Solar farm development and biodiversity

Planning Guidance Note for Suffolk

Note for LPAs: This draft Planning Guidance has been prepared by Suffolk Wildlife Trust for the East Anglian Biodiversity and Planning Group for the consideration of local planning authorities (LPA) in Suffolk and the wider East Anglian region (although it has been written with a focus on Suffolk). The Eastern England region has seen a significant increase in applications for solar farm development in recent years. It is our hope that LPAs will be able to use this draft Guidance Note as a template for their own Planning Guidance on solar farm development and biodiversity to ensure that the location and design of these developments adequately protects and increases biodiversity and maximises potential added natural capital benefits.

Some local authorities in East Anglia, such as Chelmsford City Council, have already adopted Supplementary Planning Documents for Solar Farm Development.[i1] Chelmsford's Solar Farm Development SPD includes sections on Environmental Impact Assessment and Biodiversity and Nature Conservation. This Draft Planning Guidance provides additional detail not included in this broader SPD, so is still of value even where SPDs for solar farm development have already been adopted.

[1] Solar Farm Development SPD, November 2021 (chelmsford.gov.uk)

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1. Introduction

The UK and the world face twin climate and ecological emergencies that will have huge social, environmental, and economic consequences unless we take urgent action to prevent the worst impacts. The UK Government's Net Zero Strategy aims to reach net zero by 2050 and solar energy is set to form a significant part of the new clean energy system in Britain[ii]. The significant new and upgraded energy infrastructure required to support the transition to net zero must be planned, designed, and built with protecting and restoring biodiversity and natural ecosystems as an essential requirement, as the solutions to the climate and ecological emergencies are intrinsically linked.

Suffolk is already seeing a significant increase in solar farm (ground mounted solar array) development proposals coming through the planning system, with one of the country's largest solar farm developments being proposed on the Suffolk-Cambridgeshire border. For planning applications for solar farm developments below the threshold for being considered as Nationally Significant Infrastructure Projects (and therefore approved through the Development Consent Order process), it is crucial that the planning system in Suffolk ensures that potential impacts on biodiversity and the wider natural environment from solar farm development are avoided. The location and design of solar development requires careful consideration to prevent adverse impacts and provide benefits for biodiversity, as well as realise additional natural capital benefits of solar farm development.[iii]

There are significant opportunities for well-planned and well-designed solar development to deliver ecological enhancement and biodiversity benefits alongside clean, low carbon electricity. Potential natural capital benefits of solar farms other than increasing biodiversity include carbon storage, flood mitigation, reduction in soil erosion, sustainable agriculture, and water quality improvements[iv]. For example, soil carbon sequestration can be increased in solar farms where agricultural land is converted to grassland; grassland creation on arable land also reduces soil erosion and improves water quality when compared with intensive agricultural systems.[v] [vi]

2. What is the purpose of this guidance note?

Whilst this is not a statutory document used to determine planning applications, this Guidance Note aims to ensure that applications for solar development in Suffolk consider the range of potential issues related to biodiversity and realise the potential biodiversity and natural capital benefits of solar development in Suffolk. This Guidance Note provides

information on solar development and biodiversity best practice for developers and is intended for use by applicants and decision makers in local authorities across Suffolk. The focus of this document is large scale ground mounted solar arrays rather than small-scale solar installations on buildings and roofs. This is due to the greater potential for large scale ground mounted solar arrays to impact wildlife habitats and biodiversity, as well as to have biodiversity and natural capital benefits if designed and managed well for wildlife. There are some ecological considerations which must be considered when installing small-scale solar installation on buildings and roofs which will also be covered in this document.

3. How to use this guidance note?

This Guidance Note provides advice on how to consider, protect, and enhance biodiversity in new solar development. The guidance can be used by anyone looking to undertake new solar development in Suffolk. Each section provides information about each topic. Whilst not a planning requirement, the Guidance Note can be used to inform site selection, ecological assessment, design, construction, and long-term management and monitoring of solar farms in Suffolk.

