and was in full flower. The northern field remained a reverted crop field, with fugitive wheat and a wide variety of volunteer grasses, herbs and common weeds present. This area was earmarked for re-sowing in Autumn 2018.

Table 1. Establishment of BMP habitats as of July 2018, with colours corresponding to areas in Figure 1.

BMP habitat	Location	Field unit	Progress
Traditional grazing	Beneath solar panels	Mid-field	Sown Autumn 2016
Wild flower meadow	North field – open field	Mid-field	Not yet sown
Wild flower meadow	South field – open field	Mid-field	Sown Autumn 2017
Wild flower field margins	Boundary of entire site	Field margin	Sown Autumn 2016
Pollinator mix	South of south field	Mid-field	Sown Autumn 2016 and 2017
Wild bird seed mix	South of south field	Mid-field	Sown Autumn 2016 and 2017
Old wild flower meadow	North of site	Wild flower meadow	No action
Traditional orchard	South west of site	Field margin	Planted in Winter 2016

It should be noted that the construction of a pond has also been raised and discussed. However, as there is no water across the majority of the site, construction and maintenance would be an issue, except for close to the river in the south western corner of the site. The river bank in the south west of the site is likely to be valuable habitat for riverine wildlife and the pond project, which would disrupt this habitat, is not likely to proceed.

Given the ambitious and experimental nature of the BMP, we have adopted an approach of adaptive management and are continuing to observe what happens naturally on the site, as well as the effects of our specific interventions and using these to adjust the management plan. This is to ensure that the overall objective of enhanced biodiversity across many groups is achieved in a sustainable and affordable manner.

Results

There follows a summary of results from botanical, invertebrate and breeding bird surveys conducted in 2018. For each discipline, the 2018 results are compared to 2016 and 2017 to investigate any changes over time.

Results are displayed for the site overall, then separated by three main field units, as was done for the 2016 and 2017 surveys. These are:

Mid-field: the main field areas of the site, which in 2015 was used for arable production, and which now is newly sown traditional grazing beneath the solar panels, wild flower meadow in the southern field, with a pollinator mix and wild bird seed mix to the southern end, and reverted wheat crop across the northern field.

Field margins: the 6m wide strip around the edge of the site, between the hedge and the mid-field. In 2018 the margins were one year old and orchard whips in the south east corner were entering their second growing season.

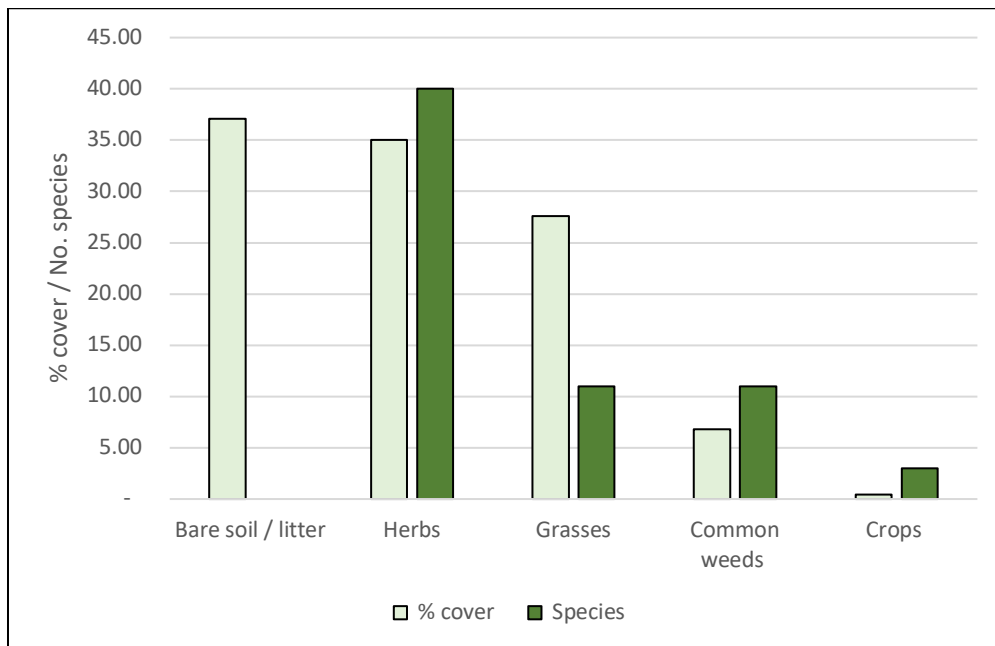
Wild flower meadow: the remnant species rich grassland to the north of the site. This area has remained untouched by the solar development.

These three field units help to define how the site's biodiversity differs across the site and help to track the changes associated with different management activities.

