Bubney Solar Farm

LANDSCAPE AND ECOLOGICAL MANAGEMENT PLAN

On Behalf Of Renewable Connections Developments Limited

March 2021 | P20-1083

LANDSCAPE AND ECOLOGICAL MANAGEMENT PLAN

BUBNEY FARM, WHITCHURCH, SHROPSHIRE

Prepared by

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commissioned by

RENEWABLE CONNECTIONS SOLAR HOLDINGS LTD

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Project	Bubney Farm			
Document	Landscape and Ecological Management Plan (LEMP)			
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1 INTRODUCTION

1.1.1 This Landscape and Ecological Management Plan (LEMP) has been jointly prepared by Clarkson and Woods and Pegasus Group on behalf of Renewable Connections Solar Holdings Ltd. in support of a planning application for the installation of a solar photovoltaic (PV) development at Bubney Farm, Whitchurch, Shropshire.

1.1.2 Ecological surveys have revealed the following notable habitats/species within the site:

- Hedgerows (a priority habitat and noted in the Local BAP)
- Mature trees both within the hedgerow network and in fields
- Off-Site habitat to the south and west comprising acid grassland, scrub, woodland and a river.
- Badgers
- Historical record of great crested newts within the farm

1.1.3 A separate Landscape and Visual Impact Assessment (LVIA, Rev A) was carried out by Pegasus Group.

1.1.4 The revised National Planning Policy Framework[1] (NPPF), issued in February 2019, states that the planning system should contribute *to "minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures".* It also states that *"opportunities to incorporate biodiversity in and around developments should be encouraged".* This LEMP seeks to maximise the landscape and ecological benefits which the development may offer.

1.1.5 Established guidance[2] sets out a series of opportunities to enhance solar farms for local wildlife and contribute to national biodiversity targets. This LEMP reflects the recommendations set out within the guidance document.

[1] DCLG (2012). *National Planning Policy Framework*. www.communities.gov.uk

[2] BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene

1.1.6 This report sets out the aims and objectives, followed by detailed management prescriptions. A timetable of works is given in Section 5 and a plan in Section 6 shows the locations for the proposed mitigation/enhancements.

2 AIMS & OBJECTIVES

2.1.1 The proposed solar farm is an example of a development which presents considerable opportunity for landscape and biodiversity mitigation and enhancement. This LEMP has been prepared to ensure that the opportunities for mitigation and enhancement are realised. The aim of this LEMP is to:

- Set out the agreed objectives for landscape management of the site;
- Set clear standards for the performance of landscape maintenance work;
- Assist in the development of work programmes for landscape maintenance staff;
- Establish landscape maintenance responsibilities; and
- Help monitor success and progress against the aims and objectives.

2.1.2 The following objectives have been identified which, when implemented, will ensure the overarching aims of the Plan are achieved.

Objective 1: To create new grassland habitats through planting of locally appropriate native species and appropriate management

2.1.3 The arable fields will be reseeded in the first sowing season post construction to ensure injurious or ruderal weeds do not establish. A native meadow seed mix will be used in order to increase the diversity of the grassland.

2.1.4 The areas within the site will be managed to create a diverse grassland habitat, which will benefit a wide range of wildlife. Grazing will be restricted within approximately half of the site, during the summer months to allow plants to flower and set seed. The remaining fields on site will be used for sheep grazing beneath the solar panels during the summer months (and winter if required) to allow rotational grazing throughout the year.

2.1.5 Species will be sown within the seed mix to benefit Local BAP species; dingy skipper *Erynnis tages* and grayling *Hipparchia semele* butterflies.

2.1.6 Specific areas outside the footprint of the solar arrays will be managed for ground nesting birds such as skylark *Alauda arvensis.* Although it is unlikely that this

species currently breeds on the site, the establishment of a grassland habitat creates an opportunity to provide for this species (included within the Farmland Birds Local BAP).

2.1.7 An area of the site will be ploughed annually in the sping and then left unseeded to provide disturbed ground for arable 'weed' plants.

2.1.8 The grassland within the field margins (between the security (deer) fencing and field boundaries) will be managed as rough tussocky grassland that will benefit a range of species including birds, bats, small mammals, invertebrates, reptiles and amphibians.

Objective 2: To plant and manage hedgerows and trees to provide habitat for a range of species and ensure visual screening of the site

2.1.9 A variety of native tree and hedgerow planting is proposed as part of the development to maintain the existing landscape structure of the area, maintain and enhance the level of visual screening of the site from the surrounding areas and help to improve and enhance biodiversity of the site. Native hedgerow planting is proposed to 'gap up' the existing hedgerow stock on the site. This will be maintained to a height of 3 metres through annual pruning to aid visual screening and to provide a more robust and continuous network of hedgerows to promote habitats for wildlife.

2.1.10 The proposals would include approximately 4800 linear metres of hedgerow reinforcement planting incluidng to the east to provide additional visual screening from the Llangollen Canal and Danson's Bridge and to the west of the site to provide additional visual screening from Iscoyd Park and Wolvesacre Hall.

Objective 3: To provide sheltering features around the site for nearby populations of bats, birds and other notable faunal species

2.1.11 A variety of bird boxes will be installed on mature trees throughout the site for species such as barn owl *Tyto alba* (a Local BAP species), stock dove *Columba oenas ,* starling *Sturnus vulgaris,* tree sparrow *Passer montanus,* as well as general nest boxes for a variety of other passerines.

2.1.12 Bat boxes will be installed onto mature trees within the site. These will include boxes within the grassland areas which would be particularly suitable for bat species such as soprano pipistrelles *Pipistrellus pygmaeus,* noctules *Nyctalus noctula* and *Myotis* bats) other boxes will be installed within/close to the woodland habitats

which would be particularly suitable for woodland species (such as brown long-eared *Plecotus auritus* and Natterers bats *Myotis nattereri*).

2.1.13 Dormouse *Muscardinus avellanarius* boxes will be installed in suitable habitat on the south and west of the Site. This habitat is well connected to the wider landscape and may provide new records for this species' distribution in Shropshire.