4. Large scale ground mounted solar arrays - Biodiversity and nature conservation considerations for solar development in Suffolk

4.1 Mitigation hierarchy and site selection

4.1.1 Mitigation hierarchy

Developers must ensure that the mitigation hierarchy is adhered to, with evidence of its application. The principles of the mitigation hierarchy are to avoid, mitigate and as a last resort compensate for impacts before considering opportunities for ecological enhancement.

4.1.2 Site selection

Sites for solar farm developments must be selected to avoid direct and indirect impacts to designated wildlife sites. This includes Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), Local Natures Reserves (LNRs) and County Wildlife Sites (CWSs).

4.1.3 Irreplaceable habitats

Solar farm proposals, including cabling routes, should not result in the loss or deterioration of irreplaceable habitats, such as ancient woodland and lowland fen. Natural England guidance on ancient woodland recommends a buffer zone of at least 15 metres for ancient woodland to avoid harm[vii]. Solar farm development

should also avoid impacts to Priority habitats (Habitats of Principal Importance[2]), see Priority habitat list on Suffolk Biodiversity Information Service (SBIS) website[viii].

4.1.4 Protected species

Impacts to protected species and Priority Species should also be avoided where possible through consideration of site selection.

4.1.5 Retaining existing ecological features

Existing on-site habitat features such as hedgerows, ponds, scrub, trees, arable weeds, and other existing on-site habitat features should be retained and opportunities to enhance existing features for biodiversity and ecological connectivity incorporated into solar farm design.

4.1.6 Agricultural land

Agricultural land classification should be considered when selecting sites for solar development to ensure no unnecessary loss of high-grade agricultural land in Suffolk. There are also environmental benefits of developing on low-grade agricultural land when compared to high-grade land, as these areas require more inputs, such as fertilisers, to achieve similar yields, so taking them out of production will tend to result in a greater reduction in chemicals that can be harmful for biodiversity in soils and agricultural run-off polluting the water environment.

4.2 Ecological assessment and surveying

4.2.1 Ecological Impact Assessment

A detailed Ecological Impact Assessment (EcIA) should accompany any solar farm proposal, supported by detailed and up-to-date ecological surveys of the site undertaken by a suitably qualified ecologist.

4.2.2 Breeding bird surveys

Where solar farm development is proposed on arable land it is likely that a breeding bird survey will be required, due to the potential presence of skylark on arable farmland. This is especially important as skylark is a Red Listed Bird of Conservation Concern in the UK and there are no documented examples of skylark successfully nesting within the area of a ground mounted solar array anywhere in the UK, even when they are known to have nested on a site prior to construction of a solar farm.[3]

Other farmland bird species should also be considered, including lapwing, grey partridge, and turtle dove. For proposals in Breckland or near the Suffolk Coast, birds

[2] Habitats and species of principal importance in England - GOV.UK (www.gov.uk)

[3] There is however evidence of solar farms can providing foraging opportunities for skylark and other farmland birds, which can be maximized through the design and management of habitat between and around the solar panels.

associated with Special Protection Areas, such as stone curlew, may also need to be considered.

4.2.3 Rare plants

The presence of rare arable plants should also be considered, and a botanical survey may be required if there are nearby records of rare arable plant species.

4.2.4 Protected and priority species

Protected and/or Priority species recorded on site which are not likely to be accommodated within the footprint of the solar farm, such as skylark and lapwing, must be considered in a separate mitigation strategy if found to be present on site.

The presence of all protected and Priority species should be considered within the EcIA. Species most likely to be impacted by solar farm development in Suffolk include farmland birds, arable plants, badgers, bats, great crested newts, and hedgehogs.

4.2.5 Ecological connectivity

The potential for solar farm development to impact ecological connectivity across the landscape and potential for this to impact the movement of wildlife through the countryside must be considered by developers and planners/decision makers.

