Client Name: **Harmony Energy**

Site Name: **Skerne Solar Farm, Driffield**

Project Ref: **PWAPl-381-2595**

Date: **02/08/2021**

Addendum Ecological Assessment to Planning Reference: 20/01962/STPLF

Introduction

This document details an updated assessment of ecological effects in relation to the proposed revisions to the consented Skerne Solar Farm, Driffield (20/01962/STPLF).

The revised proposals are described in detail in the supporting Planning Statement Addendum and presented on Figure BWre21_DLD_PD-01_module layout 1_1.250 (dated 14/07/2021). In summary, the revisions include an alternate solar PV panel layout and the addition of a battery storage facility within the existing red line boundary.

This document should be read with reference to the following documents:

- Landscape Masterplan (Ref: SKN-006K);
- The Ecological Assessment (Avian Ecology, 2020[1]);
- Biodiversity Management and Enhancement Plan (BMEP) (Avian Ecology, 2020)[2];
- Response to Natural England Comments (Avian Ecology, 2020[3]) and,
- Grid Connection Report (Avian Ecology, 2021[4]).

Previous Assessment Approach

The previous assessment, as detailed within the Ecological Appraisal (Avian Ecology, 2020)[1] set out a desk study to identify designated sites for nature conservation and records of protected and notable species. The baseline was also supported by an Extended Phase 1 habitat survey, preliminary bat roost assessment and great crested newt surveys in March and April 2020. A BMEP was prepared to support the application (dated October 2020[2]).

Consultee comments were received during the application process which requested further information in respect of impacts on the River Hull Headwaters SSSI. Additional information was therefore provided in a letter dated 21st September 2020[3] to Natural England which provided a more detailed assessment of potential impacts on breeding birds associated with the SSSI, notably lapwing and greater clarity regarding drainage and pollution control measures to prevent indirect impacts on the SSSI.

Clarity was also requested in respect of the overhead cable route which connects to the substation to the north of the Site, crossing the River Hull Headwaters SSSI. Additional Vantage Point flight

[1] Avian Ecology (2020). Driffield, Skerne Solar Farm on Behalf of PWA Planning. Ecological Assessment Report.
[2] Avian Ecology (2020). Driffield, Skerne Solar Farm on Behalf of PWA Planning. Biodiversity Management and Enhancement Plan (dated October 2020).
[3] Avian Ecology (2020). Driffield, Skerne Solar Farm on Behalf of PWA Planning. Response to Natural England Comments.
[4] Avian Ecology (2021). Skerne Solar Farm, Driffield on Behalf of PWA Planning. Grid Connection Report – 2021.

activity surveys and an assessment of the proposed cable route was undertaken in January and February 2021 and detailed within the Grid Connection Report (Avian Ecology, 2021[4]).

Baseline Conditions

Baseline ecology information including detailed methodology and results is presented within the Ecological Assessment (Avian Ecology, 2020)[1] and Grid Connection Report (Avian Ecology, 2021) and is not repeated here.

In summary, the Site consists of c. 57.4 ha located south of the town of Driffield and north of Skerne village, East Yorkshire. The Site consists of predominantly arable farmland with some grassland, and field boundaries consisting mainly of hedgerows. The surrounding countryside is of similar nature.

The Site does not form part of any statutory designated site for nature conservation. The closest and only statutory designated site within 5km is Hull Headwaters Site of Special Scientific Interest (SSSI) which, at its nearest, is approximately 20m to the north of the Site. No internationally designated sites were found within 10km.

Six non-statutory designated sites are located within 2km of the Site, including one Local Wildlife Site (LWS), one Candidate Local Wildlife Site (Candidate LWS), three Deleted Local Wildlife Sites (Deleted LWS) and one Yorkshire Wildlife Trust (YWT) nature reserve.

No protected species interests were identified within the Site although potential presence of badger were noted (mammal paths, prints and latrines). Arable habitats were considered to offer negligible opportunities for protected and notable species, although field boundary habitats were considered to offer opportunities for breeding birds, foraging and commuting bats, amphibians, reptiles, water vole and otter.

All surveys were undertaken in 2020/2021 and are therefore considered valid and appropriate to inform an updated addendum assessment of the revised proposals. The baseline conditions therefore remain unchanged from the Ecological Assessment (Avian Ecology, 2020[1]) and Grid Connection Report (Avian Ecology, 2021).

Addendum Assessment of Impacts

An assessment is presented herein of the revised proposals, through the construction, operation and decommissioning phases on ecology. The assessment considers the potential for any change in, or additional effects presented thereafter.

Mitigation and Enhancement measures are presented within the updated BMEP (Appendix 1).

<u>Designated Sites</u>

In recognition of the minor amendments included within the revised proposals, (revised solar panel layout and inclusion of a battery storage facility within the existing redline boundary), the potential effects on designated sites for nature conservation remain unchanged from the previous assessment.

Indirect effects on habitats or species through construction related pollution and run off into ditches linked to the SSSI could occur; however with the adoption of standard good practice pollution prevention and site runoff control measures, statutory designated sites are not considered likely to be adversely affected.

The BMEP (Appendix 1) has been updated to include the mitigation measures included within the Grid Connection Report (Avian Ecology, 2020). No additional measures are required as a result of the revised project.

Any essential works within the boundary of the SSSI should follow a construction management plan (CEMP) which would need to be adhered to during the construction phase of the proposed works, and this may include limiting such works within the SSSI, to minor, localised impact activities. The CEMP would need to be agreed with the Local Planning Authority prior to any commencement of works.

Habitats

The proposed battery storage facility will be located within an arable field in the north of the Site where solar panels were approved as part of the existing consent. Although within the existing redline, the facility will result in a minor increase in permanent land take compared to the solar installation. Given the low ecological value of arable land and the prevalence of such habitat in the locality, this loss is considered inconsequential.