2.1.14 Three partially buried hibernacula, as well as log and brash piles, will be installed around the site in order to provide habitat for invertebrates, amphibians and reptiles.

Objective 4: To enhance and restore the ponds on the Site

2.1.15 The ponds will be deepened to ensure that they hold water for a longer period and allowed to establish with tussocky grassland surrounding them. Some scrub management may be required in order to ensure the ponds do not become too overgrown. This would provide suitable habitat for great crested newts *Triturus cristatus*, should they still be present within the site.

Objective 5: To monitor the site and assess the success of management

2.1.16 In order to deliver the proposed ecological objectives, monitoring of the effects of management prescriptions will be required to ensure that these are effective, and to inform any necessary refinement of the site management.

2.1.17 The monitoring will include botanical surveys, great crested newt surveys and bird surveys.

3 RESPONSIBLE PERSONNEL & LINES OF COMMUNICATION

3.1 Renewable Connections Solar Holdings UK

3.1.1 Renewable Connections shall be responsible for the implementation of this LEMP and will appoint a land manager to carry out the objectives of this document. Should the site be sold, it will be the responsibility of LEMP would be passed on to the new owner.

3.2 Land Manager

3.2.1 The land manager would be responsible for the implementation of the LEMP during the operational phase. The land manager will be provided with a copy of this LEMP and liaise with Renewable Connections and consultant ecologist where required to ensure that the stipulated measures are being implemented correctly.

3.3 Ecologist

3.3.1 The Ecologist shall be suitably qualified with at least two years' experience and suitable training and a member of the Chartered Institute of Ecology and Environmental Management (CIEEM). When undertaking monitoring, a Natural England bat, great crested newt and dormouse licence will be required. Additionally, a licence is required should the barn owl box require opening. Clarkson & Woods are happy to provide a qualified and licensed Ecologist, though the developer may appoint another suitably qualified ecologist to fulfil this role.

3.3.2 The Ecologist will be appointed to carry out the monitoring as set out within this LEMP. They will also be required to provide advice on positioning of habitat boxes and potentially advise on other aspects of habitat creation and management.

4 OPERATIONAL PHASE PRESCRIPTIONS

PR1: Sowing of Diverse Grassland

Contributes to Objective 1

4.1.1 The arable fields which will be subject to conservation grazing and which will provide ground nesting bird habitat (refer to Section 6) will be seeded with a diverse native wildflower and grassland seed mix which will be of UK provenance. To aid in the establishment of the diverse grassland sward, no fertilizer will be applied after removal of the last agricultural crop has taken place.

4.1.2 Those areas without any restrictions on grazing will be seeded with an agricultural seed mix in order to provide sufficient grass for the sheep over the summer months.

4.1.3 Prior to seeding, the bare ground areas will be harrowed and rolled, using a tine harrow in order to avoid any potential damage to underground wiring and grid connections. However, if there are any areas which have suffered high soil compaction, for instance due to heavy machinery being deployed, these will be harrowed using a disc harrow to ensure the soil structure is suitable for subsequent sowing. If such a requirement arises to harrow with discs, caution should be exercised to ensure newly installed underground services are not damaged during harrowing.

4.1.4 If there is an abundance of annual or perennial weeds, these areas may be treated with a broad spectrum non-residual herbicide prior to seeding.

4.1.5 Seeding will take place following completion of construction. The site will be assessed by the ecologist or seed supplier prior to seeding, as particularly wet or dry conditions may prevent successful sowing. Seeds will be broadcast by machine (fertiliser spreader, grass seed box) and rolled where possible. The gaps between strings of solar panels are to be wide enough to accommodate a tractor travelling between them for harrowing, sowing and rolling purposes. In areas where a machine is unable to access, such as far underneath panels, seeding in these areas will be broadcast by hand and trodden in.

4.1.6 The seed mixture sown within the conservation areas will contain a variety of native flower and grass species and will reflect the species typically found within the area. The soil is likely to be highly fertile, which will prevent a highly diverse sward establishing. Therefore, the seed mix may comprise a small number of non-vigorous species with the aim of further species colonising naturally as the soil

fertility declines. The seed supplier will advise and a soil test may be required. All seed will be of UK provenance and locally sourced if possible.

4.1.7 The seed mix should also contain the following species, which are species to support dingy skipper and grayling, which are local priority species.

Common Name	Latin Name
Birdsfoot trefoil	*Lotus corniculatus*
Red fescue	*Festuca rubra*

PR2: Management of Grassland

Contributes to Objective 1

4.1.8 Half of the site has been targeted for conservation grazing (as the Plan in Section 6 shows) and half with no restrictions on grazing, so that sheep can be moved around all year within the site.

Conservation Grazing

4.1.9 The grassland within these fields will be subject to regular cutting as appropriate during the first year (at least three times within the year to approximately 500mm) in order to prevent the spread of annual weeds and reduce the nutrient levels in the soil.

4.1.10 Arisings will be collected with a baler to remove nutrients and thereby promote the establishment of a biodiverse sward.

4.1.11 The frequency of cutting will be dependent on the establishment of the sward and will be more regular should annual weeds establish or if arisings cannot be removed from the site.

4.1.12 In subsequent years, this area will be managed through low intensity grazing using sheep using the following approach:

January-February	Light grazing on any new growth (optional).
Early March	Remove grazing; this allows plants to grow and creates good habitat for ground nesting birds

Late September to end of December	Main grazing period with light grazing down to a short sward height; a mosaic of plant heights helps encourage insects.

The intended outcome of a conservation grazing scheme will be to have a sward of the following height structure at the beginning of March:

- 75% at a height of approximately 5cm
- 25% at a height of approximately 25cm

4.1.13 Grazing is only to be undertaken by sheep. Cattle grazing will not be possible due to the damage this livestock may cause to the solar panel equipment.

4.1.14 Stocking density of between 5 – 10 animals per hectare is recommended between late September and March. This is a typical stocking density for conservation grazing. Higher densities are likely to have a detrimental effect upon the quality of the grassland. Where larger breeds of sheep are used for grazing consideration should be given to lowering stocking density.

