



*Designing
Nature-Positive
Solar Farms:*

Best Practices for Biodiversity Gains



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As the demand for renewable energy grows, solar farms are becoming increasingly common across landscapes. With thoughtful design and management, solar farms can not only minimise harm but actively contribute to biodiversity and wildlife conservation, as well as providing natural capital benefits such as carbon storage, flood mitigation, reduction in soil erosion, sustainable agriculture, and water quality improvements.

This document outlines the best design practices to ensure solar farms deliver gains for nature alongside energy production.



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1. Site Selection:

Avoiding Ecologically Sensitive Areas

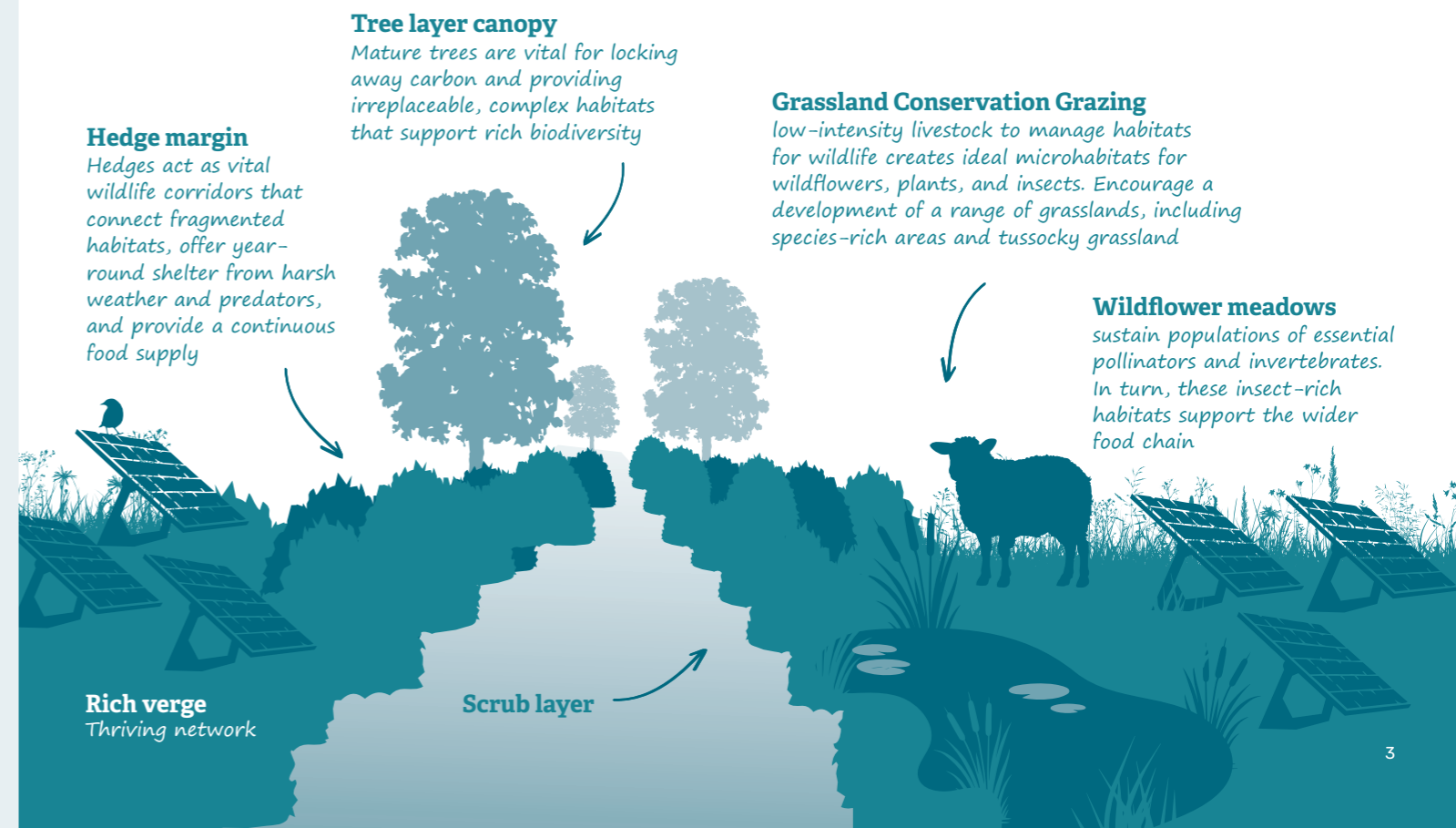
The first and most critical step is choosing the right location:

- **Avoid high-value conservation areas**, including designated sites, wetlands, ancient woodlands, and protected habitats and species.
- The **Local Nature Recovery Strategy (LNRS)** should be used to inform site selection to enable coordination of nature recovery actions across the county. We would expect solar farms to be delivering the aims of the LNRS.
- **Prioritise previously disturbed land** like brownfield sites with low ecological value, low-quality agricultural land or abandoned industrial sites.
- Conduct **ecological assessments** before design stage to allow the mitigation hierarchy to inform design that avoids / minimises impacts on key species, migration routes, foraging areas and sensitive habitats, particularly for bats. This is important and often appears to be a missed opportunity.

Note that these comments relate to the panel areas themselves and all associated infrastructure. For example, cabling work has potential for disturbance from noise and vehicle movements and so cable routes should avoid being located next to ancient woodlands and sensitive and protected habitats. Timing must also be managed to avoid the bird and bat breeding seasons. The location of compounds which require lighting must also be considered, avoiding lighting compounds at night, especially close to woodlands and other sensitive bat/bird habitats.

Utilising rooftops and car parks for solar panels is an efficient way to hit renewable energy goals while preserving agricultural land.

Layers of Life



2. Habitat Enhancement and Land Management

Once a site is selected, opportunities to enhance local biodiversity should be maximised:

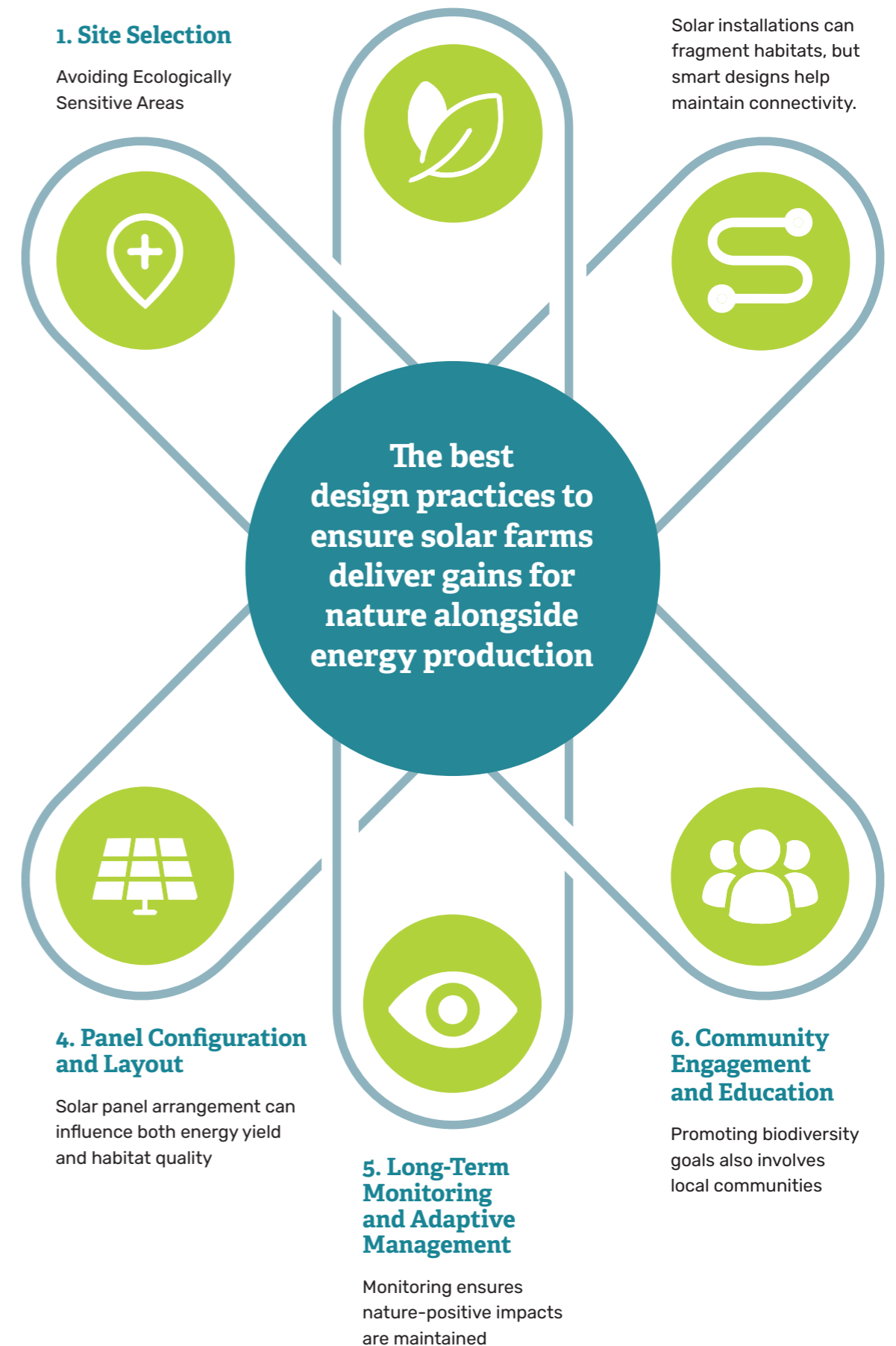
- **Retain existing ecological features** such as hedgerows, ponds, scrub, trees, (especially applies to ancient and veteran trees), arable weeds, and other existing on-site habitat features.
- **Establish wide (at least 15m), species-rich buffers** around the margins of each solar panel parcel. Provide a number of key plant species, preferably of local provenance, and selected on a site-by-site basis suited to local growing conditions and target pollinator communities. These buffers should be maintained as dark corridors and should be of appropriate semi-natural priority habitat such as a mosaic of scrub and species-rich grassland.
- **Plant or maintain hedgerows** at the site boundary where appropriate to the landscape. Hedgerows should be designed to be 3-5m wide, thick and dense with a mixture of species-rich and tussocky field margins to support breeding birds and other wildlife. There should be at least a 15m buffer between the panel area and the hedgerows. A management regime should be put in place to maintain hedgerows at the appropriate height across the site including a three-year rotation for trimming and allowing some stretches of hedgerow to remain untrimmed for longer.
- **Ecotones** should be allowed to establish around existing hedgerows and woodland. This would include allowing woodlands to spread laterally and naturally through wide buffer strips that are not planted. Around hedges, instead of a sudden change from mowed/short grass to hedge, a graduation from short grass through rough/longer grass and ruderal scrub to a hedge should be provided.
- **Plant a shade-tolerant mix of native wildflowers and grasses** between and around panels, and in open areas where light levels are higher, to create pollinator-friendly grassland and ensure they are designed to receive the appropriate management to maintain them as species-rich.
- Use **low-intensity grazing**, such as sheep, instead of mowing to maintain vegetation without disrupting soil health or nesting species. There is some evidence that well managed spring and winter grazing, but not summer grazing, can increase plant diversity on solar farms.
- Aim for a **range of grasslands**, including species-rich areas and tussocky grassland, with a long term plan for how they are managed.
- Create or maintain **variation in vegetation structure**
 - Exclude some areas from management to allow heterogeneity in height.
- Create **ponds or wetlands** of differing sizes and depths with gradients within them, and the provision of different substrates within the ponds and species-rich wetland planting to provide habitat for reptiles, amphibians and invertebrates. Ponds should also have buffers with margins that are seldom mown (every 2-3 years on rotation) or scrub.
- **Minimise nocturnal impacts** - Visible lighting should be avoided, both during construction and operation, to reduce impacts to nocturnal wildlife such as bats. If lighting is necessary it must be minimised and directed away from hedges, woodland and scrub. Robust bat surveys will be needed to inform any other mitigation required and indeed whether lighting would be allowable on site. Any lighting used should also avoid blue/white wavelengths.
- Install **bird and bat boxes, bug hotels, or log piles** where appropriate, to provide shelter for key species. This should only be done when there is a lack of suitable natural breeding, feeding and sheltering locations and must not be a substitute for better management of the landscape to provide the resources wildlife needs to thrive.
- **Avoid the use of pesticides and herbicides** to support healthy insect populations.
- Where impacts on ground-nesting birds are expected, compensatory habitat will need to be provided off-site and close-by. The area or number of plots should be informed by breeding bird surveys and mapping of territories.
- **Habitats** created and/or enhanced as part of the scheme's ecological delivery (mitigation, compensation, and net gain) should be retained beyond the lifetime of the development (after decommissioning) and **secured in perpetuity to provide a legacy for nature and people as part of a Nature Recovery Network in Norfolk.**
- Habitat creation and management must be tailored to the local area to benefit locally important species.