The battery storage facility will also require the removal of a small section of species-poor intact hedgerow to enable vehicle access. However, the BMEP (Appendix 1) illustrates 625m of new hedgerow along the redline boundaries which is considered sufficient to compensate for this loss.

In recognition of these minor amendments, potential effects on habitats remain unchanged from the previous assessment.

Protected Species

The permanent loss of arable habitat for the battery storage facility, as well as the small section of hedgerow, is considered highly unlikely to result in any additional impacts on birds, mammals, amphibians and reptiles. The mitigation and, where relevant, enhancement measures proposed for these species in the previous assessment and BMEP (Appendix 1) are considered to be sufficient in light of the revised proposals.

Mitigation and Enhancement

The project design, includes a range of inherent elements which avoid or reduce the potential for adverse effects on ecology. Potential effects remain unchanged from the previous assessment and therefore no addition mitigation is proposed.

Full details of mitigation measures and biodiversity enhancement measures are provided in the BEMP (Appendix 1) and new planting in the Landscape Masterplan (SKN006K). Enhancement measures have been updated to include some additional tree and shrub planting in the areas around the proposed battery storage facility and are detailed within the updated BMEP (Appendix 1).

The creation of new floristically diverse grassland habitat throughout fields once intensively managed as arable farmland will support the achievement of net biodiversity gain.

Conclusion

No impacts on designated sites are envisaged as a result of the revised proposals. Any additional effects on habitats and protected species are considered to be negligible, with the mitigation measures proposed in the original Ecological Assessment[1], BMEP (Appendix 1) and Grid Connection

Report[4] anticipated to be sufficient to minimise impacts and provide overall biodiversity enhancement.

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Driffield, Skerne Solar Farm

on behalf of Harmony Energy

Biodiversity Management and Enhancement Plan

avianecology

Document Control				
Project Name:	Driffield, Skerne Solar Farm			
Project Number:	PWAPl-381-2595			
Report Title	Biodiversity Management and Enhancement Plan			
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	10/06/2020	Superceded	S Whiteley *BSc MCIEEM*	D Foy *BA (Hons.) MCMA*
V2	19/10/2020	Superceded	N/A	S Whiteley *BSc MCIEEM*
V3	02/08/2021	Final	L Pimlott *MSc MCIEEM*	S Whiteley *BSc MCIEEM*

CONTENTS

1 INTRODUCTION

1.1.1 This Biodiversity Management and Enhancement Plan (BMEP) sets out habitat protection and enhancement measures for a proposed solar installation located on agricultural land at Skerne, Driffield, Yorkshire ('the Site'). This document also details ecological management practices to be adopted with the aim of developing and maintaining wildlife habitats to provide a net gain for local biodiversity.

1.1.2 This BMEP has been updated following amendments to the Site proposals to incorporate a battery storage facility and should be read in conjunction with the updated Ecological Assessment (Avian Ecology, 2021[1]), the original Ecological Assessment (Avian Ecology, 2020[2]) and the Grid Connection Report (Avian Ecology, 2021[3]).

1.1.3 Habitat enhancement measures and ongoing management practices are proposed in line with guidance produced by BRE guidance *Biodiversity Guidance for Solar Developments* (BRE, 2014[4]) that will enhance and safeguard key habitats for the benefit of wildlife, and enhance the ecological value of land currently under agricultural use.

1.1.4 BRE guidance *Biodiversity Guidance for Solar Developments* (BRE, 2014) states that; '*with appropriate land management, solar farms have the potential to support wildlife and contribute to national biodiversity targets. Indeed, solar farms may have several additional advantages in that they are secure sites with little disturbance from humans and machinery once construction is complete. Recent research suggests biodiversity gains on solar farms can be significant*'.

1.1.5 The approach provided within this report includes provision for long-term management of the land to conserve and improve habitat connectivity with the wider landscape for wildlife through protecting and enhancing potentially important wildlife corridors and habitats. This will contribute to the establishment of coherent ecological networks, supporting the biodiversity net-gain targets of the National Planning Policy Framework (2019).

1.2 Implementation of the BMEP

1.2.1 The implementation of the BMEP will be the responsibility of the Developer or any subsequent Owner of the development, working in conjunction with the landowners ("Owners") and/or appointed management organisation.

1.2.2 All works associated with the implementation of the BMEP will be undertaken by experienced contractors and / or under the watch of a suitably qualified (and where required, licenced) ecologist.

1.2.3 The Developer or any subsequent Owner of the development shall be responsible for the cost of implementing the BMEP including the cost of carrying out any management, monitoring, or other such activities.

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[1] Avian Ecology (2021). Driffield Skerne Solar Farm. Ecological Assessment 2021.
[2] Avian Ecology (2020). Driffield, Skerne Solar Farm on Behalf of PWA Planning. Ecological Assessment Report.
[3] Avian Ecology (2021). Skerne Solar Farm, Driffield on Behalf of PWA Planning. Grid Connection Report – 2021.
[4] BRE (2014). *Biodiversity Guidance for Solar Developments*. Eds G E Parker and L Greene.

2 ECOLOGICAL BASELINE – PRE-DEVELOPMENT

2.1.1 The BMEP should be read in conjunction with the Landscape Plan (SKN-006K). A description of habitats and species can be found in the original Ecological Assessment.

2.1.2 The Site does not form part of any statutory or non-statutory designated site for nature conservation and comprises large arable fields bounded by hedgerows, trees and watercourses. The wider area comprises a largely agricultural landscape.

3 ECOLOGICAL MITIGATION MEASURES

3.1 Designated Sites and Habitats

3.1.1 No designated sites will be affected by the development. Adjacent habitats will be protected by perimeter security fencing which will be erected first to prevent the encroachment of construction works beyond the Site boundary.

3.1.2 The Hull Headwaters SSSI is located c.20m north of the Site boundary.

3.1.3 Standard measures to ensure runoff control and pollution prevention will be implemented; these measures will safeguard on-site ditches and boundary habitats as well as off-site land and associated habitats and species.