4.1.15 Should the sward height become a problem, with plants starting to shade the lower levels of the panels, a strip can be cut at the base of the panel to shorten the sward height in this area. This cutting will take place in September and arisings will be removed.

Agricultural Grazing

4.1.16 This area will not have any restrictions on grazing and it is assumed that the sheep moved from the conservation area in early March would be relocated into this area until late September when they can be moved back.

PR3: Creation of Ground Nesting Bird Habitat

Contributes to Objective 1

4.1.17 The areas to be created for ground nesting birds will be managed to ensure a sward height of between 20 to 50cm (as shown in Section 6) during spring and summer. Management will be in the same way as set out in PR2 above (conservation grazing), but stocking densities may need to be reduced or grazing removed in order to achieve the correct sward height.

4.1.18 Should the sward become taller than 50cm during March to August, a strip will be cut through the area the width of a tractor or quad mounted mower (approx. 3m) to approximately 5cm above ground level. Arisings will be left in situ to provide some thatch structure for nesting. Mowing will be carried out slowly to allow animal to escape as the grass is being cut.

PR4: Creation of Arable Plant Habitat

Contributes to Objective 1

4.1.19 A strip on the southern boundary will be managed for arable plants. Within this area, there will be no routine application of herbicides, but where a pernicious weed burden becomes an issue, targeted herbicide application and or hand pulling will be necessary (see PR6). No seed or crop will be added to these areas, to encourage the existing seed bank to germinate, grow and re-seed.

4.1.20 The arable weed plant area will be cultivated in spring (March-April) each year for the lifetime of the array, to a depth of 150mm to establish a firm, fine tilth. This will then be left undisturbed to naturally regenerate, which will provide suitable conditions for arable weed plants to thrive annually. The cultivation depth can also be adjusted to control germination of problematic weeds.

4.1.21 The management is in accordance with that described within Natural England Entry Level Stewardship Option EF11.

4.1.22 This area will be included within the monitoring visits to ensure that injurious weeds do not establish – changes in management may be required if this is the case (such as the inclusion of an autumn plough).

PR5: Management of Field Margins

Contributes to Objective 1

4.1.23 Coarse, tussocky grassland will be created between the security fencing and the field boundary hedgerows.

4.1.24 In order to prevent the encroachment of scrub, rotational cutting will be applied. Half of the site will be cut per year to approximately 15cm, allowing two years growth to establish before cutting.

4.1.25 Mowing will take place outside of the bird nesting season (March to August inclusive) during periods of dry weather to ensure that waterlogged ground is not damaged by machinery.

4.1.26 Due to the potentially tall grass/scrub and amount of arisings that would need to be collected, two options are available:

- A flail mower and collector is utilised and arisings are removed to be composted or baled for silage; or
- A disk-cutter is utilised and arisings are left in situ, turned, then collected.

4.1.27 Sheep or pony grazing may also be utilised in combination with the above to reduce the amount of arisings to be collected. Livestock will only be utilised between September and February inclusive.

PR6: Management of Injurious Weeds

Contributes to Objective 1

4.1.28 The land will be managed to ensure that any of the five injurious weeds (Weeds Act 1959) do not proliferate or spread on the site. The five species include:

- Common ragwort *Senecio jacobaea*
- Spear thistle *Cirsium vulgare*
- Creeping or field thistle *Cirsium arvense*
- Broad-leaved dock *Rumex obtusifolius*
- Curled dock *Rumex crispus*

4.1.29 Should any of these species become problematic (i.e. a spread to more than 10% of the total field), management prescriptions may need to be altered.

4.1.30 Firstly, the weeds will be cut to ground level prior to or during flowering (but before setting seed).

4.1.31 A further cut may be required in autumn (September/October, during dry weather).

4.1.32 Ragwort may need to be hand pulled rather than cut.

4.1.33 Should the spread of weeds remain at >10% after two years of cutting/reduction in stocking density, weeds may require further treatment. Either:

- Spot treated with a broad spectrum, non-persistent herbicide; or
- Treated with a species-specific selective weed killer.

4.1.34 Should herbicides be utilised, an ecologist will be contacted prior to use for further advice.

4.1.35 The spread of undesirable plants will be monitored by the site operator and through monitoring visits by an ecologist as set out in PR12.

PR7: Hedgerow/Tree Planting

Contributes to Objective 2

4.1.36 The native shrub and hedgerow shall be planted in autumn or winter, avoiding periods of severe cold, wet weather or waterlogged conditions.

4.1.37 The line of the proposed hedgerow will be marked out with string and a first spade's depth of soil removed. A further spade's depth of soil will be loosened using a fork or cultivator and leaf mould or manure will be mixed in with it.

4.1.38 The whips will be planted in two staggered rows approximately 400mm apart from each other (no less than 5 per metre) to create a thicker hedgerow.

4.1.39 A mulch will be used around the base of the plants to reduce grass and weed growth and maintain moisture after initial planting, and spiral tree guards will be installed (these shall be removed after the fourth growing season).

4.1.40 During the first summer, any weeds that do develop should be removed to reduce competition.

4.1.41 If dry weather persists during the first summer, make sure that the hedgerow is well watered to prevent failures.

4.1.42 Any plants that fail within the first five years will be replaced by a similar species in the autumn.

PR8: Hedgerow/Tree Management

Contributes to Objective 2

4.1.43 In the first spring, cut the whips down to 45-60cm. This hard pruning will encourage the hedgerow and shrubs to become thick and bushy. At the end of the second growing season, trim the hedgerow so that it becomes 'A-shaped' in section with a wide base and narrow top. The wide base will provide additional habitat for small mammals and birds to nest as well as creating a wider corridor for these species to travel. The target height for the new hedgerows and/or hedgerow reinforcements should be up to 3 metres (full summer height excluding trees).

4.1.44 Once the hedgerow has become established (approximately year 5) a cyclical cutting regime should be undertaken. No more than half of the hedgerows on Site

should be cut in any one year. The cut should take place in January and February so that birds can make use of the berry crop throughout the winter.