4.2.6 Aquatic invertebrates

There is some evidence that aquatic insects, bats, and birds may mistake large solar arrays as water bodies, causing them to attempt to breed on them, drink from them or land on them. This potential impact should be considered for any solar farm development close to protected sites which are designated for their importance for these species. Further monitoring of solar farms is required to confirm or disprove this potential impact to wildlife from solar development.

4.3 Ecological design and enhancement

4.3.1 Understanding baseline conditions

Habitat creation on solar farms must consider existing site conditions including soil types, hydrology, nutrient levels, and which habitats are characteristic of the local area. Natural regeneration should be considered to allow species naturally occurring within the seed bank and within the local area to develop on site. Where natural regeneration is not used, habitat creation must use native species. Habitat creation objectives should also consider local conservation priorities and provide benefits for priority species where possible. For example, turtle doves are a key conservation priority in Suffolk and habitats for this species could be incorporated into solar farms which would also have significant benefits for wider species including numerous birds as well as invertebrates and hazel dormice (another priority species).

4.3.2 Natural capital

Natural capital benefits of solar farms other than increasing biodiversity should be considered when planning and designing habitat creation within solar farms. The natural capital benefits of solar farms include carbon storage, flood mitigation, reduction in soil erosion, sustainable agriculture, and water quality improvements. For example, hedgerow creation and/or tree planting in the right locations on-site could help to reduce run off during high rainfall, mitigating local flood risk as well as increasing ecological connectivity.

4.3.3 Habitat creation

4.3.3.1 Grassland

Establishment of species-rich grassland can be difficult and is dependent on soil types, land use history and successful long-term management. Solar farm developments should consider alternative habitats to grassland where this is suitable. For example, pockets of woodland, scrub and ponds can be incorporated into solar farm design in areas where shading on or by solar panels is avoided. Woodland and scrub can be manged by coppicing on a shorter rotation to avoid panel shading. Coppicing creates a dense woodland structure which is more suitable for nesting birds. Woodland within solar farms is also protected from deer browsing, which is has a negative impact on woodland in the wider landscape. Woodlands free from deer browsing pressures have an improved structure which provides significant biodiversity benefits. These factors should be carefully considered when Biodiversity Net Gain assessments are undertaken.

Other habitats which could be created on site include areas of rough or tussocky grassland, which require less management and provide habitat for species such as reptiles, small mammals, and birds of prey. Field margins and corners can be enhanced by sowing *native* nectar-rich and/or winter bird seed mixes as well as being used to create arable plant areas. Management that includes cultivation to create areas of bare ground – especially on sandy soils – can help arable plants establish and benefit and wide range of wildlife including reptiles, invertebrates, and turtle doves. Woody material from any unavoidable hedgerow or tree works on site can also be used to create features for amphibians, reptiles, and invertebrates including hibernacula and log piles.

4.3.3.2 Hedgerows

Existing hedgerows on site should be enhanced by filling any gaps, improving management for wildlife, and linking to improve connectivity for wildlife across the site. New hedgerow, scrub and woodland planting can be used to visually shield solar farm developments from nearby settlements and reduce landscape impacts, as well

as providing benefits for biodiversity. Hedgerow and scrub planting can also be used to improve security on site.[4]

4.3.3.3 Ecological connectivity

Solar farm developers should consider how wildlife habitats created and enhanced within and adjacent to solar farms can help to improve ecological connectivity. Adverse effects on the ability of wildlife to move through the landscape should be minimised by design of fencing to prevent it acting as a barrier to the movement of small and medium sized mammals that do not need to be excluded from the area of the solar array (unlike deer).