3.1.4 During construction; best practices shall be adopted to suppress the deposition of dust and protect retained habitats through appropriate protective fencing as required under BS42020:2013 *Biodiversity: Code of Practice for Planning and Development.*

3.1.5 Hedgerows will be retained on Site with only minor widening works expected on existing access points. Hedgerows, and along with mature trees around the construction areas, will be protected in-line with BS 5837:2012 *Trees in relation to design, demolition and construction*.

3.1.6 There will be clear delineation of working areas and access routes for vehicles entering the Site and instructions on these will be given to all site construction staff, delivery drivers and subcontractors.

3.1.7 During the operation of the solar farm over time, dirt and dust can accumulate on the glass surface of the module, reducing its power output. Periodic cleaning of PV modules where required will be undertaken without chemicals and using a soft brush and clean water.

Cable Route

3.1.8 In relation to the cable route, if works are required during the bird breeding season, prior to works an experienced ecologist should carry out a nesting bird check. If any active bird's nests are found, the ecologist will advise on appropriate measures to be implemented to ensure the nest is protected (likely to include establishing an appropriate buffer between the nest and works, whilst the nest is active).

3.1.9 Bird flight diverters should be fixed to the proposed grid connection cable so that birds flying along the River Hull Headwaters SSSI are more likely to see the cable, and thus reduce the collision risk. This could also be important at night, given these diverters glow and reflect in the dark.

3.1.10 Works associated with the proposed grid connection cable should avoid impacting habitats within the River Hull Headwaters SSSI directly, and this includes ensuring that appropriate buffers are maintained between works and the River Hull. These buffers should also be applicable to the storage of work equipment/materials, and moving works vehicles. As well as buffers, other pollution prevention measures should be adopted to ensure the risk of runoff of chemicals (and silt) from works vehicles does not pass into the River Hull.

3.2 Birds

3.2.1 Site clearance works will be undertaken outside of the breeding bird season in so far as reasonably practical. The breeding bird season is considered to be 1st March to 31st August inclusive. Where this period cannot be avoided, a suitably experienced ecologist will be appointed to undertake a pre-site clearance survey to identify the presence of any wild bird nests being built or in use (including those of ground nesting birds such as skylarks *Alauda arvensis* and lapwing *Vanellus vanellus*). Only once the appointed ecologist is satisfied that an offence under Part 1 of the Wildlife and Countryside Act 1981 (as amended) will not occur, may works proceed.

3.2.2 If a nesting species is identified, suitable work exclusion zone will be established around nest site where required, in line with best practice guidance and in consultation with the advising ecologist.

3.2.3 During operation, disturbance will be minimal and limited to intermittent maintenance activities. However, it is recommended that the cleaning of panels is undertaken outside of the breeding bird season in so far as reasonably practical to minimise disturbance to nesting birds.

3.3 Bats

3.3.1 Protection of hedgerows and mature trees on Site or along access routes and adjacent land will safeguard potential roost sites and maintain foraging and commuting opportunities.

3.3.2 In order to protect foraging / commuting bats, lighting required during construction and/or operation of the solar farm will be used in a sensitive manner and directed away from field boundary habitats. This will be achieved in a number of ways, including the use of low level lighting and use of hoods and careful selection of lighting (further information is provided in BCT guidance (2018) *Bats and Lighting in the UK: Bats and the Built Environment Series*[5]).

3.4 Badger

3.4.1 A pre-construction badger *Meles meles* survey will be undertaken no earlier than 3 weeks prior to works commencing to check for active or any newly constructed setts (between the initial baseline survey and the construction start date) within at least 30m of construction areas.

3.4.2 If baseline conditions have altered and significant disturbance to badgers or their setts is considered likely during the proposed works, one or both of the following options will be incorporated:

- The development design will be amended to avoid works which may impact upon badgers and their setts (e.g. alteration of the configuration of panels and/or fencing); and/or,
- A disturbance licence will be obtained from Natural England before construction commences.

[5] Bat Conservation Trust. (2018). *Bats and Lighting in the UK: Bats and the Built Environment Series*.

3.5 Water Vole and Otter

3.5.1 Ditch habitats around the Site have the potential to support water vole *Arvicola amphibius,* which are known to be present in the wider area. A buffer of at least 5m from bank tops will be maintained during construction so as to protect these ditches, and any species they may support. This buffer, in combination with pollution prevention measures, will minimise the risk of indirect effects from pollution and site run-off during construction.

3.5.2 All existing water crossings will be used and no new watercourse crossings are proposed.

3.5.3 Overall, it is highly unlikely that the development would affect water vole, should they be present, either directly or indirectly.

3.5.4 A buffer zone as described above would also serve to protect the ditch network as possible movement corridors for otters *Lutra lutra*.

3.6 Amphibians and Reptiles

3.6.1 Land within the Site is dominated by arable crops, which is intensively managed and considered to be unsuitable habitat to support amphibian or reptile populations. More favourable habitat is available along with field margins and hedgerows which are all associated with field boundary features. Great crested newts are not considered to be locally present, based on eDNA analysis of two ponds undertaken in April 2020 (adjacent to Site and 165m north of Site).

3.6.2 Total land take for any solar farm development is typically low (less than 5% footprint on the ground) and construction works are low impact; comprising limited excavation for a temporary period of time. The proposed battery storage facility also has a relatively land take. It is therefore considered that the implementation of a series of Reasonable Avoidance Measures (RAMs) directed at the general protection of wildlife will be sufficient to avoid adverse impacts on individual animals. This will ensure that the potential for effects on reptiles, amphibians and other species during construction will be avoided. Such measures will include the establishment of exclusion/protection zones along hedgerows during construction, timing of certain works, tool box talks to site staff on ecological responsibilities and precautionary measures to adopt in relation to protected species.