4.1.45 A detailed condition survey of all retained trees will be carried out by a qualified arborist at least once every two years. Any necessary remedial works will be carried out as soon as possible. An establishment survey of all trees will be carried out by a qualified arborist annually for the first five years, making recommendations to assist with establishment. Any necessary remedial works will be carried out as soon as possible. Deadwood resulting from tree management works will be used on the site to create wood piles. Piles are to be no more than 600mm in height. The wood at the bottom of the pile is to be set 1/3rd into the ground. Piles are to be located within the habitat area.

4.1.46 Tree stakes, ties and guards will be regularly checked during the establishment period and adjusted as necessary to ensure that the developing trees are not damaged. Stakes, ties and guards will be removed by the landscape maintenance contractor at the earliest opportunity (typically between year 3 and 5) when it is considered that the trees are self supporting.

4.1.47 There will be a minimal pruning policy for trees as pruning wounds can provide a source of infection. Formative pruning of new trees will only be carried out to remove dead and diseased wood and to create a well balanced tree with a single leader. Clear stems of 2 metres will be maintained by rubbing off any shoots and when the trees reach 5 to 6 metres high lower branches will be removed to give a canopy height of approximately 2.4 metres.

4.1.48 If trees die, the reason for death shall be investigated and addressed before replanting a replacement. If death is due to the planting conditions these shall be ameliorated. If death is due to pests or disease and likely to be present in the future a resistant species of an alternative similar tree shall be selected. Where trees have become moribund due to compaction or lack of nutrients soil aeration techniques and the use of inoculants shall be considered.

4.1.49 Trees will establish anchor roots better, increase stem girth and form a better stem taper if allowed to move in the wind, whilst remaining secured at ground level.

- Cut planted hedgerow and scrub back heavily in first spring.
- Trim hedgerow in to 'A' shape every January/February.
- After years 5, trim 50% of hedgerows each year in January/February.

- Formative pruning of new trees - to create a well-balanced tree with a single leader and, by rubbing off any shoots, creating a clear stem of 2m. When the trees reach 5-6m in height, lower branches will be removed to give a canopy height of approximately 2.4m.
- Check that tree stakes, ties and guards are not too loose, too tight or broken. On instruction from client, replace or upgrade guards/shelters as necessary.
- Visual inspection for fungal activity (for trees this is to be performed by a qualified arborist) - remove diseased wood or treat as appropriate. Keep use of pesticides to a minimum.
- Visually inspect bark mulch areas around trees and top up to 75mm depth, if required. Remove any weeds within the mulch by hand, do not use strimmers or herbicides in these areas.
- Keep paths clear from branches/vegetation – pruning any encroaching tree branches. Trees shall be pruned to a height of 3m if overhanging paths.
- Remove dead, damaged or dying branches as appropriate.

PR9: Installation of Habitat Boxes

Contributes to Objective 3

4.1.50 The following 18 no. bird boxes will be installed onto mature trees/hedgerows within the site. Exact locations for these boxes will be agreed on site with an Ecologist.

#	Description and Image	Positioning
2	Barn Owl Trust Barn Owl Box 	To be purchased from Barn Owl Trust or handmade using specifications as shown at: http://www.barnowltrust.org.uk/infopage.html?Id=42) The Barn Owl Box is to be placed on a large mature tree in the open, with unobstructed access to the entrance.
2	Schwegler No. 5 Owl Box 	Suitable for tawny owl, but also stock dove and jackdaw To be installed 4-6m above ground on a mature tree with unobstructed access to the box. To encourage use, a thick layer of sawdust or wood shavings should be spread in the base of the box.

#	Description and Image	Positioning
2	Schwegler 3S Starling nest boxes 	To be placed at least 2m above the ground in a quiet and sheltered area of site on mature trees. Ensure the boxes are covered from the rain by facing the entrance down slightly in order to prevent rain seeping in and so encourage use and increase the longevity of the box. Ensure there is clear access to the box entrance at all times. Best placed on a north or easterly aspect.
2	Schwegler 2B Treecreeper Nest Box 	To be placed on a mature tree with rough bark (such as oak or pine) on a trunk with a diameter of 25-30cm. Should be placed at least 3m off the ground. Best placed on a north or easterly aspect.
2	Schwegler 5KL Nuthatch Box 	To be placed close to the No. 5 Owl boxes in order to discourage nuthatches from utilising the owl boxes. Should be placed at least 3m off the ground. Best placed on a north or easterly aspect. Ensure the boxes are covered from the rain by facing the entrance down slightly in order to prevent rain seeping in and so encourage use and increase the longevity of the box. Ensure there is clear access to the box entrance at all times.
8	Schwegler 1B Bird Box (28mm entrance) 	One group of 4 boxes placed in clusters to be suitable for tree sparrow (which nests colonially) and four boxes to be installed individually. To be placed at least 2m above the ground in a quiet and sheltered area of site on mature trees. Ensure the boxes are covered from the rain by facing the entrance down slightly in order to prevent rain seeping in and so encourage use and increase the longevity of the box. Ensure there is clear access to the box entrance at all times. Best placed on a north or easterly aspect.

4.1.51 The following 10 bat boxes will be installed onto mature trees/hedgerows within the site. Exact locations for these boxes will be agreed by an ecologist whilst on site.

#	Description and Image	Positioning
5	Schwegler 2F with double front panel 	Nail onto the main trunk of mature trees 4 to 5m high, on south, south west or south eastern aspects, ideally in a sunny location. Suitable for smaller species of bats and the internal panels dissuade birds from nesting within this box.
3	Schwegler 3FN 	Nail onto the main trunk of mature trees 4 to 5m high, on south, south west or south eastern aspects, ideally in a sunny location. Suitable for a variety of bats.
2	Schwegler 3FS 	Nail onto the main trunk of mature trees 4 to 5m high, on south, south west or south eastern aspects, ideally in a sunny location. Suitable for larger colonies of small bats such as pipistrelles.