Botany

In terms of ground cover, the Southill site in 2018 was recorded to have 35% herbs, 28% grasses, 23% bare soil, 14% litter, 7% common weeds and 1% crops (Figure 2). In terms of number of species recorded, there were 40 species of herbs, 11 grasses, 11 common weeds and 3 crop species. No rare or notable plant species were observed. The 40 herbs were a mix of common arable species (with white clover, black medick and common poppy being the most dominant species), limestone grassland species (wild marjoram, fragrant agrimony) and less common cornfield wild flowers recently introduced to the site (corn cockle, corn marigold). The 11 grasses were mainly common agricultural varieties, the most dominant of which were rough meadow grass, perennial rye grass, Yorkshire fog and cock's foot. Crested dog's tail was the most dominant of the wild grass species.

Figure 2. Percentage ground cover and number of species for each main plant group in 2018



Botany per field unit

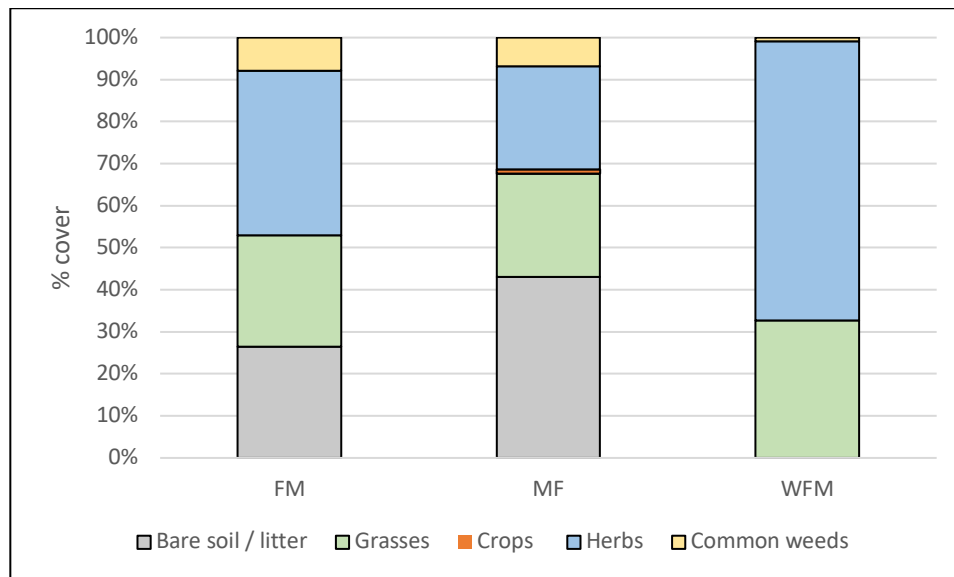
In the field margins, herbs made up 40% of ground cover, while grasses accounted for 26%. There was a mean of 25% bare soil (Figure 3). Rough meadow grass, timothy and cock’s foot were the dominant grasses and black medick, bird’s foot trefoil and wild carrot were the dominant herbs.



In the mid-field area (including beneath the solar panels), grasses made up 25% of ground cover, herbs were also 25%. On average, nearly 45% of the mid field area was bare ground (Figure 3). This relatively high proportion of bare soil likely reflects the gappy nature of grassland and wild flower areas as they establish. Crested dog’s tail was the dominant grass, with white clover and common poppy being the dominant herbs.

In the old wild flower meadow to the north of the site, grasses made up only 30% of cover, while herbs accounted for 70% (Figure 3). No bare soil was recorded. Wild marjoram, hedge bedstraw and ox-eye daisies were the dominant herbs in the old wild flower meadow, while cock’s foot and Yorkshire fog were the dominant grasses. Pyramidal orchids were observed outside the quadrat surveys.

Figure 3. Percentage ground cover compared between the 3 main field areas in 2018



Nine grass species were observed in the field margins, and 8 in the mid-field, a combination of recently sown and naturally occurring grass types. The number of grass species in the wild flower meadow was lower at 6 species (Figure 4).