4.3.3.4 Solar panel design

Design of solar farms, including the height of solar panels above the ground and distance between solar panels, is important for the establishment and management of habitat between the solar panels. For example, to manage grassland between the solar panels using sheep grazing, the front edge of the panels should be at least 70cm high to allow sheep access to grass beneath the panels, and increasing the distance between the rows of solar panels to allow more light to reach the ground is important for encouraging greater diversity of species within the sward, and hence its biodiversity value.

4.3.3.5 Boundary habitats

All solar farm proposals should have wildlife-friendly boundaries which allow protected and Priority mammal species, such as hedgehogs, to pass through solar farm developments. Options include minimum 100mm gaps at the base of fences and gates, regular mammal gates and fencing with wide gauge wire spacing to allow species to pass through fencing. Visible lighting should be avoided on solar farms to reduce impacts to nocturnal wildlife such as bats, as well as reducing landscape impacts.

4.4 Biodiversity net gain

The Environment Act 2021 sets out several policies which aim to halt biodiversity declines and restore natural habitats. A key part of the act is the government's new approach to development, known as Biodiversity Net Gain (BNG), an approach designed to leave biodiversity in a measurably better state after development than it was before. As part of the Environment Act 2021 most development that falls under the Town and Country Planning Act in England will be required to demonstrate a minimum 10% increase in Biodiversity Units compared with pre-development levels. This requirement is currently expected to become mandatory for many sites from January 2024.

[4] Guidance on planting and managing hedgerows for wildlife: Planting a hedgerow for wildlife | Suffolk Wildlife Trust

Biodiversity Net Gain will be measured using the biodiversity metric tool, also known as the Defra metric, which has been designed and tested by Natural England. The biodiversity metric uses information on the type, size, condition, and location of habitats on a site to calculate the number of 'biodiversity units' present. Any change in these habitats can then be added to the biodiversity metric to calculate the change in biodiversity units that will result. This will then show what a developer needs to do to achieve 10% (or any other %) Biodiversity Net Gain. Developers are allowed to do this through creating new habitats or enhancing habitats that already exist on the development site (on-site) or away from the development site (off-site).

Large scale solar farm development seeking permission through the local planning system will be subject to BNG requirements.

There are some specific considerations for BNG delivery that are unique to solar farm development, which tends to be located on arable or intensively grazed farmland and by its nature typically achieves anything between 20% and 100% BNG, due in large part to the standard practice of converting farmland within the area of the solar panels to higher biodiversity value grassland for ease of management during the operational lifetime of the solar farm.[5]

4.4.1 Ensuring %BNG is 'additional'

Solar farm proposals should aim to achieve significantly more than 10% biodiversity net gain, due to the ease with which they typically exceed this through the standard practice of converting farmland to higher biodiversity value grassland for ease of management during the operation of the solar farm. Gains achieved in this way are not considered to be 'additional' to what would be achieved by a typical solar farm development in the absence of a BNG requirement. Applications for solar farm developments should demonstrate how they will deliver additional BNG on top of any achieved through the conversion of farmland to higher biodiversity value grassland within the area of the solar array.

4.4.2 Selling 'excess' Biodiversity Units

'Excess' Biodiversity Units – any above those needed to achieve the minimum required level of BNG – generated through the conversion of farmland to higher biodiversity value grassland within the fenced area of the solar array should not be sold as off-site gains for other developments. As described in 4.2.1, Biodiversity Units resulting from this standard operational management practice are not considered to be additional to any biodiversity uplift that would be achieved by a typical solar farm in the absence of any BNG requirement, and therefore are not considered as eligible for sale as off-site gains for development taking place elsewhere.

Further, selling excess Biodiversity Units generated in this manner would undermine the potential of biodiversity net gain to genuinely contribute to nature's recovery in

[5] Solar Energy UK Briefing: The Facts About Solar Energy. Briefing | Fact Checker (solarenergyuk.org)

Suffolk, as well as reduce the potential of this policy to contribute to the aims of the Environment Act 2021.