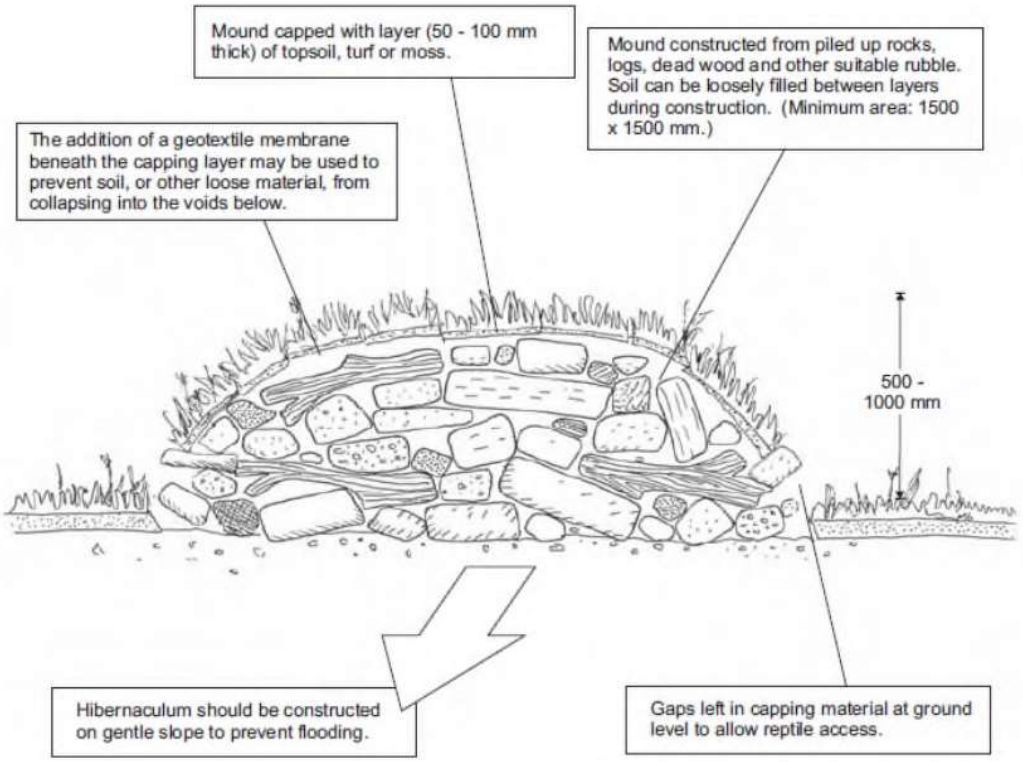
4.1.52 20 no. dormouse nest boxes will be installed within the habitat to the west and south of the site. The boxes will be placed at a height of between 1.5-4m on a suitably mature trees or shrub. The following dormouse nets box design will be installed (or similar on agreement with the consultant ecologist):

- *Mammal Society Dormouse Box – Sliding Roof* available from Wildcare http://www.wildcareshop.com/dormouse-box-sliding-roof-1.html

PR10: Creation of Hibernacula

Contributes to Objective 3

4.1.53 Three wildlife hibernacula will be created, comprising partially buried logs and rubble, to provide shelter and an over-wintering refuge for reptiles, amphibians and invertebrates. Appropriate locations for the hibernacula are shown in Section 6. The creation of the refuges will take place at the end of the construction stage and will ideally utilise existing wood and stone generated during site preparation, ground excavation and hedgerow removal works. However, should this not exist, materials necessary to create the refuges will be brought onto site. A diagram showing the construction of a hibernaculum is shown below:



4.1.54 Given the establishment of a long grass sward, the hibernacula may be marked with a post to ensure that machinery used for grass cutting does not impact the structures.

PR11: Pond Enhancement

Contributes to Objective 4

4.1.55 The "ponds" on site, which are currently depressions in the fields being ploughed and cropped, will be deepened to ensure that they hold water for a longer period over the year. The deepening will allow some deep and shallow areas within the pond.

4.1.56 The pond deepening will be carried out during construction, when machinery is on the site. There are no time restrictions on this work, given that they are not currently functioning as ponds and so do not support any aquatic life. Prior to any work, an ecologist will visit the site in order to check the current status of the ponds and advise on the pond deepening work.

4.1.57 The ponds will be left unmanaged initially, in order to encourage estbalishment of natural aquatic and marginal vegetation within them and rough grassland and scrub to establish around them. They will be subject to monitoring (see PR 12) and where vegetation begins to encroach or overshade the waterbody, advice will be given on cutting it back.

PR12: Monitoring

Contributes to Objective 5

4.1.58 Monitoring will be carried out by a suitably qualified ecologist to assess the ecological development of the site in years 1, 2, 3, 5 and 10 post construction. Subsequent to this, visits will be conducted every 5 years for the remaining lifetime of the array, with changes to the LEMP made where this is considered appropriate.

4.1.59 All records of species obtained during the surveys will be submitted to the Local Record Centre.

4.1.60 A monitoring strategy is set out below:

Year (years post-construction)	Focal Species/ Group	Description
1, 2, 3, 5 and 10. Then every 5 years.	Botany	Carried out during June/July. Targeted quadrats will be utilized within three habitat types: field margins, beneath panels and between panels. Quadrats will be recorded using National Vegetation Classification methodology, with at least 15 quadrats being recorded (5 within each habitat type).

Year (years post-construction)	Focal Species/ Group	Description
		The monitoring will focus on species diversity and will look to see how the diversity increases over the years.
1, 2, 3, 5 and 10. Then every 5 years.	Birds/bats /dormice	Inspection of habitat boxes by suitably licensed ecologist to check for signs of use.
3 and possibly 10	Great crested newt survey	An eDNA survey of the ponds within the site will be carried out in order to assess whether grea crested newts have successfully colonized. If the result is negative, a further survey will be conducted in year 10 as it may take several years for a population to establish on the site.
5	Breeding Birds	A total of 3 breeding bird surveys will be conducted between April and June, with a focus on the ground nesting bird area.