The greatest number of herbs - 30 species - was observed in the mid-field area, while a relatively low number was observed in the field margins (18) and the wild flower meadow (15). The relatively high

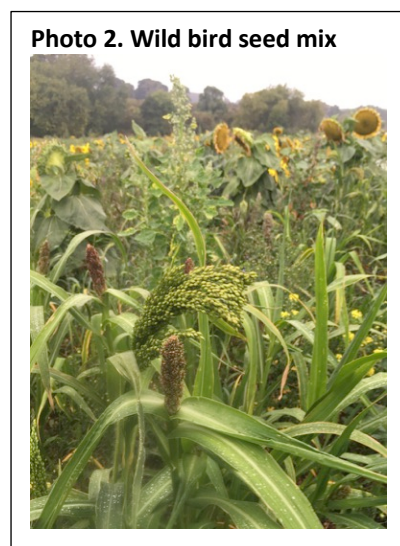


Photo 2. Wild bird seed mix

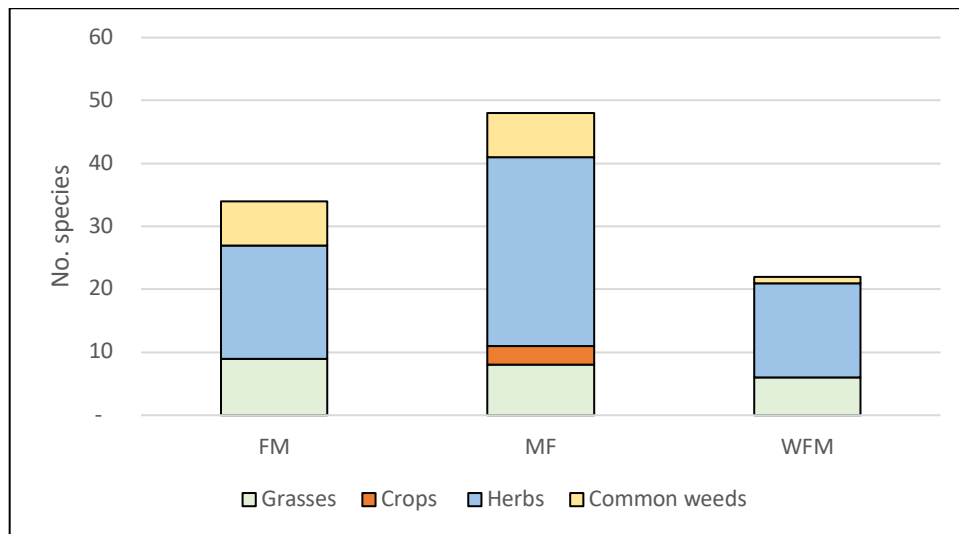
number of species in the mid-field likely reflects the large field area (>80% of the site's area) and the variety of habitats, including newly sown limestone grassland, pollinator crop, wild bird seed, traditional grassland and reverted wheat field. By comparison, the field margins have been sown with a uniform wild flower and grass mix, and the wild flower meadow contains a select array of herbs, including several limestone specialist species (e.g. wild marjoram, fragrant agrimony) as well as common wild flowers (e.g. oxeye daisy, red clover).

Self-sown wheat was found in low density across the mid-field area. The other 2 crops observed –barley and quinoa – were part of the sown wild bird seed mix at the southern end of the south field.

There were 7 common weed species observed in the field margins and mid-field. The dominant weed species in both cases was the prickly sow thistle. Just one species of weed – common ragwort - was recorded in the old wild flower meadow (Figure 4).

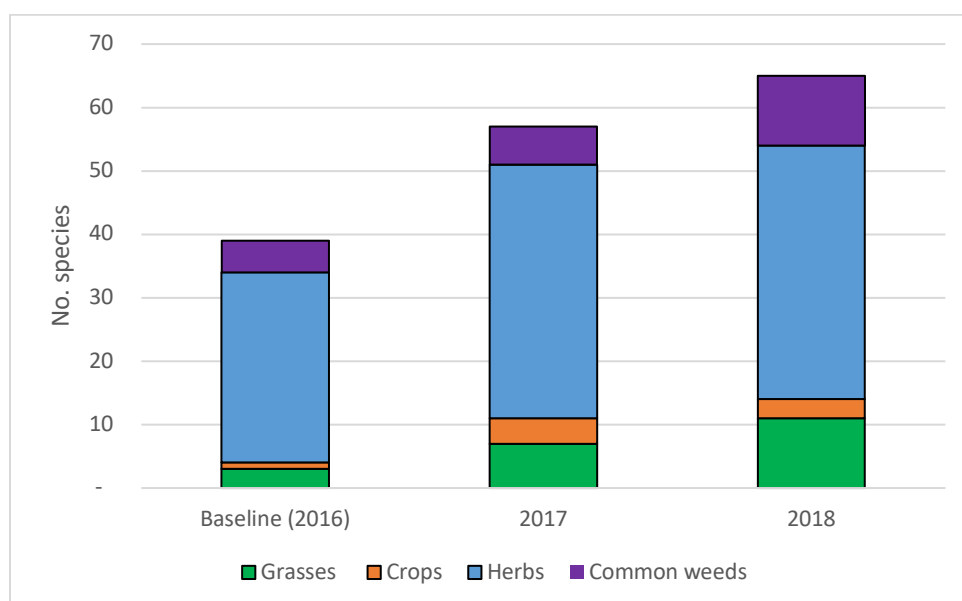
This species mix reflects the transitional nature of the site, with the field margins, south meadow and grassland beneath the solar panels having been recently re-sown, and the northern meadow having reverted to a mix of grasses, fugitive wheat and arable weeds.