3.6.3 Neighbouring terrestrial habitat will not be directly or indirectly affected by the development with perimeter fencing and pollution prevention measures in place.

4 ECOLOGICAL ENHANCEMENT MEASURES

4.1.1 Measures to be implemented are illustrated on **Figure 1**.

4.2 Habitat Enhancement

4.2.1 Management practices are proposed that will enhance the Site for the benefit of local wildlife. The design and long-term management of the land seeks to maintain and improve functionality through protecting and enhancing potentially important wildlife corridors i.e. through creation and maintenance of native species hedgerows within and around the Site. The Landscape Plan (SKN-006K) sets out the landscape planting and maintenance specifications.

4.2.2 All planting stock supplied shall be healthy and viable and comply with BS 3936: Parts 1 to 10 as relevant, and BS 4043, the National Plant Specification, published by the Horticultural Trades Association (HTA) as appropriate. Supplying nurseries will be registered under the HTA Nursery Certification Scheme. All plants will be packed and transported in accordance with the Code and Practice for Plant Handling as produced by CPSE.

4.2.3 All seeding shall be carried out in accordance with BS 4428:1989 Code of Practice for general landscape operations (excluding hard surfaces), or the most up to date and current British Standard and in accordance with seed suppliers' technical advice.

4.3 Hedgerow and Shrub Planting

4.3.1 New hedgerow planting proposed as part of the development as shown on **Figure 1** includes approximately 625m of new mixed native species hedgerow creation and strengthening infill of existing gappy sections of hedgerow. This will provide well-structured hedgerows of value for wildlife around the Site. An area of shrub planting is also proposed adjacent to the battery storage facility.

4.3.2 The following species will form the hedgerow and shrub planting and infilling at the Site:

- hawthorn *Crataegus monogyna* (40%);
- blackthorn *Prunus spinosa* (30%);
- elder *Sambucus nigra* (30%)

Ground Preparation

4.3.3 Where necessary existing weeds will be manually removed or if necessary treated with a suitable herbicide as specified within the herbicide handbook (English Nature, 2003[6]).

4.3.4 All extraneous matter such as plastic, wood, metal will be removed from site to a registered waste disposal facility.

Planting

4.3.5 Hedgerows will be notch or trench planted in a double staggered row at 5 plants per linear metre.

[6] English Nature (2003) The Herbicide Handbook.

4.3.6 The exact timing of the proposed hedgerow planting will be dependent on the ground conditions but bare-root planting should ideally take place between the months of December-February inclusive. It is expected that ground conditions and climate will allow for earlier planting (i.e. before January), and this will allow the plants more time to establish a network of feeder roots before the onset of spring. Planting should avoid freezing and water logged conditions.

4.3.7 Planting slots shall be made using a planting spade. Plant notches should be T, L- shaped or straight, using spades of a design suitable for this purpose. The planting notches must be vertical and deep enough for the roots to hang freely, with the transplant being planted so that the root collar is exactly level with the ground surface. The notch must then be closed and the soil will be well firmed round the roots in line with the guidelines as set out in British Standard BS 4428 (1989) '*Code of practice for general landscape operations (excluding hard surfaces)'*

4.3.8 If ground conditions are dry during the time of planting (unlikely during December-February) then all individual plants should be well watered following planting.

4.3.9 All hedgerow planting stock will be protected from rabbit damage using approved proprietary 600mm clear biodegradable plastic spiral guards, supported with 0.9m 12/14lb canes as advised by the manufacturer.

Management

4.3.10 During the establishment period, all dead, dying or diseased stock will be replaced with stock of similar size and species by the appointed contractor. If the failure of the plant is due to disease and the disease is considered likely to re-occur then an alternative native species of local provenance may be used as a replacement. The exact timing of the planting of replacement hedgerow plants and trees is dependent on the ground conditions; however, planting should ideally take place between the months of December and February inclusive, this will allow the plants more time to establish a network of feeder roots before the onset of spring.

4.3.11 The planting areas will be kept weed-free during the establishment period, using approved hand-weeding or if necessary herbicide treatment (applications in April, June and August). The herbicide handbook (English Nature, 2003) provides guidance on appropriate herbicide use in relation to nature conservation works. Where used, herbicides will be sprayed in appropriate weather conditions, to avoid affecting adjacent grassland areas.

4.3.12 During the establishment period, the planted hedgerows should be inspected during periods of warm weather and drought. If it is considered that the ground conditions are too dry, the planted hedgerows will be watered on a regular basis until weather conditions are considered suitable for watering to cease.

4.3.13 During establishment, hedgerows will be trimmed outside each growing season; hedgerows will be cut back by half the growth of that year with pruning aiming to encourage the development of healthy well-shaped specimens. New hedgerows will be trimmed using powered hand-held machinery (not flail cutters) for the first 3 years until established.

4.3.14 Once established, all hedgerows will be cut on a 2-3 year rotational basis and will be cut on different sides each year and not all hedgerows will be cut in the same year to allow a varied structure for the benefit of wildlife and to allow plants to flower and set seed/fruit. Established hedgerows will be cut between late September and February using a tractor mounted flail or by using tractor mounted circular saws to reshape and manage more mature overgrown hedges.

4.3.15 No cutting or trimming is to be undertaken during the breeding bird season (01st March to 31st August inclusive).

4.3.16 If of a sufficient size and quantity, arisings and pruned material can be collected and used to create habitat piles / wildlife refuges in habitats along field margins.

4.3.17 After the establishment period, hedgerow and tree planting guards (where used) will be removed and all hedgerows will be maintained at a height of approximately 2-4m.

4.3.18 Existing trees within hedgerows will be left to grow naturally and not cut. These will be clearly marked to ensure that they are not cut back during hedgerow trimming/maintenance works.