4.1.61 Biological monitoring will ensure the habitat is establishing as intended and will track the development of the sward which should increase in diversity over time. Monitoring will also give an early-warning of any injurious weeds or vegetation failure that may occur. Over time the monitoring information will build up a picture of the ecological benefits of the site to a broad range of species. Recommendations may be made to amend the management prescriptions to promote a more diverse grassland sward. Recommendations may include a change in management or supply of additional seed.

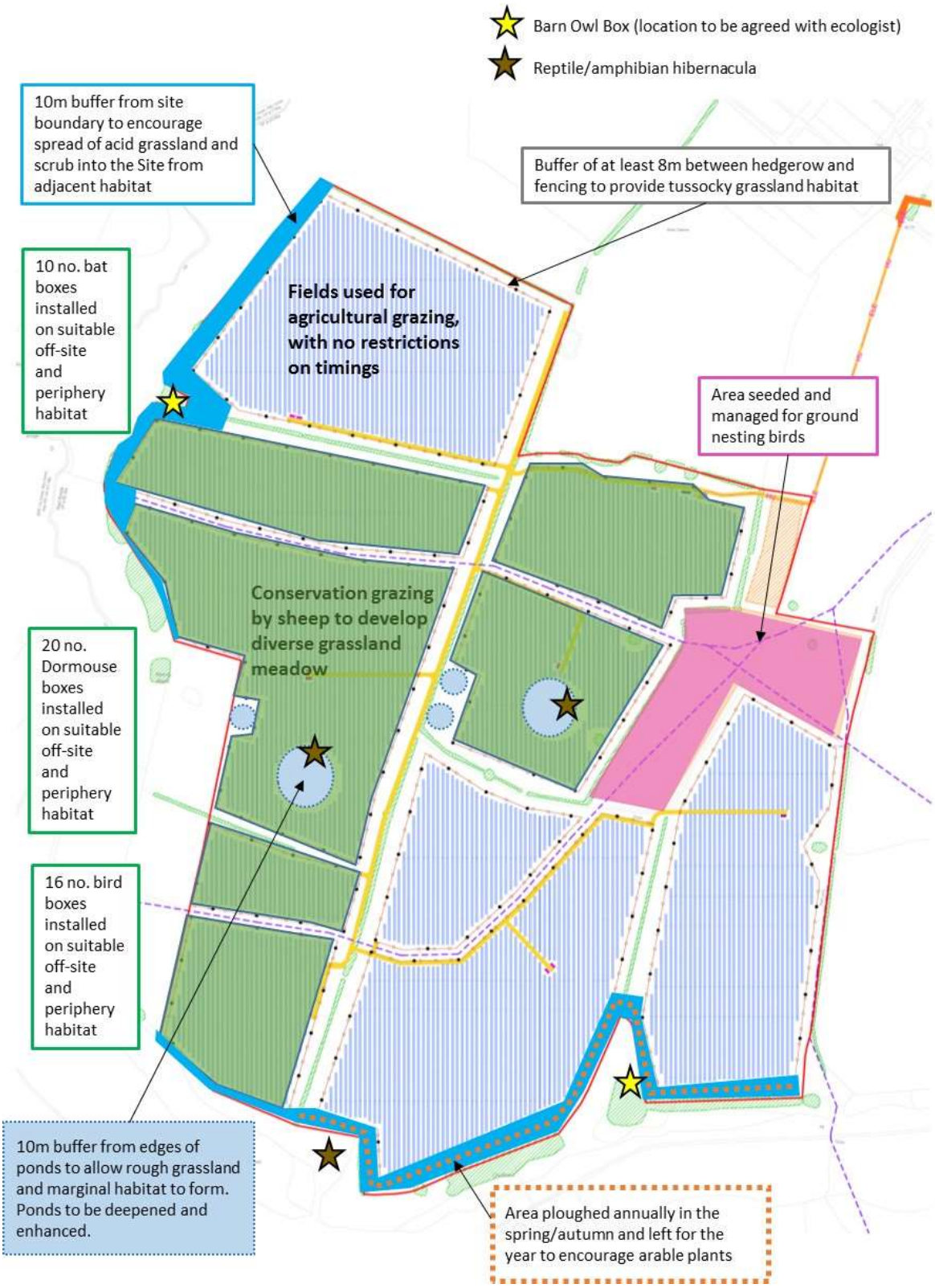
4.1.62 Following completion of each years monitoring visit a monitoring report will be supplied to the Local Planning Authority.

5 MANAGEMENT PLAN DIARY

Prescriptions		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PR1	Seeding of Site *Ideally spring or autumn, but summer seeding may be appropriate if ground conditions are not too dry (and spring/autumn is too wet)*			*Sowing of seed (optimum time)*					*Sowing of seed (optimum time)*				
PR2	Management of Grassland Beneath Array – **Conservation Grazed – Year 1** *Regular cutting during first year with arisings removed*												
PR2	Management of Grassland Beneath Array – **Conservation Grazed – Subsequent Years** *Management over subsequent years*	*Light grazing on any new growth*								*Main grazing period*			
PR2	Management of Grassland Beneath Array – **Summer/Agricultural Grazing**			*Main grazing period*									
PR3	Management of Ground nesting Bird Habitat *Conservation grazed with mowing in strips to if required*	*Light grazing on any new growth*								*Main grazing period*			
PR4	Management of Arable Plant Habitat *Cultivated in March/April and left to allow arable plants to establish*			*Cultivation of arable plant area*									
PR5	Management of Field Margins *Cut/ grazed on 2 year rotation*	*Cutting*								*Cutting*			
PR6	Management of Injurious Weeds *Weeds to be cut and/ or weed-killed where necessary*	*Cut prior to /during flowering*								*Further cut if required*			