Figure 4. Species richness of 4 plant groups compared between the 3 main field areas in 2018



If one compares the botanical species observed in 2018 with that found in previous years, a number of differences are notable. First, the number of grasses has significantly increased from just 3 agricultural species observed in 2016 to a mix of 11 agricultural and wild grasses observed in 2018. Second, the number of herbs observed on the site overall has increased from 30 species in 2016 to 40 in 2017 and 2018 (Figure 5). This likely reflects the number of new herbs introduced to the site through newly created habitats. The number of crop varieties observed has increased from 1 (wheat) in 2016 to between 3 and 4 in 2017 and 2018, thanks to the seed-bearing crop varieties included in the wild bird seed mix. Finally, the number of common weeds observed across site has increased, from 5 species in 2016 to 11 species in 2018 (Figure 5). This is likely to reflect in part the amount of disturbance and associated bare soil that exists across the site as newly-sown habitats establish themselves and provide opportunities for weeds to colonise.

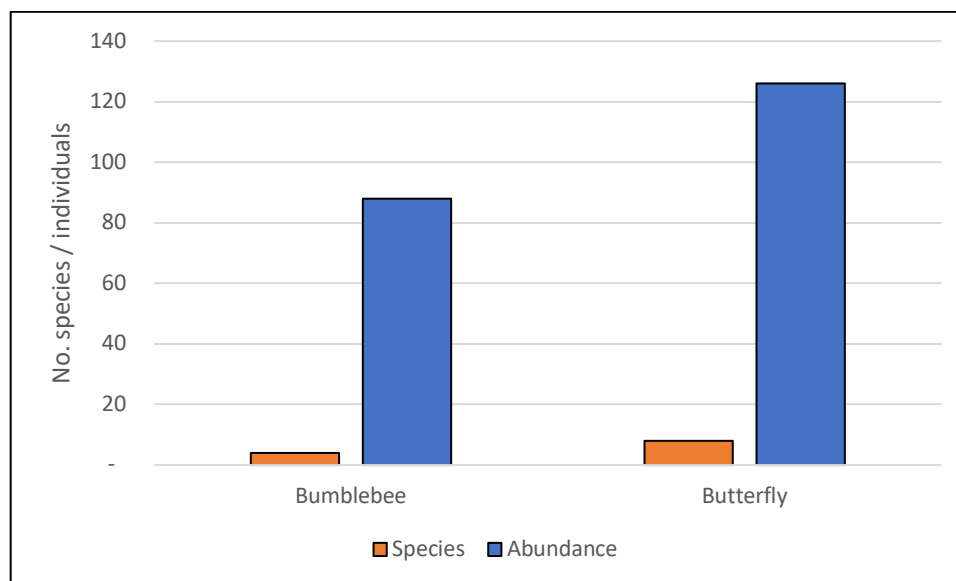
Figure 5. Species richness of 4 plant groups compared between 2016, 2017 and 2018



Invertebrates

For invertebrates, bumblebees and butterflies were used as indicator groups as for previous years. In total, 88 bees of 4 species were observed across the site, at a mean encounter rate of 4.9 per 100m (Figure 6). Three were common native species (white- and red-tailed and common carder) while the fourth was the honey bee *Apis mellifera*. For butterflies, 126 individuals of 8 species were noted across the site at a mean encounter rate of 7.0 per 100m. The butterflies observed were all common UK species, dominated by meadow browns (63) and marbled whites (30).

Figure 6. Species richness and abundance of bumblebees and butterflies at Southill solar farm in 2018



For butterflies, the greatest abundance was observed in the wild flower meadow (32.0 per 100m), a moderate but increasing abundance was observed in the field margins (6.8 per 100m), with a far lower encounter rate in the mid-field (2.1; Table 2). For bumblebees, the greatest abundance was noted in the mid-field area (6.4 individuals per 100m), with lower abundance in the field margin (3.3 per 100m) and unusually low abundance in the old wild flower meadow (2.0 per 100m). This low abundance may reflect better forage elsewhere on the site or in the wider landscape, or possibly some negative interaction with the honeybees (there are 3 hives at the northern edge of this habitat).

