

Solar parks: maximising environmental benefits

Solar energy, in common with other forms of renewable and low carbon energy sources is a valuable part of the UK's energy future. This information note pulls together a summary of advice relating to solar parks, their siting, their potential impacts and mitigation requirements for the safeguarding of the natural environment and the opportunities there may be for financial support through environmental stewardship. The aim is to help developers and landowners consider how they might maximise the environmental benefits of a solar park whilst avoiding or minimising the risk of damaging environmental features. If you would like to discuss any issues please see the *Further information* section below for contact details.

Definition

Solar parks are installations of multiple solar photovoltaic (PV) modules, usually mounted 1.5-2.5 metres above either greenfield or brownfield land occupying between 2 and 15 hectares. These figures are based on current installations and technology and this note will be updated as the technology and circumstances develop. Other notes also may be written as and when required and information becomes available.

Background

Like any type of development, solar parks have the potential to affect the landscape, natural habitats, soils and geological and archaeological features. Damage may be caused during operation or when panels are being erected or decommissioned. Cumulative impacts might also occur when parks are sited close to one another. Well located and designed solar parks may not only avoid negative environmental impacts, but may also deliver additional benefits to the environment beyond low carbon energy.

Some solar farms will need planning permission from the planning authority, for more information contact your local council. If you are considering developing a solar park you can avoid any unnecessary delays and costs by discussing

your proposals with Natural England at the earliest opportunity.



German solar farm with sheep grazing below panels

Our specialists should be able to advise you from the outset on what to do to safeguard the environment. To date (June 2011) Natural England has recommended consent to 90% of all onshore energy schemes (of all types) and 100% of those offshore. Schemes which progress smoothly share some common characteristics, including engagement with Natural England well before the formal consultation phase required by legislation.

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Key points

A range of technical considerations inform site selection and the detailed design of solar park developments. These include:

- solar resource;
- topography; and
- proximity to existing grid infrastructure.

Environmental considerations that also need to take into account include:

- soils and soil structure;
- wildlife habitats and designated sites;
- effects on specific wildlife species;
- damage to designated landscapes;
- effects on the character of the landscape;
- damage to geological and archaeological features; and
- implications of water run-off.

The importance of vegetation

Vegetation is vital for wildlife, and steps should be taken to reduce the risk of reducing vegetation, for example, through excess shade or lack of rainwater. Good vegetation cover is also needed to protect soil and water, as well as provide grazing for livestock. Therefore the need to retain, encourage and manage appropriate vegetation cover needs to be considered early in the design of any solar farm.

Soil protection and husbandry

The long term capability of agricultural land, in particular the *Best and Most Versatile* agricultural land, needs to be safeguarded during the construction, operation and decommissioning of solar panels. To maintain good soil structure and water infiltration:

- soil organic matter levels should be retained or enhanced;
- compact areas of soil should be loosened; and
- existing land drainage maintained.

Excessive run-off may need to be diverted to grassed soak-aways so as to avoid soil erosion.

Good soil husbandry includes avoiding unnecessary soil disturbance and avoiding trafficking on soils when they are wet as this will cause compaction. Trackways and other sealed areas should have carefully designed drainage to avoid creating a pathway for erosion.

Reversibility and permanence also need to be considered. How easy would it be to convert and decommission these areas and put them to other use?

Any development should leave the land capable of supporting agriculture, especially if it is *Best and Most Versatile*, and/or semi-natural habitats in the future.

For information on identifying best and most versatile agricultural land see TIN049 *Agricultural Land Classification: protecting the best and most versatile agricultural land* and for guidance on soil protection see the Defra publication *Construction Code of Practice for the Sustainable Use of Soil on Construction Sites*. Details are available in *Further information* below.

Protecting watercourses

The key to avoiding increased run-off and soil into watercourses is to maintain soil permeability and vegetative cover. Permeable land surfaces underneath and between panels should be able to absorb rainfall as long as they are not compacted and there is some vegetation to bind the soil surface. Spraying off vegetation to prevent it growing between the panels would increase the risks of erosion, carbon emissions, run-off and pollution to watercourses.

Any associated infrastructure such as concrete surfaces and tracks should be designed so as to avoid direct run-off into watercourses and other sensitive areas.

The risks of run-off and soil erosion are lowest on low gradient land and cohesive soils and highest on dry, sandy and steeply sloping soil surfaces.

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Biodiversity

Protecting wildlife

The location of solar parks should avoid sites of high wildlife value, in particular, designated sites such as Sites of Special Scientific Interest (SSSIs), Special Protection Areas and Special Areas of Conservation. Any development proposed on land within or adjacent to designated sites is likely to have an adverse effect on the environmental features for which they were designated, in particular during the construction phase.

Solar parks can affect wildlife where they are near sites of high wildlife value. For example, near a bat roost where the land may be used for foraging or to navigate to foraging sites, thereby reducing the foraging area available to them. There are some indications that very large, unbroken expanses of uniform solar panels may mimic water surfaces on which insects may attempt to settle and breed. If this proves to be a problem, then mitigation measures will be sought and publicised.

