

# BIODIVERSITY AND SOLAR FARMS

## 1. INTRODUCTION

The impacts of solar farms on biodiversity are central in the decision-making process to give planning approval for such schemes. It is important to determine if solar farms enhance or reduce biodiversity. If biodiversity is reduced then mitigation factors need to be considered, and their efficiency.

## 2. WHAT IS BIODIVERSITY?

Biodiversity can be defined as the totality of genes, species and ecosystems of a region. A further definition would be the number of plants and animals that exist in a particular area.

## 3. WHY IS BIODIVERSITY IMPORTANT?

Habitats are homes for plants and animals; they come together to form systems called ecosystems. Ecosystems are central to the maintenance of systems required for life; the Carbon cycle, the Nitrogen cycle and the Water cycle. In nature the more complex the system then the more stable it is; elements of a complex system can be removed without a system collapse. Ultimately biodiversity equates to planetary stability.

## 4. BIODIVERSITY AND GOVERNMENT POLICY

In 2019 DEFRA confirmed that delivery of biodiversity net gain would be a mandatory requirement for all new developments in England.

The Environment Act 2020 includes the mandatory approach to ensure biodiversity net gain.

Biodiversity 2020 is a national strategy for England wildlife and ecosystem services <sup>(4)</sup>.

At a local authority level there is a responsibility for enhancing biodiversity and, through the planning authority, has a duty to conserving biodiversity as part of planning decision-making. Conserving biodiversity can also include restoration or re-enhancement to a population or habitat <sup>(2)</sup>.

## 5. BIODIVERSITY AND PLANNING POLICY

Government policy as described in section 4 is defined in planning policy as written in the National Planning Policy framework <sup>(4)</sup>. Key paragraphs are quoted below:

### **“15. Conserving and enhancing the natural environment**

17.0. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions.”

In a survey carried out by BSG Ecology in 2019 <sup>(2)</sup> the following statement was made; “evidence of solar farms impact on biodiversity remains limited.... there is little empirical data on the subject”.

The BSG report goes on to say that “Ground mounted PV panels have the potential to cause the highest impact on nature as they are installed on land which may have at least some value to wildlife”.

Natural England <sup>(9)</sup> recommends the avoidance of solar developments in or near to areas of high ecological value. In the same report it was stated that “the lack of evidence available relating to the ecological impact of solar farms is concerning”

Limited studies have considered biodiversity impacts on different species;

### 5.1 Insects

Robertson at Michigan State University noted that solar panels posed a false habitat layout to 300 species of insects and thus may have far reaching cascading adverse effects to food chains <sup>(12)</sup>. This conclusion was mainly based on Hungarian research that noted aquatic invertebrates were attracted to solar panels as a stimulus to induce egg-laying. The Hungarian research concluded it was important to site solar farms away from important/sensitive aquatic invertebrate populations.

### 5.2 Birds

Research by McCrary et al and Harrison et al <sup>(8/13)</sup> noted 70 bird fatalities (over a 40 week period) were recorded as a result of collision with solar farm infrastructure. Studies suggest water birds may confuse solar arrays with water bodies. Birds such as swallows that drink on the wing could be at risk. Most of the studies are from the USA and again Natural England 2017 <sup>(9)</sup> note lack of robust data.

### 5.3 Bats

Studies indicated that bats attempted to drink from panels and occasionally collided with them <sup>(6)</sup>. Natural England concluded research was inclusive but raised overall concerns <sup>(9)</sup>.

### 5.4 Other Biodiversity concerns

A 2017 report <sup>(7)</sup> states that solar farms may fragment habitats and PVs can effect movement of species, hiding places, preying strategies and availability of food. Effects on local microclimates and soil temperature were noted. A study in 2016 <sup>(1)</sup> stated that species diversity and plant diversity was lower under PV arrays. In 2011 Natural England noted <sup>(9)</sup> the negative impact solar development could have in areas of high ecological value.

## 5.5 Comparative Studies

There are few comparative studies to analyse the effects of solar farms on biodiversity. One study in 2016 was published by UK Solar Trade (<sup>13</sup>). The research examined 11 Solar Farms alongside neighbouring control plots and found that solar farms had a positive impact on biodiversity for a range of plant and animal species when combined with an appropriate land management plan. The research was however based on small sites (maximum 30 ha) and the survey area was generally 50% of this.