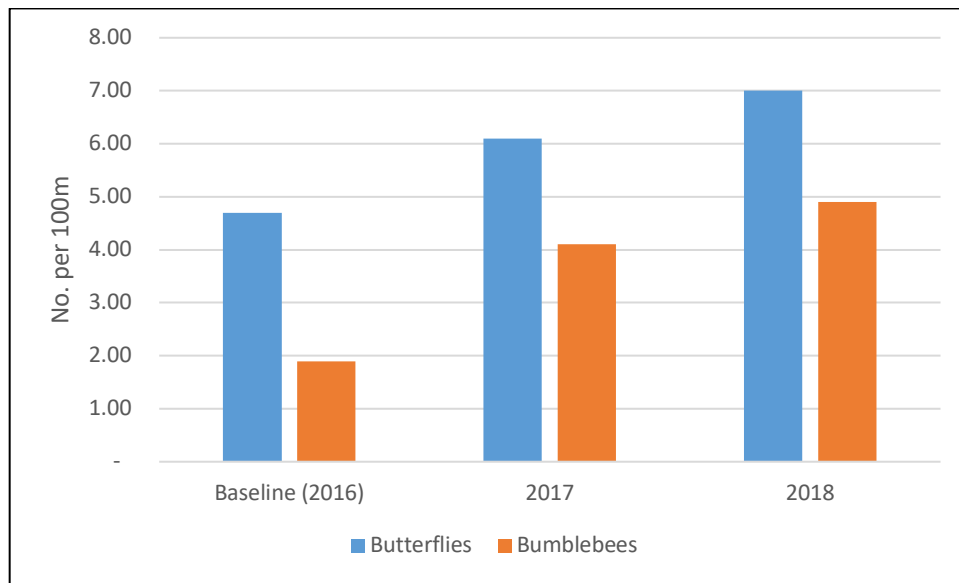
Table 2. Abundance of bumblebees and butterflies compared between the 3 main field areas.

per 100m	FM	MF	WFM
Butterfly	6.8	2.1	32.0
Bumblebee	3.3	6.4	2.0

Comparison between years

Comparing the observations for butterflies between 2016, 2017 and 2018, there has been a consistent increase in the rate of individuals observed per 100m, from 4.7 to 6.1 to 7.0 (Figure 7). The number of species observed increased from 6 to 8 in 2018, with the addition of the Small blue and Ringlet butterflies.

Figure 7. Comparing encounter rate per 100m for butterflies and bumblebees between 2016, 2017 and 2018.



Bumblebee numbers have shown a significant increase between 2016, 2017 and 2018, from 1.9 per 100m to 4.1 to 4.9. The number of species remained fairly stable at 3 in 2016 and 4 in 2017 and 2018.

Abundance per habitat between years

Butterflies

Butterflies increased in the field margins from an average of 2.3 in 2016 and 2.0 in 2017 to 6.8 per 100m in 2018. In the mid-field, butterfly abundance remained fairly low, with 1.0 per 100m observed in 2016, 2.2 in 2017 and 2.1 per 100m in 2018. The old wild flower meadow remained the most productive area of the site, with 15.3 in 2016, 25.5 in 2017 and 32.0 per 100m in 2018.

Photo 3. Small tortoiseshell butterfly in the field margins



The increase in butterflies in the field margins is likely to reflect the increase in wild flowers in this field area, due to the majority of field margins having been re-sown with a wild flower rich seed mix in 2016. These wild flowers provide a variety of nectar sources for butterflies to feed upon.

The old wild flower meadow remains the most productive for butterflies, most likely due to the high diversity of wild flowers. The reason for an increase in butterfly activity in this area between 2016 and 2018 is not clear, but it may be related to the cutting and collecting of grass from this area in 2017. Alternatively, this upward trend could reflect the improvement in nectar sources across the wider site, or

potentially the cessation of insecticide use across the site since 2015.

The relatively low abundance of butterflies across the mid-field could be explained by the relatively exposed nature of this field area, being largely open and with no hedgerows or wind breaks. With the

establishment of the wild flower meadow on the south field (seeded in Autumn 2017) it is surprising the increase in wild flowers within this area has not influenced butterfly numbers, as it has done for bumblebees. It is possible a greater number of butterflies will be observed in the mid-field in future years, as this habitat develops further.

Bumblebees

Bumblebees increased in the field margins from 0.67 per 100m in 2016 to 2.3 per 100m in 2017 to 3.3 per 100m in 2018, with this increase likely reflecting the greater abundance of wild flowers in this habitat since being re-sown in 2016.