Very little research has been conducted to date, but one laboratory study undertaken by Bjoern Siemers and Stefan Grief (2010) showed that bats attempted to drink from the panels and occasionally collided with them. If the plates were vertically aligned they often crashed into them when attempting to fly through them. Juvenile bats are expected to be more prone to this behaviour. Some birds and invertebrates are also likely to be affected by solar parks developed close to areas of high wildlife value.

Where a solar park is proposed within or close to such sensitive sites, the planning application should include a detailed assessment of the likely impacts on the ecological interest of the sites and contain practical measures which avoid or minimise any adverse effects on their features of interest. Any solar park close to a designated site will need to demonstrate that it would not compromise the objectives of the designation.

Biodiversity: mitigation

With specialist ecological advice there may be opportunities to mitigate potential impacts on species and habitats through measures such as:

- Precise layout and spacing of PV modules.
- Habitat creation and enhancement on adjacent land to offset habitat loss.
- Timing of construction activity.
- Careful use of lighting.

Sites with low wildlife value, for example, intensive arable or grassland fields are likely to offer greatest opportunity for wildlife. Not only will they avoid adverse impacts, but they are also more likely to deliver environmental benefits.

Biodiversity enhancement

Solar park sites, especially on sites of lower existing biodiversity value may offer opportunities to deliver enhancement measures.

These should be considered on a site by site basis and are likely to be most effective when they contribute to local biodiversity priorities identified through your local Biodiversity Action Plan. These should be available on the web.

Creating grasslands and hedgerows on the areas around the panels is likely to offer most benefits for plant and animal communities. You can also consider creating ponds where the conditions are appropriate and planting wild bird seed mixtures for birds and nectar and pollen rich margins for bees and butterflies.

You need to consider what ongoing management will be required to maintain the habitat and who and how this will be done. You can get advice from a variety of sources, including consultants and voluntary groups, as well as Natural England.

Some habitats require more management than others. For example if you want to establish flower-rich grassland around panels you will need to graze or cut and remove the herbage. Grazing is best and sheep or goose grazing is likely to be more suitable than cattle grazing, which is unlikely to be practical.

Establishing native trees and hedgerows will provide nesting, roosting and foraging opportunities for birds and invertebrates. They can also help screen the panels where they may be intrusive in the landscape.

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When planning and creating habitats consider long term management issues, such as:

- Is the management sustainable while the park is operating?
- Will the habitat survive and continue to be managed once the park has been decommissioned?

A management plan should help establish clear objectives and responsibilities for management and maintenance of any habitats created. The plan should also consider the budget needed to cover regular maintenance. If you are not the landowner, then local farmers may be best able to do this flexibly in response to need.

Landscape

It is recognised that solar parks can change the character and visual experience of a given area or landscape, and that they may become an element of the future UK landscape as part of our response to climate change. Careful site selection and design is the best way to avoid or minimise potential adverse landscape and visual impacts.

The location and design can be informed by existing Landscape Character Assessments and by responding to any landscape and visual assessments that are undertaken.

Designated landscapes

The presence of a designated landscape for example a National Park or an Area of Outstanding Natural Beauty is likely to reduce the degree to which a solar park can be successfully accommodated, and a proposal within, or close to, one of these sites will need to demonstrate that it would not compromise the objectives of designation.

Landscape character considerations

Table 1 on page 6 identifies landscape character factors that can aid site selection and design. It provides a general guide, but is not a rigid checklist as most landscapes will display a mixture of factors indicating both greater and lesser degree to which solar PV parks can be accommodated, these should be considered 'in the round'.

Visual considerations

Generally impacts are likely to be greater in hilly areas and more easily avoided or mitigated against in flatter areas. Solar parks are also likely to be more acceptable where there are simple landscape patterns, such as those associated with later phases of agricultural enclosure.

Where the land form is flatter existing and new natural features (for example, trees, hedgerows, ridges) as well as buildings, roads and railways are more likely to screen solar parks.

Historic environment

The historic environment is linked to wider landscape considerations and in some locations can also be an important feature in its own right. Solar parks should not be located on Scheduled Ancient Monuments. Other archaeological sites should also be avoided as they could easily be damaged, even where they are not visible above soil level.

Geology and geomorphology

Geological and geomorphological features may be designated as SSSIs or Local Geological Sites or may be an important part of the local landscape character. The siting of solar parks should take full account of designated geological and geomorphological features and in particular ensure they do not impact of the integrity and visual appreciation of geomorphological landforms and processes.

Landscape enhancement

Where enhancement measures (these may also be biodiversity measures) will contribute to a local landscape strategy or enhancement plan, solar park developments may be able to leave a positive landscape legacy.

Single Payment Scheme

If you have land which is being developed as a solar park, you will need to consider whether it needs to be deducted from any claim for payments under the Single Payment Scheme (SPS). This section explains how the SPS eligibility rules relate to solar park land.