4.4 Tree Planting

4.4.1 New tree planting proposed as part of the development as shown on the Landscape Plan (SKN-006K) and **Figure 1**.

4.4.2 The following tree species will be planted within the field boundaries of the Site:

- willow *Salix fragilis*
- oak *Quercus robur*

Ground Preparation

4.4.3 Where necessary existing weeds will be manually removed or treated with a suitable herbicide as specified within the herbicide handbook (English Nature, 2003[7]) or hand-weeding.

4.4.4 All extraneous matter such as plastic, wood, metal will be removed from site to a registered waste disposal facility.

Planting

4.4.5 Plants of UK (and preferably local) provenance will be used. All planting stock supplied shall be healthy and viable and comply with BS 3936: Parts 1 to 10 as relevant, and BS 4043, the National Plant Specification, published by the Horticultural Trades Association (HTA) as appropriate. Supplying nurseries should be registered under the HTA Nursery Certification Scheme or similar. All plants will be packed and transported in accordance with the Code and Practice for Plant Handling as produced by CPSE.

4.4.6 The exact timing of the planting will be dependent on the ground conditions. All bare-root planting stock will be protected and kept covered until actually planted in order to minimise water-loss and prevent the roots from drying out. Bare root stock shall be planted while dormant (i.e. between approximately October -February) or alternatively cell or container grown stock shall be used. Planting should not take place when the ground is frozen or in water logged condition. If ground conditions are dry during the time of planting (unlikely during December-February) then all individual plants should be well watered following planting.

4.4.7 Trees are to be placed into the pits and backfilled with local topsoil previously stripped from within the Application Site. A general-purpose organic slow release fertiliser (at the rate of 75gm/m2) and

[7] English Nature (2003) The Herbicide Handbook.

Organic Tree Planting and Mulching Compost (at the rate of 20litres/m2) are to be incorporated into the top 150mm of topsoil during backfilling. Where tree pits are more than 300mm deep, backfilled material shall be consolidated / firmed in 150mm layers.

4.4.8 Trees shall be well firmed-in and secured with tall canes or light stakes, proprietary rubber tree ties and spacers as below.

4.4.9 Trees will be protected from grazing damage by the fitting of 0.6m proprietary shrub shelter or tree shelters secured using appropriate stakes. The use of biodegradable guards is preferred. Composted bark mulch will be spread to a depth of 75mm in a 1m diameter circle around all individual trees, ensuring that desirable groundcover plants (where present) are not buried.

4.4.10 All trees shall be watered in at the end of each day of planting

Management

4.4.11 During the establishment period of new hedgerow stock (the first five years), all dead, dying or diseased stock will be replaced with stock of similar size and species by the appointed contractor at their own cost. If the failure of the plant is due to disease and the disease is considered likely to re-occur then an alternative native species of local provenance may be used as a replacement. The exact timing of the planting of replacement hedgerow plants is dependent on the ground conditions; however, planting should ideally take place between the months of December and February inclusive, this will allow the plants more time to establish a network of feeder roots before the onset of spring.

4.4.12 During the establishment period weeds around the base of each tree will be removed within a 1m to 1.5m radius.

4.4.13 Trees will not be cut.

4.4.14 No cutting or trimming is to be undertaken during the breeding bird season (01st March to 31st August inclusive).

4.4.15 Tree guards and stakes will also be checked and replaced where necessary. Biodegradable guards are proposed therefore will not require removal. If a different guard is used they would require removal once tree has established.

4.5 Grassland Creation

4.5.1 The BRE (2014)[8] guidance state that, as panels are raised above the ground on posts, over 95% of a site used for solar farm development is still accessible for plant growth and complementary agricultural activities, such as conservation grazing (BRE, 2014). The RSPB briefing note on Solar Energy also states that biodiversity gains are possible where intensively cultivated arable or grassland is converted to extensive grassland and/or wildflower meadows between and/or beneath solar panels and in field margins (RSPB, 2014[9]). Recent ongoing studies on solar farms also identified a positive benefit for some species[10]. A significant benefit to wildlife will be therefore achieved

[8] BRE (2014) BRE National Solar Centre Biodiversity Guidance for Solar Developments.
[9] RSPB (2014) *Solar Energy: RSPB Policy Briefing, December 2014*. RSPB: Sandy. Available at https://www.rspb.org.uk/Images/Solar_power_briefing_tcm9-273329.pdf.
[10] https://community.rspb.org.uk/ourwork/b/biodiversity/posts/bird-use-on-solar-farms-final-results

through creation of botanically diverse grassland within the Site, favourable to birds, mammals, amphibians, reptiles and invertebrates.

4.5.2 The main body of the Site is currently arable farmland. Arable areas will be converted to more species and structurally diverse grassland through sowing a suitable seed mix and subsequent management.

4.5.3 The area of the Site used for the solar panel installation comprises arable land and will be converted to grassland.

Species Composition

4.5.4 The areas that have been impacted by the solar panel installation works will be sown with a suitable meadow seed mix of UK provenance (e.g. Emorsgate Seeds EG27 or EM3).

4.5.5 Undeveloped areas identified on the BEMP will be sown with a species-rich wildflower mix such as BSBM Boston Seeds Butterfly and Bee 80/20 Wildflower Meadow mix[11]. Yellow rattle *Rhinanthus minor* will be included in the seed mix as this species is known to parasitise grass species, thereby impairing the vigour of the grass growth and providing more opportunities for wild flower species to establish.

4.5.6 The wildflower mixtures used is subject to final soil tests and may be amended if necessary.

Ground preparation and Sowing

4.5.7 The areas that have been identified for seeding will first be cultivated, firmed, levelled and scarified to create a suitable planting bed. The seed bed will be prepared by removing weeds using repeated surface cultivation or a suitable non-residual herbicide.

4.5.8 Areas will be sown in accordance with the suppliers instructions, ideally during early spring following the completion of development and underground cabling (although seeding is possible at other times of year). Seed will be sown by machine or where this is not possible, seed will be broadcast by hand.