Bumblebees also increased in the mid-field, from 0.33 per 100m in 2016, to 1.2 in 2017, to 6.4 per 100m in 2018. This increase in 2018 is likely to be in response to the sowing of the south field with wild flower seeds in Autumn 2017, so providing a greater abundance of nectar sources for bumblebees to forage on. Unlike butterflies, bumblebees are less temperature dependent, and so may be more suited to foraging in this exposed mid-field area.

Bumblebees displayed high abundance in the wild flower meadow in 2016 (7.0 per 100m) and in 2017 (17.0). However, their numbers were very low in 2018 (2.0 per 100m).

Breeding birds

In total, 67 species of bird were recorded during 3 surveys conducted during the breeding season by professional bird surveyor Tony Powell. Of these, 27 species were listed as birds of conservation concern (BOCC) for the UK. The red listed dunnock, linnet, marsh tit, meadow pipit, redwing, skylark and starling were noted on site this year.

At the time of writing, no other solar farm surveyed by the Wychwood Biodiversity team comes close to this species number. The high number of bird species is in part due to the range of habitats within and surrounding Southill, including:

- mature hedges which provide excellent nesting habitat for a wide range of species, including chaffinches, chiffchaffs, dunnocks, house sparrows, wrens, robins, blue tits and great tits;
- the large open field area across the majority of the site which is suitable for foraging meadow pipits, linnets and yellowhammers, and breeding skylarks;
- the rail embankment to the western boundary of the site which is dense with scrub of different ages and provides excellent foraging and breeding habitat for a wide variety of breeding birds; and
- the stream and associated scrub which is suitable for warblers.

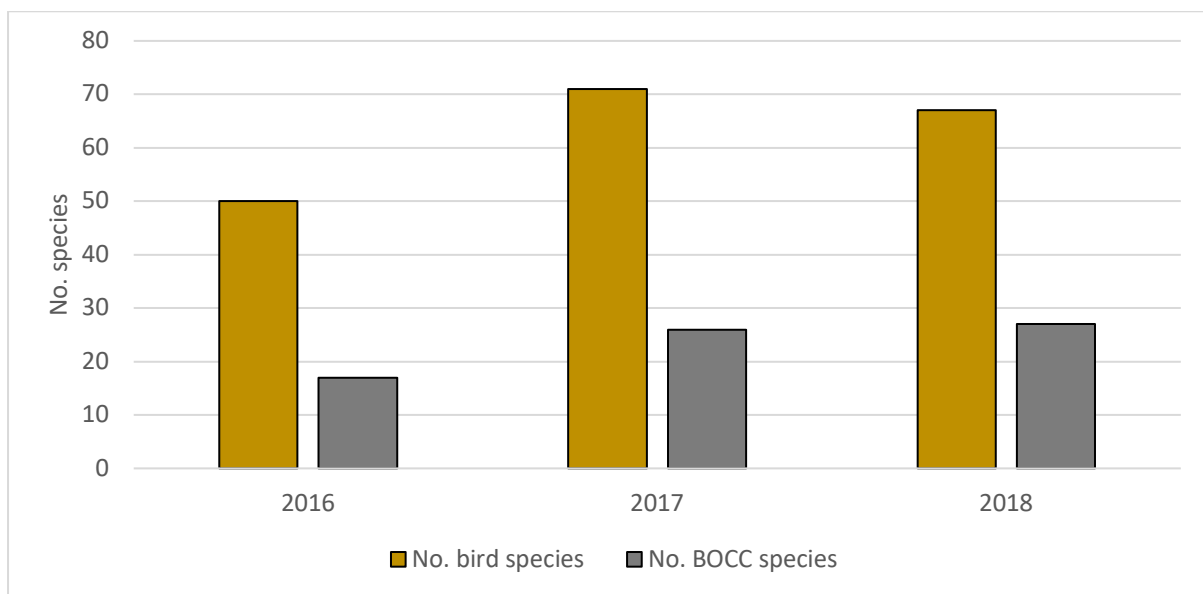
Comparing results between the years, the number of bird species has increased from 50 in 2016 to around 70 in 2017 and 2018. The number of these species considered to be Birds of Conservation Concern has also risen, from 17 in 2016 to 27 in 2018 (Figure 8, Table 3).

Table 3. Number of bird species compared 2016 – 2018

	2016	2017	2018
No. bird species	50	71	67
No. BOCC species	17	26	27

Note that mid-way through the 2018 bird breeding season, Network Rail undertook major habitat clearance work on the rail embankment, clearing all scrub and trees close to the rail track. It is believed the works directly affected the breeding success of the following scrub-loving species: chiff chaff, willow warbler, black cap, whitethroat, linnets and long-tailed tit. This may have negatively affected the bird results from 2018 and is likely to impact survey results from 2019.

Figure 8. Number of bird species compared between 2016, 2017 and 2018.