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To be eligible for SPS, the land must be predominantly used for agricultural activity and, with limited exceptions, this requirement applies throughout the whole calendar year. For further information about the SPS eligibility rules please read the latest version of the SPS Handbook for England which is available on the Rural Payments Agency website (see link in *Further information* below).

SPS eligibility: land use

For a land parcel to be eligible for SPS, you must be able to demonstrate that the land is predominantly used for agricultural activity. This is easier to do if the land is being grazed or harvested rather than if it is just being kept in Good Agricultural and Environmental Condition (GAEC).

In a land parcel which is predominantly used for agricultural activity, any areas which are taken up by the solar panels themselves, in a way that does not allow the areas underneath to be grazed or used for agricultural activity, will not be eligible for SPS. These areas must therefore be shown on the Rural Land Register (RLR) as SPS ineligible features, and must be deducted from any SPS application.

Where the solar panels are elevated from the ground, such as on a mast or framework of multiple poles, the area of the mast itself (or of the poles), and any associated hard-standing, is not eligible but the land surrounding it (ie under the panels) may be eligible, provided it can still be used for agricultural activity, for example if it is capable of being grazed. Such eligible land may be claimed for SPS, and should be shown on the RLR as part of the maximum eligible area for SPS.

If the predominant use of the land parcel is for solar panels, ie non-agricultural activity, the whole land parcel will be ineligible for SPS.

SPS eligibility: land availability

The farmer must be carrying out an agricultural activity on the land (at least maintaining it in good agricultural and environmental condition) and have it at their disposal on the date of the application deadline (usually 15 May) of the scheme year. The land must also remain eligible for SPS for the full calendar year.

SPS eligibility during the installation

Depending on how much of the land parcel is affected by the work, and the extent to which it is affected, it is unlikely that the land parcel will be eligible while this is being done. Therefore the land parcel should probably be excluded from the claimed area for the scheme year in which the solar park is being set up.

Agri-environment schemes

Developers and land managers have sought clarification on the extent to which solar PV affects, or is compatible with, Environmental Stewardship agreements. There is some potential for solar PV parks to coexist with agricultural land use and/or land managed for nature conservation benefit. The extent to which this occurs will depend on the existing land use and, where agri-environment agreements are in place, the requirements of those schemes. The criteria used to identify eligible land under SPS also applies to agri-environment schemes.

Entry Level Stewardship

Based on Section 1.3 (the eligibility section) of the 3rd edition of the Entry Level Stewardship Handbook, where the land can be grazed or used for any agricultural purpose then it can count towards the points target for the agreement. However, management options must not be placed directly on this land. Part parcel or boundary options can be located on the specific land parcel as long as they are not directly located on the actual area covered by solar arrays.

Higher Level Stewardship

Your local Natural England Adviser should be contacted for advice when considering Higher Level Stewardship and the impact of solar PV parks. They will be able to interpret the proposals and determine the potential impact from the installation of the solar panels. The issues raised within this guidance should be considered in the round by the adviser before a decision is made regarding an application or agreement.

Cross compliance

If you claim SPS, Uplands Transitional Payment and/or Environmental Stewardship, all your

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agricultural land must also meet the cross compliance requirements, including keeping the land in Good Agricultural and Environmental Condition (GAEC), for the whole of the calendar year.

If you have concerns about complying with any cross compliance rules during the installation of the solar park, it may be possible to get a derogation by requesting one from the Rural Payments Agency in advance of the work taking place and explaining what standards may not be met. See below for a link to the cross compliance advice website.

Further information

Natural England Technical Information Notes are available to download from the Natural England website: www.naturalengland.org.uk. In particular see:

- TIN049 *Agricultural Land Classification: protecting the best and most versatile agricultural land*

See also:

Construction Code of Practice for the Sustainable Use of Soils on Construction Sites
www.defra.gov.uk/publications/2011/03/27/construction-cop-soil-pb13298/

Rural Payments Agency rpa.defra.gov.uk

Cross compliance
www.defra.gov.uk/crosscompliance/

For further information and details of your local Natural England Adviser contact the Natural England Enquiry Service on 0300 060 0863 or e-mail enquiries@naturalengland.org.uk.

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Table 1 Landscape character factors

Factor	Increased chance that solar parks can be accommodated in the landscape	Reduced chance that solar parks can be accommodated in the landscape
Landform (also related to visual factors such as elevation and viewing angle)	Absence of strong topographical variety. Featureless, convex or flat.	Presence of strong topographical variety or distinctive landform features
Landscape pattern and complexity	Simple, regular or uniform	Complex, rugged and irregular
Settlement and man-made influence	Presence of contemporary structures, for example, utility, infrastructure or industrial elements. Presence of roads and tracks in the landscape	Absence of modern development, presence of small scale, historic or vernacular settlement, roads and tracks
Inter-visibility with adjacent landscapes	Little inter-visibility with adjacent sensitive landscapes or viewpoints	Strong inter-visibility with sensitive landscapes. Forms an important part of a view from sensitive viewpoints
Perceptual aspects (sense of remoteness, tranquillity)	Close to visible signs of human activity and development	Physically or perceptually remote, peaceful or tranquil