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3. Wildlife Corridors and Access

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Solar installations can fragment habitats, but smart designs help maintain connectivity. The **LNRS should be used** to enable coordination of nature recovery actions and help deliver the Lawton principles:

- Promote **connectivity to semi-natural habitat** - This will enable solar farms to act as stepping stones across the landscape for wildlife, connecting otherwise isolated habitat patches and populations.
- Install **permeable fencing** that allows small animals (e.g., hedgehogs, amphibians, reptiles) to move freely while still securing infrastructure. There should not be spikes or barbed wire on the top of fences, especially in areas of high bat activity.
- Design **wildlife corridors** to allow safe movement of larger animals across and around the site, whilst maintaining woodland habitat free of deer browsing.
- Create **buffer zones** around sensitive areas such as streams or hedgerows to protect water quality and preserve natural travel routes.

4. Panel Configuration and Layout

Solar panel arrangement can influence both energy yield and habitat quality:

- Design the layout to **avoid shading natural features** like hedgerows or water bodies.
- Include **open areas** within and around arrays to diversify habitat types and encourage species variety.
- The design of panels is important in terms of grassland habitat underneath and surrounding them. Shading from panels impacts not only directly underneath but beyond this area. Raising the lower edge of panels to >90cm above ground level reduces management of vegetation in front of panels which typically would need regular cutting or spraying to avoid vegetation growing and shading panels. This design feature also increases sheep access under panels, which again reduces the need for management and creates more shelter for animals.
- Increasing panel row spacing to >7m increases the light levels between rows, which is good for creating richer grassland habitats.

5. Long-Term Monitoring and Adaptive Management

Monitoring ensures nature-positive impacts are maintained:

- Establish **biodiversity baselines** before construction and conduct **regular ecological monitoring**. We recommend that the guidance given by Solar Energy UK in their Standardised Approach to Monitoring Biodiversity on Solar Farms is followed as this allows for research/data to be collected in a centralised way.
- Use findings to adapt management practices, e.g., changing grazing schedules or introducing new plant species.
- Partner with **local ecologists and conservation organisations** to track and improve environmental outcomes.

6. Community Engagement and Education

Promoting biodiversity goals also involves local communities:

- **Maximise opportunities for local communities to connect with nature**, being able to connect with nature is good for people. Wildlife corridors to link existing areas of habitats and allow wildlife and people to move across the landscape would provide a strategic green infrastructure benefit.
- Include **interpretive signage**, trails, or nature viewing areas when safe and appropriate.
- **Partner** with schools, universities, or conservation groups for citizen science projects or educational initiatives.
- Maintain **transparency** with the public about biodiversity goals and progress.

Conclusion

Solar farms represent a unique opportunity to combat climate change while restoring degraded landscapes and supporting wildlife. Through careful site selection, nature-friendly design, and ongoing stewardship, developers can ensure that solar energy infrastructure not only minimizes harm but actively contributes to environmental regeneration.

A well-designed solar farm can be a haven for pollinators, a refuge for wildlife, and a model for harmonizing clean energy with ecological resilience.



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