Prescriptions		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PR7	Hedgerow/Tree Planting	*Carry out planting during dormant phase*										*Carry out planting during dormant phase*	
PR8a	Hedgerow/Tree Management - Establishment Period (years 1 to 5)	*Carry out replacement planting as required*		*Carry out formative pruning of trees and hedges*		*Carry out regular watering of plants to full depth of topsoil and weed as necessary. Carry out every 2 weeks during periods of dry weather*				*Check stakes/ties and identify dead or dying plants that need replacing*		*Carry out replacement planting as required*	
PR8b	Hedgerow Management – Once Established (year 5 onwards)	*Carry out annual pruning of hedge and maintain at a height of 3m*											
PR9	Installation of Bird, Bat and Dormouse Boxes	*Post-construction*											
PR10	Creation of Habitat Piles *Hibernacula to utilise materials generated from construction where possible.*	*During or post-construction*											
PR11	Pond Enhancement	*During or post-construction*											
PR12	Monitoring *To be carried out in years 1,2,3,5 and 10*	*Various surveys*											

6 BIODIVERSITY MITIGATION AND ENHANCEMENT PLAN



7 LANDSCAPE MITIGATION PLAN

PLANTING SCHEDULE

Native Tree Planting:

Quantity	Species	Height (cm)	Girth (cm)	Habit	Ages / Times Transplanted	Root Condition
Heavy Standard Trees						
39	*Acer campestre*	350-425	12-14	Clear stem min 200 cm; 5 breaks	3x	40L
30	*Quercus robur*	350-425	12-14	Clear stem 175-200 cm; 5 breaks	3x	40L

Native Hedgerow Planting:
To be planted at 5/linear m, double staggered row at 0.5m offsets

Quantity	Species	Mix %	Height (cm)	Habit	Ages / Times Transplanted	Root Condition
3606	*Acer pseudoplatanus*	15	60-80	Transplant – seed raised	1+1	B
3606	*Corylus avellana*	15	40-60	Transplant – seed raised; branched; 2 breaks	1+1	B
9615	*Crataegus monogyna*	40	40-60	Transplant – seed raised	1+1	B
2404	*Ilex aquifolium*	10	20-30	Leader with laterals	-	0.5L
1202	*Prunus spinosa*	5	60-80	Transplant - seed raised; branched; 2 breaks	1+1	B
1202	*Rosa canina*	5	60-80	Transplant – seed raised; branched; 3 breaks	1+1	B
2404	*Sambucus nigra*	10	60-80	Transplant – seed raised; branched; 3 breaks	1+1	B

PLANTING SPECIFICATION

1 GENERAL

1.1 All plants will conform to BS 3936-1 (1992): and be in accordance with the National Plant Specification. Supplying nurseries will be registered under the HTA Nursery Certification Scheme. All plants will be packed and transported in accordance with the Code of Practice for Plant Handling as produced by CPSE.

1.2 Planting will not be carried out when the ground is waterlogged, frost bound or during periods of cold drying winds.

1.3 All bare-root planting stock will be kept covered until actually planted in order to minimise water-loss and prevent the roots from drying out.

1.4 All bare-root planting stock will be root dipped in an approved water-retaining polymer.

1.5 If the formation level is compacted it should be ripped through before topsoiling.

2 TREE PLANTING

Ground Preparation and Tree Pit Excavation

2.1 Where necessary remove existing weeds by hand. Chemical removal using a glyphosate based herbicide will be avoided unless large areas need clearing – following which allow a suitable period to elapse, as recommended by the manufacturer, for the herbicide to take effect.

2.2 Tree pits of at least 75mm diameter greater than the root system and no deeper than the rootball / container depth are to be excavated and the sides well scarified to prevent smearing. All extraneous matter such as plastic, wood, metal and stones greater than 50mm in any dimension shall be removed from site.

2.3 During excavation of the pit, the soil dug should be placed to one side separating topsoil and subsoil as far as is practical.

Tree Planting

2.4 Trees shall be planted as per the planting arrangement as set out on the planting plan and plant schedule.

2.5 The typical rooting depth for trees is 900mm. The first 300mm shall be made up of topsoil; it shall be ensured that a suitable subsoil provides the remainder of the minimum rooting depth.

2.6 The root system of the tree should be wetted prior to planting. The tree should be planted at the correct depth taking into account the position of the root flare and the finished level - the rootball or root stem transition should be level with the existing host soil or surface. The base of the rootball should typically sit on subsoil, for larger rootballs the subsoil will sit around the lower portion of the rootball.

2.7 Tree pits should be backfilled with the excavated topsoil, if the original topsoil is not available or deemed unsuitable, a multi-purpose topsoil should be used. Any subsoil excavated should be discarded and the subsoil depth (beyond 300mm deep) backfilled with a high sand content subsoil. Backfill should be added gradually, in layers of 150mm to 230mm depth, ensuring the tree is held upright At each stage the fill should be firmed in to eliminate all air pockets under and around the root system, but with care being taken not to excessively compact the soil. The final layer should not be consolidated.

2.8 General-purpose slow release fertiliser (at the rate of 75gm/m2) and Tree Planting and Mulching Compost at the rate of (20litres/m2) are to be incorporated into the top 150mm of topsoil during final cultivations.

2.9 All extra heavy standard size trees are to be double staked with 75mm dia stakes. Stakes should be driven at least 300mm into undisturbed ground before planting the tree, taking care to avoid underground services and cables etc. and should typically be one third the height of the tree stem above ground.

2.10 Staked trees shall be secured to stakes with suitable proprietary rubber tree ties and spacers.

2.11 Immediately after planting, but before applying the below bark mulch, all trees should be saturated to field capacity.

2.12 Ornamental composted bark mulch will be spread to a depth of 75mm across a 0.8m dia circle around individual trees, ensuring that the root flare and base of the stem, along with any ground cover plants, are not buried.

3 NATIVE HEDGE TRANSPLANTS

4 Ground Preparation

4.1 Where necessary existing weeds will be treated with a glyphosate-based herbicide and a suitable period allowed to elapse, as recommended by the manufacturer, for the herbicide to take effect.

4.2 All extraneous matter such as plastic, wood, metal and stones greater than 50mm diameter will be removed from site to a registered waste disposal facility.

Planting

4.3 New hedgerows to be planted at 5/linear m, double staggered row at 0.5m offset as per schedule.

4.4 Existing hedgerows to have infill planting (as required following detailed review on site), species and stock size to match proposed new hedgerow planting (see planting schedule).