4.5.9 All seeding shall be carried out in accordance with BS 4428:1989, or the most up to date and current British Standard at the time.

4.5.10 After establishment, the grassland vegetation within the Site will be managed to provide a varied habitat structure with longer and shorter grassland through grazing or cutting, with areas providing nesting opportunities for birds, such as skylark, and nectar, pollen and shelter for invertebrates, amphibians, reptiles and small mammals.

Grassland Management

4.5.11 The grassland vegetation around the Site will be managed by grazing or cutting to provide a varied habitat structure providing nesting opportunities for birds, such as skylark, and nectar, pollen and shelter for invertebrates, amphibians, reptiles and small mammals. Taller grassland vegetation will be encouraged to develop at the base of hedgerows to provide dispersal, foraging and shelter opportunities for wildlife.

[11] https://www.bostonseeds.com/library/BSBM-Butterfly-and-Bee-Wildflower-Meadow-Seed-Mixture.pdf

Initial Management

4.5.12 Initially, in the first year following sowing, checks will be made to assess and control annual weeds. Problem perennial weeds will be controlled by hand pulling or if necessary careful targeted application of a non-residual herbicide by way of spot spraying with a knapsack (low pressure to avoid spray drift), or weed wiping (no herbicide application within the vicinity of ditches and watercourses) herbicide application may be used in April, June and August. Alternatively, annual weeds can be managed by topping and mowing prior to setting seed which will encourage lateral development of the grasses.

4.5.13 Any topping undertaken between April and July should be no lower than 200mm to prevent harm to any ground nesting birds.

4.5.14 Specific attention should be paid to the potential presence of the following five injurious (harmful) weeds: common ragwort *Senecio jacobaea*), spear thistle *Cirsium vulgare*, creeping thistle *Cirsium arvense* curled dock *Rumex crispus* and broad-leaved dock *Rumex obtusifolius*; which are all listed within the Weeds Act 1959. These species should be removed from the grassland areas prior to enhancement works commencing[12] [13].

4.5.15 In the event that the grassland / meadow planting fails and the area of bare ground is greater than 20%, these areas will be re-seeded.

Long-term Management

4.5.16 Following establishment of a suitable sward, the grassland habitats will be managed either through low intensity grazing or alternatively by cutting, as detailed below.

Grazing Regime

4.5.17 Once established the grassland within the perimeter fence can be managed by sheep grazing, adopting a low-intensity grazing regime detailed as follows.

4.5.18 The grassland would be subject to light intermittent grazing by sheep between approximately September and January where conditions allow. Moderate trampling will expose ground for colonisation by annuals the next spring; however, heavy trampling can lead to ground poaching and infestations by weed species that will be detrimental to the site. During the spring and summer (March to August), sheep will be removed or stocking density reduced to allow summer flowering plants to set seed. Grazing will be carefully monitored in the winter period in order to prevent excessive compaction of wet earth.

4.5.19 Sheep are a favourable grazing option, being widely available and effective at reducing sward height in the autumn, while also providing moderate trampling. Sheep are not efficient grazers of long grasses, therefore if used; an initial control cut may be required before introducing sheep.

4.5.20 Ideally, it is best to aim for a stocking rate just sufficient to maintain a varied structure, rather than the maximum that the grassland can support. Grazing density (Table 5.1) is based on medium sized sheep (e.g. 60kg). It is important to constantly monitor the Site to ensure the grassland is not under or over grazed and stock density and duration altered accordingly. The stocking density should be

[12] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525269/pb9840-cop-ragwort-rev.pdf
[13] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69296/pb7190-harmful-weed-control.pdf

reduced in wet periods or in conditions when poaching would lead to a break-up of the sward and colonisation by aggressive weed species.

Table 5.1: An indicative guide to stocking levels for lowland grassland (number of sheep per hectare). Adapted from the Lowland Grassland Management Handbook produced by Natural England.

Number of grazing weeks per year	Calcareous Grassland (sheep per ha)
16	7.5
20	6
24	5
36	3.5
52	2.5

4.5.21 The following indicators will be used to review and amend stocking densities:

- An increase in the amount of uneaten grass, the accumulation of litter, an increase in vigorous rank and unpalatable grasses, and a reduction in low growing herbs, indicates stocking density is too low (need to increase livestock density).
- A reduction in density/diversity of plants, excessive poaching, weed invasion and the development of bare patches indicates stocking density is too high (need to livestock reduce density).

<u>Cutting Regime</u>

4.5.22 Following establishment, up to two cuts will be taken per year, an early cut in February (if necessary), to manage regrowth around panels and a second later in the season between August and September (each cut reducing sward height to approximately 150mm). No cutting will take place through the summer to allow the seeds of the later flowering species to fall prior to the cut.

4.5.23 There may be circumstances when an additional summer cut is required to prevent vegetation obscuring panels, in such cases cuts should reduce sward height to no lower than 200mm to avoid impacts on nesting birds.

4.5.24 The second cut in late summer may not be required in species-rich wildflower and perimeter areas and alongside hedgerows once established, to allow longer tussock grassland to establish.

4.5.25 Cutting should adopt a systematic method (i.e. working outwards towards the boundary features); this will allow fauna to temporarily and safely vacate the area.

4.5.26 The management will take a flexible approach and the exact dates will be dependent upon weather conditions. A phased (rotational) cutting regime is recommended (i.e. ideally the entire area should not be cut at the same time) in order to allow for more varied structured grassland.

4.5.27 Cuttings will be left on-site for three to five days following the cut to allow seeds to disperse, and then be removed in order to remove nutrients and promote the development of a species-rich sward and placed on habitat piles located within field margins.

4.6 Wildlife Enhancement

4.7 Habitat Piles

Birds

4.7.1 Additional bird nesting provision will be made through the inclusion of 15 bird boxes erected on suitably-sized trees located at the peripheries of the Site.

4.7.2 Bird boxes should ideally be installed in the autumn (September to November) following the cessation of construction works, by the appointed contractor under advice of the suitably competent ecologist.