4.4.3 Ensuring BNG habitat creation plans are realistic

It is important that target habitat type and condition for habitat creation or enhancement beneath and between the solar panels are realistic and do not overestimate biodiversity gains. For example, it is highly unlikely that solar farm proposals will be able to create higher distinctiveness grassland habitats such as *lowland meadow*, *lowland dry acid grassland*, or even *other neutral grassland*, between or beneath rows of solar panels on ex-farmland, where high residual soil nutrient levels and the shading effect of panels will impact the establishment of plant species and the resulting species diversity and biodiversity value of these habitats.

There is currently no industry-wide standard approach to applying BNG to the (typically grassland) habitats established between and beneath solar panels, combined with a lack of evidence from the application of the Defra metric to these habitats post-development. In the absence of evidence that more species-rich semi-natural grassland can be successfully established and maintained beneath or between rows of solar panels we would advise solar developers and their consultants to err on the side of caution. Grassland directly beneath solar panels is unlikely to exceed the criteria for *modified grassland* in poor condition. Between the rows of panels, where more light (and rain) can reach the ground, modified grassland might achieve moderate condition, but the evidence does not yet exist to be confident that this will always be the case.

With the right management, it may be possible to establish and maintain higher distinctiveness species-rich grassland such as *other neutral grassland* or *lowland acid grassland* on land around the outside of the solar panels but still within the fenced area of the solar farm.

4.5 Construction and operation

Construction of solar development should be timed and sensitively undertaken to allow for minimal ground disturbance and therefore quicker establishment of post-construction habitats. Low-pressure construction vehicles should be used to reduce soil compaction and improve establishment of post-construction habitats.

Establishment of habitats can be undertaken prior to construction if well-planned. Sowing of wildlife flower seed mixes should be undertaken at least one year prior to commencement of construction which will bind the soil improving conditions for construction. Remedial works may be required post-construction to reseed areas of bare soil.

Pre-commencement surveys may be required for mobile species such as nesting birds and badger.

Maintenance operations on site should be planning and timed to avoid disturbance to wildlife on-site. For example, maintenance operations will need to be timed to avoid disturbance to nesting bird species.

4.6 Long-term management and monitoring for wildlife

4.6.1 Landscape and Ecological Management Plan (LEMP)

A Landscape and Ecology Management will need to be submitted detailing how target habitats will be created and managed in the long-term, this should last for the 30 years required for biodiversity net gain in accordance with the Environment Act 2021 or the lifetime of the solar farm.

4.6.2 Ecological monitoring

It is recommended that application include details of proposed ecological monitoring in addition to that required for BNG purposes to determine how species populations change on site over time.

There is a lack of evidence for the efficacy of establishing different grassland types within solar farms and long-term ecological changes in terms of species composition, diversity, and abundance for different taxonomic groups. Long-term ecological monitoring of solar farms would help to create this evidence base. There are several species groups in particular which require further long-term monitoring to determine how solar development impacts them. For example, there is some evidence to suggest that aquatic insects may mistake solar arrays for water, however more evidence is needed to confirm or disprove this theory.

4.6.3 Management considerations for solar farms:

4.6.3.1 Ideally livestock will be removed and/or grassland left unmown between April and July to allow plants to flower and set seed, providing a nectar resource for invertebrates.

4.6.3.2 Some areas of grassland should be left uncut over winter to provide habitat for a range of species and allow invertebrates such as butterflies to overwinter in grass stems.

4.6.3.3 Hedgerows on site should be managed for wildlife, by avoiding cutting during the bird nesting season (March to August inclusive), not cutting hedges every year, allowing them to grow at least 2 metres wide and tall and leaving an uncut grass margin along the base of the hedge.

4.6.3.4 Management operations on site should avoid the bird nesting season (March to August inclusive) to reduce disturbance.