A key statement in the comparative study was “appropriate land management plan”. Studies that suggest biodiversity enhancement invariably refer to edges of the development, areas between ponds and habitats created outside of the PV arrays. Recommendations for minimising and offsetting impacts of solar farms are;

Gasparalos et al (2017) suggest developing biodiversity-friendly operational procedures. Recommended practices include the following (BRE, 2014; RSPB, 2014; Esteves, 2016)

- Installation/retention of boundary features such as hedgerows, ditches, stone walls, rough grassland, field margins and scrub.
- Planting pollen and nectar strips.
- Security fencing – plant growing climbers e.g. honeysuckle, and ensure there is 20-30m gap between the base of the fences and the ground to allow small wildlife to pass through.
- Grassland habitat – e.g. wildflower meadow and tussocky grassland.
- Controlled grazing by sheep between panels, with a pause in spring and summer to allow vegetation growth.
- Installation of artificial structures such as nest boxes, hibernacula and log piles. (BSG 1)

17.1 Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework <sup>53</sup>, take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries

<sup>53</sup> Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality.

In the context of planning approvals for solar farms note <sup>53</sup> above is of particular relevance and importance.

“Habitats and biodiversity”

17.4 To protect and enhance biodiversity and geodiversity, plans should:

- a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity<sup>56</sup>, wildlife corridors and stepping stones that connect them and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation<sup>57</sup>; and
- b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity”.

Protecting MMV (Best & Most Versatile Land) ALC Grade 1, 2 & 3a remains a priority <sup>(10, 11)</sup>.

The paragraphs above illustrate the importance of protecting and enhancing biodiversity in determining if planning permission can be given to any application.

## 6. **AGRICULTURE & BIODIVERSITY**

### **Impacts of Solar Farms on Biodiversity – a Review**

This section reviews the available research and literature relating to the effects of solar farms on biodiversity.

It is recognised that intensive farming methods have not encouraged biodiversity. However, a move to sustainable farming methods enhanced by the Countryside Stewardship Scheme has assisted in promoting enhanced biodiversity on farmland.

The Stewardship Scheme is to be replaced by the Environmental Land Management Scheme. In an introduction to the scheme the Secretary of State for the Environment states;

“The focus of our future policy will be the three components of Environmental Land Management. The Sustainable Farming Incentive will be a universal scheme open to all farmers and will support sustainable approaches to farm husbandry to deliver for the environment, such as actions to improve soil health and water quality, enhance hedgerows and promote integrated pest management. Local Nature Recovery will be a new scheme that eventually replaces Countryside Stewardship and will focus on building back nature into and beyond our farmed landscapes”. <sup>(3/4)</sup>

## 7. **SUMMARY**

It would appear that limited research suggests that there is a negative impact on biodiversity from solar farms. Various mitigations can affect this impact. However, agriculture policy is also developing significant measures that will increase biodiversity on farmland.

## 8. **CONCLUSIONS**

Natural England conclude <sup>(10)</sup>

“The lack of evidence relating to the ecological impact of solar farms is concerning. It has led to authoritative organisations making speculative arguments and publishing information that on occasion appears to conflict. For conservation organisations to provide sound advice that is coherent and consistent, evidence is needed. The move towards renewable energy sources by many governments is progressive and admirable, however more needs to be done to understand the interaction between these new technologies and the ecology that they are ultimately designed to protect”

“In the literature, concerns have been raised that solar PV developments have the potential to negatively impact a broad range of taxa including birds, bats, mammals, insects and plants. In light of this, it is highly recommended that research is undertaken into the ecological impacts of solar PV arrays across a broad range of taxa at multiple geographical scales”.

## 9. Therefore:

- 9.1 Much more research and evidence is required before it can be stated that there will not be a significant adverse biodiversity impact from solar farms.
- 9.2 Until such research is complete it would be premature to give approval for large scale solar schemes as after a few years considerable ecological damage could be achieved that would be difficult to correct.
- 9.3 Current advice is to site solar farms away from areas of value. It should be noted that the Longfields site is near an SSSI, has the river Ter on the norther boundary of the site, has significant areas of ancient woodland and other large areas of valuable woodland habitat. There are several kilometres of specie rich hedgerows and other water areas in and around the site.
- 9.4 On the basis of an adverse impact on biodiversity, the Longfields Solar Farm proposals should not proceed.

## References

1. Armstrong et al 2016 *Diversity under PV arrays*
2. BSG ecology 2019 *Impacts of Solar Farms on Biodiversity*
3. Defra 2020 *Environmental Land Management*
4. Defra 2020 *The path to sustainable farming*
5. Gasparatos et al 2017 *Renewable energy and biodiversity*
6. Grief & Siemens 2010 & 2017 *Inate recognition of water bodies in bats*
7. Harrison et al 2017 *Evidence review for Natural England*
8. McGrary et al 1988 *Avian Mortality*
9. Natural England 2011 TIN 101
10. Natural England 2017 NEE RO12
11. National Planning Policy Framework (NPPF) 2019
12. Robertson 2009 & 2019 Michigan State University (Conservation Biology)
13. UK Solar Trade 2016 *Effects of Solar Farms on Biodiversity – A comparative study.*