4.7.3 Boxes should be erected at an appropriate height of between 1 to 5 metres. Boxes should be angled so that they face away from the prevailing wind or in a semi sheltered environment. Positioning within or close to hedgerows will increase chances of occupation. Bird boxes will be suitable for a variety of farmland bird species.

4.7.4 Suitable specifications for bird boxes are provided in **Appendix 1**.

Bats

4.7.5 Additional bat roost provision will be made through the inclusion of 15 bat roost boxes on trees. Boxes will be erected on suitable trees, at an appropriate height (ideally above 4m in height) and with clear flight paths to utilise the Site boundary features.

4.7.6 Suitable specifications for roosting boxes are provided in **Appendix 1.**

Other species

4.7.7 The base security fence will be lifted in places to allow the free movement of wildlife, including brown hare *Lepus europaeus* (known to be present) through the grassland habitats. The fencing will be lifted to approximately 200mm from ground level and section lengths will be at least 0.5m long. Hedgehog *Erinaceus europaeus* boxes will also be placed around the site boundaries.

4.7.8 Any wood and grass removed during habitat management or other work operations will be kept in habitat piles, placed along the edge of hedgerows and in particular along the southern boundary of the Site nearest to the woodland edges, in order to provide valuable invertebrate habitat and shelter for other species including small mammals/amphibians/reptiles. These will be placed in the same locations each year.

5 ECOLOGICAL MONITORING

5.1.1 The development of the biodiversity interest of the Site will be monitored over time by a suitably experienced ecologist.

5.1.2 A walkover survey will be undertaken on years 1, 3 and 5 and 10. This will involve an inspection of the hedgerows, trees, grassland and any other ecological features to ensure that they are being managed in a manner suitable for the enhancement of wildlife interest. Bird and bat boxes will also be checked. The results of these monitoring surveys will be used to inform future changes in

management and the need or otherwise to replace missing bat/bird boxes. The management plan will be amended if necessary based on the monitoring recommendations (including amending the cutting regime if necessary).

6 INDICATIVE MANAGEMENT SCHEDULE

6.1.1 The following management programme shows possible months in which activities will commence within the first planting period after construction:

Initial Habitat Enhancement Year 1

Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Year 1												
Grassland creation (*recommended)			✓*	✓*	✓	✓	✓	✓	✓			
Hedgerow and shrub planting	✓	✓										✓
Installation of bird nest and bat roost boxes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Habitat Management Year 2

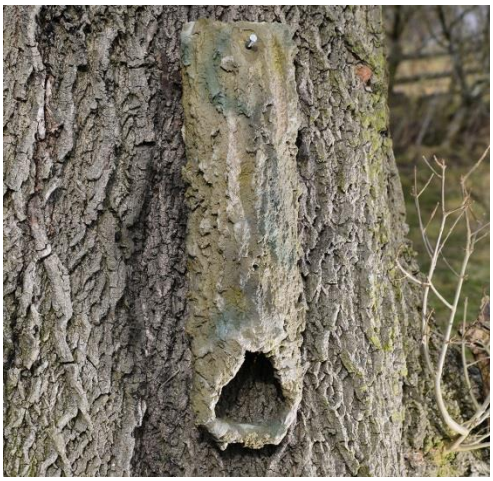
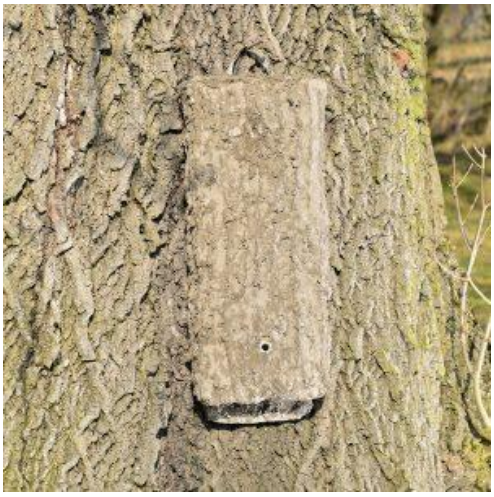
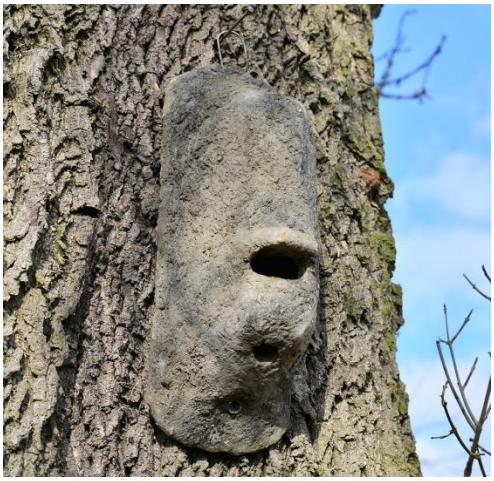
Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Year 2												
Initial management of solar panel area grassland (targeted herbicide treatment of perennial weeds or cutting/topping where necessary)				✓		✓		✓				
Initial management of species-rich wildflower meadows areas (targeted herbicide treatment of perennial weeds or cutting/topping where necessary)				✓				✓				
Herbicide treatment or hand-weeding of hedgerow planting bed				✓		✓		✓				
Trimming of new hedgerows if required	✓	✓							✓	✓	✓	✓