5. Small-scale solar installation on buildings and roofs - Biodiversity and nature conservation considerations for solar development in Suffolk

5.1 Mitigation hierarchy and site selection

The installation of small-scale solar installation on residential and non-domestic buildings and roofs may be 'permitted development' in some cases with no need to apply to the Local Planning Authority for planning permission. See the Planning Portal Interactive website for more details on development by householders[ix] and non-domestic buildings[x] that requires consent. All relevant wildlife legislation still applies with 'permitted development' so any potential negative impacts to protected species, such as nesting birds and bats must be addressed by developers and householders.

Developers and householders proposing to install small-scale solar installations must ensure that they avoid impacts to protected species. It is still necessary to adhere to the principles of the mitigation hierarchy to avoid, mitigate and as a last resort compensate.

5.2 Ecological assessment and surveying

Developers and householders proposing to install small-scale solar installations should ensure that they avoid potential impacts to protected species, in particular nesting birds and bat which may be using roofs to nest and roost. It may be necessary for a Preliminary Roost Assessment, and possibly an Ecological Impact Assessment (EcIA), to be carried out by a suitably qualified ecologist, supported by ecological surveys of the site undertaken to determine likely impacts on protected species.

The installation of small-scale solar installation on buildings and roofs could impact nesting birds and bats by blocking access to nesting and roosting sites.

6. Supporting documents required for planning applications

6.1. Ecological Impact Assessment

6.2. Biodiversity Net Gain Assessment – accompanied by full biodiversity metric calculations, baseline habitats plan (including condition assessments), recommended/proposed habitat plan for the site. *For full details on what is required for outline, full and reserved matters application in Suffolk see:* Biodiversity Net Gain Interim Planning Guidance Note for Suffolk, May 2023

6.3. Landscape and Ecology Management Plan

6.4. Construction and Environment Management Plan

7. Glossary

Biodiversity – The term given to the variety of life on the planet.

Biodiversity net gain - Biodiversity net gain is development that leaves biodiversity in a measurably better state than before.

Carbon sequestration – a process by which carbon dioxide is removed from the atmosphere and stored in solid or liquid form. Carbon can be stored in the natural environment such as in soil or habitats such as forests.

Mitigation hierarchy - The Mitigation Hierarchy constitutes a fundamental approach to development and is a pre-requisite for biodiversity net gain. The principles of the mitigation hierarchy are – 'avoid', 'mitigate' and 'compensate'. It must also be recognised that not all habitats can be re-created, such as ancient woodland, which are considered to be irreplaceable.

Natural capital - Natural capital is a term for the habitats and ecosystems that provide social, environmental and economic benefits to humans.

Net zero - means that any carbon emissions created from a project, product or service is effectively cancelled out by making changes to reduce carbon emissions to the lowest amount (and offsetting as a last resort). Net zero is achieved when the amount of carbon emissions added are no more than the amount taken away.

8. Additional resources

Solar Habitat: Ecological trends on solar farms in the UK. Solar Energy UK, June 2023.

BRE (2012) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene.

Biodiversity Net Gain Interim Planning Guidance Note for Suffolk, May 2023

9. References

[i] Solar Farm Development SPD – download from Supplementary Planning Documents and planning advice notes (chelmsford.gov.uk)

[ii] Powering Up Britain - The Net Zero Growth Plan (publishing.service.gov.uk)

[iii] Solar Panels and Wildlife Review 2019 (bsg-ecology.com)

[iv] The Natural Capital Value of Solar • Solar Energy UK

[v] Carbon Storage and Sequestration by Habitat 2021 - NERR094 (naturalengland.org.uk)

[vi] Convert arable land to permanent grassland - Farming (blog.gov.uk)

[vii] Ancient woodland, ancient trees and veteran trees: advice for making planning decisions - GOV.UK (www.gov.uk)

[viii] Suffolk's Priority Habitats | Suffolk Biodiversity Information Service (suffolkbis.org.uk)

[ix] Planning Portal - Interactive guidance

[x] Planning permission - Solar panels - non domestic - Planning Portal