Additional observations

- Numerous adult hares were seen across the site during 2018
- There were numerous sightings of muntjac and roe deer across the site.
- There was a substantial presence of badgers across the site, including runs, diggings and scat.

Ecosystem services

Ecosystem services are the benefits that nature provides to people which contribute to human health, livelihoods and wellbeing. Ecosystem services are usually grouped into 4 categories:

- Provisioning: goods people obtain from nature such as food and shelter
- Regulating: benefits obtained from the regulation of ecosystem processes, such as flood defence and climate regulation
- Cultural: benefits such as recreation, spiritual enrichment and 'sense of place'

- Supporting: natural processes that maintain other services such as primary production and nutrient cycling. Supporting services are difficult to assess and are not considered further.

Below is a subjective assessment of the ecosystem services that are likely to be provided by Southill within the first 5 years of its operation under current conditions. Guidance has been taken from the DEFRA Ecosystem Services report of 2011¹. Note that this assessment should be repeated periodically to track changes over time. It is anticipated the planned BMP activities would increase the provision of certain ecosystem services in time.

Table 1. Likely ecosystem service potential of Southill solar farm during first 5 years of operation

Class of ecosystem service	Ecosystem service	Site's potential to provide services in first 5 years of operation (negligible, low, moderate, high)	Direction*	Description
Provisioning	Food provision	Low	Positive	Sheep grazing through Autumn and Winter (TBA)
Regulating	Air quality	Low	Positive	High hedges and mature vegetation help filter air; little or no dust production
	Water quality	Moderate	Positive	Mature vegetation helps reduce surface water flow; filters and slows surface water flow
	Soil erosion regulation	Moderate	Positive	Mature vegetation cover minimises soil erosion
	Pest and disease regulation	Moderate	Positive	High bird diversity is likely to assist with agricultural pest insects; stable vegetation cover reduces risk of invasive weeds
	Carbon sequestration	Low	Positive	As permanent grassland, the site is likely to achieve a small positive carbon balance over time
	Pollination	Low	Positive	There should be a moderate abundance of pollinators within the site
Cultural	Maintaining habitats and biodiversity	Moderate	Positive	The site is an example of grassland with moderate botanical diversity, with well-maintained hedges, some of which are tall
	Recreation and aesthetic value	Low	Positive	There is no public access to the site, but there are organised visits and school groups.

*Negative = detrimental to service, neutral = site does not provide the service, positive = site provides the service

It is recommended that this assessment be repeated periodically (i.e. every 5 years) to track changes over time. It is anticipated the planned BMP activities would increase the provision of certain ecosystem services in time.

¹ Christie et al (2011) Economic Valuation of the Benefits of Ecosystem Services delivered by the UK Biodiversity Action Plan. DEFRA Project NE0112.

Recommendations

The Biodiversity Management Plan¹ (BMP) lays out the means by which the development of Southill solar farm would result in a significant contribution to biodiversity. This plan has been developed with consideration of existing biodiversity and in fitting with the character of the surrounding landscape, and with input from a wide range of stakeholders. It is recommended the implementation and management activities in the BMP are followed fully.

As of summer 2018, most of the BMP activities have been undertaken and others are planned for implementation soon. Below are the BMP activities which are recommended for 2019:

- Commencing sheep grazing between August and March within the solar farm;
- Monitoring the site for problems with annual and perennial weeds, especially in the newly sown north meadow and the pollinator mix. Taking action to re-sow problem areas in the Autumn if physical weed control is not sufficient;
- Re-sowing access track used by rail contractors to access the riverside during 2018;
- Over-sowing areas of the solar farm grassland with wild flowers;
- Maintaining existing hedge and scrub whips and keeping them weed-free;
- Installing bird and bat boxes around the site's perimeter; and
- Planting an arc of scrub in the south western corner of the solar farm, within the field margin.

It is recommended that annual biodiversity monitoring continue be undertaken to track the changes to biodiversity over time. This is especially important in the early years of the site being established. The results of the biodiversity monitoring and site observations should continue to be used to refine the biodiversity management plan.