Ongoing Annual Management

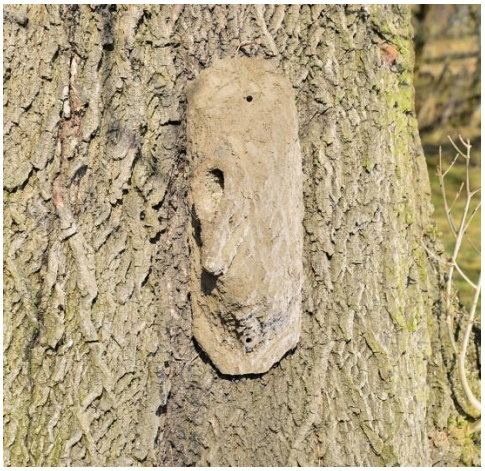
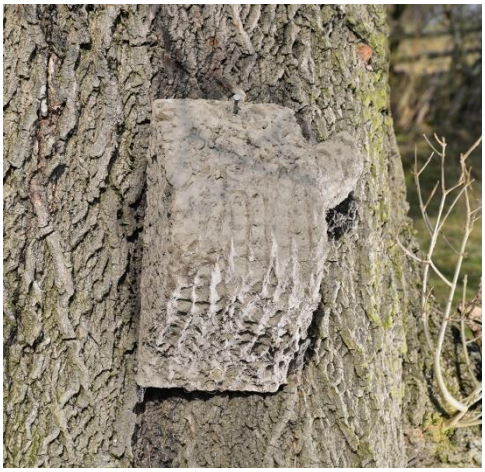
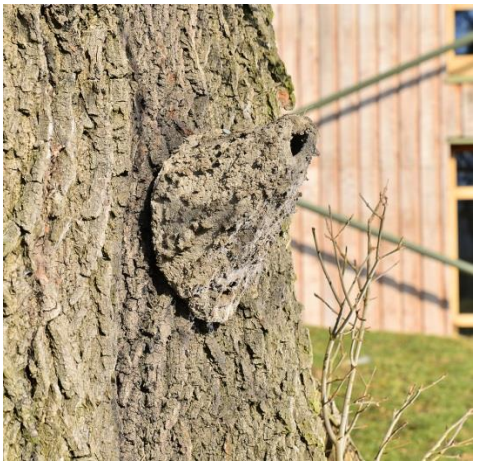
Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Year 3 onwards												
Grassland cutting (*if not grazed*)		✓						✓	✓			
Sheep grazing	✓								✓	✓	✓	✓
Herbicide treatment or hand-weeding of hedgerow planting bed (establishment period first five years)				✓		✓		✓				
Trimming of new hedgerows (up to year 3 and established)	✓	✓							✓	✓	✓	✓

Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Established hedgerows cut on a 2 or 3 year cycle (no more than 1/3 cut in any one year).	✓	✓							✓	✓	✓	✓

APPENDIX 1: WILDLIFE BOX SPECIFICATIONS

Suitable Bat Roost Boxes		
Large Twin Crevice		Primarily for use by roosting bats but may also be used by small birds as a safe roost site. Two curved internal voids narrowing down to tight crevices at the top. Suitable for a range of bat species, mating roosts and spring and autumn roosts where the thermal mass is a benefit. Top loop for more comfortable carrying and quick initial attachment to the tree and two *through the box* nail holes for secure attachment of this heavy box.
Kent Type Twin Crevice		Two parallel crevices for roosting bats with internal connection to move between the two. Light internal finish for helping to spot bats, droppings and rub marks. Top loop for quick and easy initial attachment to the tree, plus two *through the box* nail points for maximum security.
Bat chamber		Primarily for use by roosting bats including as an autumn mating roost, particularly for pipistrelles. Also likely be used by small birds as a safe roost site. 16mm hole for endoscope inspection in the base facilitating inspection, potentially avoiding working at height with the right equipment. Light internal finish facilitates detection of droppings or rub marks. Top loop makes initial attachment to the tree easier – with two further attachment points for 6” nails for security.
Siting	The bat boxes can be sited in trees and are best positioned at a height of between 3 to 6 metres. Bat boxes should ideally be sited in open sunny positions facing different directions to provide a variety of micro-habitats.	
Timing	Bat boxes can be installed at any time of year following the cessation of construction works.	
Other Notes	Note that once bats have inhabited a roost site they may only be disturbed by licensed	

	bat workers.
References	https://www.barkboxes.co.uk/product/large-twin-crevice/ https://www.barkboxes.co.uk/product/kent-type-twin-crevice/ https://www.barkboxes.co.uk/product/bat-chamber/

Suitable Bird Boxes		
Great tit / tree sparrow nest box		Nest box and roost site with 28mm entrance suitable for great tit or tree sparrow. Likely to be used by roosting birds, one of these was adopted by a blue tit whilst still in production, and with potential for use by roosting bats.
Starling box		A large box for nesting starling. This meets BTO recommendations, but we are researching whether smaller curved boxes will be used by the species. *Branch stub* entrance provides shelter and protection from predators. Top loop provides more comfortable carrying and a quick initial attachment point to the tree; whilst *through the box* nail points provide security for this large box.
Branch stub		Replicating a rotting branch stub with void. More likely to be used by nesting and roosting birds than roosting bats.

APPENDIX 1: WILDLIFE BOX SPECIFICATIONS

Suitable Bird Boxes		
Open fronted nest box		For birds such as robin and pied wagtail. Open fronted but with a generous canopy to screen from aerial predators. Place in good cover not in the open.
Siting	The nest boxes should be sited in trees and are best positioned at a height of between 2 to 4 metres. Boxes should be angled so that they face away from the prevailing wind or in a semi sheltered environment. Positioning within or close to hedgerows will increase chances of occupation.	
Timing	Bird boxes will be erected outside of the breeding bird season, to eliminate the possibility of disturbing birds currently utilising the trees for nesting.	
Other Notes	Note that bird boxes should not be opened between the months of March to September to avoid disturbing nesting birds.	
References	https://www.barkboxes.co.uk/product/great-tit-tree-sparrow/ https://www.barkboxes.co.uk/product/starling-box/ https://www.barkboxes.co.uk/product/branch-stub/ https://www.barkboxes.co.uk/product/open-fronted-nest-box/	

FIGURE 1: BIODIVERSITY MANAGEMENT AND ENHANCEMENT PLAN