Appendices

Appendix 1. Summary of results of the botanical survey undertaken in June 2018

	Mean % cover	Mean DOMIN score (1-10)	Abundance score (I-V)
Cover	34.7		
Bare soil	23.3	5	V
Moss	-		0
Litter	13.8	5	II
Grasses	27.6		
Crested dog's tail (grass 9)	8.3	4	III
Cocksfoot	2.1	3	II
Timothy	2.1	3	II
Meadow brome (grass 2)	2.6	3	II
Sterile brome (grass 3, 6)	2.9	3	II
Grass 4	0.9	1	I
Rough meadow grass (grass 1, 5, 8)	3.1	4	II
False oat grass (grass 11)	0.9	1	I
Golden oat grass	0.5	1	I
Rye	3.1	4	II
Yorkshire fog (grass 7, 10)	0.9	1	I
Crops	0.4		
Wheat	0.3	1	I
Oats	-		
Barley	0.1	1	I
Quinoa	0.1	1	I
Wild flowers	35.0		
BFT	1.7	2	I
Agrimony (fragrant)	0.1	1	I
Bedstraw (hedge)	2.3	3	II
Campion (white)	0.1	1	I
Clover (white)	3.8	4	I
Clover (red)	0.7	1	I
Common poppy	3.2	4	II
Corncockle	0.7	1	I
Cornflower	0.5	1	I
Corn marigold	0.1	1	I
Dandelion	0.8	1	II
Euphorbia	0.1	1	I
Forgetmenot (early)	0.2	1	I
Fox and cubs	0.1	1	I

Geranium (cut leaf)	0.1	1	I
Hawksbeard (smooth)	1.6	2	II
Hawthorn (seedling)	0.1	1	I
Hemlock	0.2	1	I
Hogweed	0.1	1	I
Knapweed	0.7	1	I
Madder (field)	0.1	1	I
Medick (black)	3.7	4	II
OED	1.5	2	II
Old man's beard	0.3	1	I
Parsnip (wild)	0.2	1	I
Plantain (greater)	0.2	1	I
Plantain (RW)	0.5	1	II
Salad burnett	0.1	1	II
Selfheal	0.8	1	I
Sorrel (common)	0.2	1	I
Speedwell	0.1	1	I
St John's Wort	0.1	1	I
Wild carrot	1.8	2	II
Wild marjoram	2.5	3	I
Wild parsnip	0.1	1	I
Willowherb (Hoary)	2.5	3	II
Willowherb (sq stalked)	0.1	1	I
Willowherb (broad leaf)	1.1	2	I
Yellow rattle	0.6	1	I
Yarrow	1.6	2	I
Common weeds	6.8		
Bristly ox tongue	0.2	1	I
Cleavers	0.4	1	I
Common nettle	0.1	1	I
Dock (broadleaved)	0.5	1	I
Marsh thistle	0.7	1	I
Field bindweed	0.8	1	I
Common ragwort	0.5	1	I
Spear thistle	0.5	1	I
Wetted thistle	0.7	1	I
Smooth sow thistle	0.2	1	I
Prickly sow thistle	2.3	3	II
Total cover	107.0		

Appendix 2. Results of the invertebrate survey undertaken in June 2018

	T1	T2	T2b	T3	T3b	T4	T5	T6	T7	T8	T9	T10	T10b	T11	T12	T13a	T13b	T14	T15	Total	Per 100m
Species BF	FM sown (uncut)	Sown WFM	Sown WFM	Pollinator (topped)	Riverine grass	FM arable (cut)	MF (SF sown grass)	Arable FM	FM sown (uncut)	MF (SF sown grass)	MF arable	MF (sown grass)	Sown FM	WFM	WFM	MF (SF sown grass)	MF	Sown WFM	MF arable		
MB	1	3	-	-	4	1	-	-	6	-	2	3	6	8	27	-		2	-	63	3.50
MW	-	-	-	-	-	-	-	-	1	-	-	1	2	8	18	-		-	-	30	1.67
S Sk	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-		1	-	5	0.28
TS	1	-	-	-	-	-	1	3		-	3	-	-	-	-	1		1	-	10	0.56
Sm B	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-		-	-	1	0.06
SW	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-		-	-	3	0.17
LW	-	1	-	-	1	-	-	-	1	-	-	-	2	-	-	1		-	-	6	0.33
R	2	-	-	-	2	1	-	-	1	-	1	-	-	-	1	-		-	-	8	0.44
SpR	4	2	-	-	2	2	1	3	7	-	3	2	3	3	4	2		3	-		
No.	5	4	-	-	7	2	1	5	12	-	6	4	10	17	47	2		4	-	126	7.00
Species BB																					
WTBB	1	10	16	-	-	1	-	-	6	-	1	-	-	2	1	-		5	1	44	2.44
RTBB	5	5	14	1	-	-	-	-	-	-	-	-	3	1	-	-		9	-	38	2.11
CCBB	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-		-	-	2	0.11
TBB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-
HB	1	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-		-	1	4	0.22
SpR	4	2	2	2	-	1	-	-	2	-	1	-	2	2	1	-		2	2		
No.	8	15	30	2	-	1	-	-	7	-	1	-	4	3	1	-		14	2	88	4.89

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