4.5 The plants should be planted using L shaped or straight notches) using spades of a design suitable for this purpose. The 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 BS 4428 (1989).

4.6 All bare-root hedge planting stock will be protected from rabbit damage using approved proprietary 600mm clear plastic spiral guards, supported with 0.9m 12/14lb canes as advised by the manufacturer. Excluding evergreen species.

4.7 All container-grown planting stock will be protected from rabbit damage using approved proprietary 600mm plastic shrub shelters, supported with 0.9m x 32mm x 32mm softwood stakes as advised by the manufacturer.

4.8 All plants shall be watered in at the end of each day of planting.

4.9 Weed growth in all areas of tree planting will be controlled until successful establishment is achieved by careful application of a systemic herbicide such as Roundup by an approved landscaping contractor in order to clear any extraneous vegetation.

4.10 All hedgerow planted areas to be finished with a 50mm min depth of Amenity bark mulch.

Maintenance during first growing season

4.11 All dead, dying or diseased hedge plants will be replaced with plants of similar size and species. If the failure of the plant is due to disease and the disease is considered likely to re-occur then an alternative species may be used as replacement if agreed with the LPA.

4.12 The planting area will be kept weed free throughout the maintenance period using approved herbicides in April, June and August.

5 GRASS

Preparation

5.1 Areas to be seeded will be sprayed out using a glyphosate-based herbicide and cultivated to a minimum depth of 100mm. During the construction phase there may be areas which have suffered high soil compaction, for instance due to heavy machinery being deployed. These areas should be harrowed using a disc harrow to ensure the soil structure is suitable for subsequent sowing. If such a requirement arises to harrow with discs, caution should be exercised to ensure newly installed underground services are not damaged during harrowing.

5.2 Seeding should take place in early spring in the first year following completion of underground wiring, and be broadcast by machine and rolled where possible. The gaps between strings of panels are to be wide enough to accommodate a tractor travelling between them for harrowing, sowing and rolling purposes. In areas where a machine is unable to access, such as far underneath panels, bare areas shall be raked by hand and seeding in these areas should be broadcast by hand.

Beneath and between the panels

5.3 Grass seed will be sown in accordance with BS 4428 (1989), and will be sown from April to May or from September to October, during calm weather and not when the ground is frost bound or waterlogged. The site will be seeded where shown using the seed mix shown below or equivalent (to be agreed with the project ecologist).

5.4 The seed supplier should be contacted prior to purchasing the seed mixture and the soil conditions and location of the site should be discussed. A bespoke seed mixture suitable for the specific conditions on the site may be more suitable.

5.5 Seeds can be mixed with a substrate such as sand or sawdust for ease of broadcasting.

Grassland Cutting

5.6 Following establishment of a suitable sward, the grassland habitats will be managed through either grazing and/or mechanical cuts to develop grassland with a varied structure. Both approaches are identified below.

5.7 Problem perennial weeds within the grassland will be controlled by carefully targeted applications of a suitable selective none residual herbicide by way of spot spraying with a knapsack (low pressure to avoid spray drift), or weed wiping.

5.8 In the unlikely event that grassland fails to become established upon areas of bare ground created during the works these areas will be lightly scarified and reseeded with the same seed mix used to seed the site at the during the construction phase.

5.9 An inspection will be undertaken in early August following completion of the installation. The inspection will be undertaken by the solar farm operator. Should the proportion of bare ground be greater than 20% sowing will be repeated in these areas. Reseeding in August is likely to be particularly appropriate where the months of May, June and July have been very dry. The operating company will assess the proportion of bare ground on the site.

5.10 Mechanical Cutting Regime

Areas of newly seeded grassland will be subject to one cut during the first year of establishment. In good growing conditions (warm soils and adequate rainfall) the grass will establish and require its first management around 6-10 weeks from sowing. Cut when sward reaches 100mm in height. However, additional cuts may be required to prevent the height of the sward from obscuring the solar panels. The grassland should be cut to 40-70mm. Arising´s will be left in situ for 3-5 days to allow seeds to disperse, then be collected with a baler or rake to remove nutrients and thereby promote the establishment of a bio diverse sward.

Cutting should follow a sympathetic method (ie working outwards towards the boundary features), this will allow fauna such as invertebrates, birds and small mammals to temporarily and safely vacate the area.

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

Grassed areas along hedgerow bases can be cut less frequently once established, with a single main cut (reducing sward height to approximately 150mm) late in the season, between August and September, subject to weather conditions.

All arising´s will be removed from site.

Please refer to seed suppliers recommendations for ongoing maintenance and cutting regime.

5.11 Grazing Regime

Once established the grassland within the perimeter fence can be managed by sheep grazing as an alternative to mechanical cutting. Grazing should follow a low-intensity grazing regime.

Grassland to be subject to light intermittent grazing by sheep between late August/September and November and through to February where conditions allow. Stock should be removed in the late winter period if ground conditions become saturated in order to prevent compaction of wet earth and excessive damage to the sward.

During the spring and summer (March to August), sheep will be removed to allow flowering plants to set seed. Light summer grazing may also be carried out if grass growth is particularly vigorous, particularly in the early years after establishment.

Guidance on stocking levels for lowland grassland (number of sheep per hectare) can be obtained from the Lowland Grassland Management Handbook produced by Natural England.

Please refer to seed suppliers recommendations for ongoing maintenance and cutting regime.

5.12 Grass Seed Mixtures

Germinal (or similar) WFG8 Hedgerow & Shaded Areas
(To be agreed with the project ecologist) sown at 4gms/m2
To be sown around the perimeter areas of the Application Site as indicated on the plans.

Cotswold Seeds (or similar) Solar Park Long Term Grazing Mixture with Clover
(To be agreed with the project ecologist) sown at 32.5kg/ha
To be sown within the security fencing of areas occupied by solar panels as indicated on the plan.

Emorsgate (or similar) EM3 Special General Purpose Meadow Mixture
(To be agreed with the project ecologist) sown at 4gms/m2
To be sown to areas within proposed Conservation Areas and areas within grassland for bird nesting .

Proposed Hedgerow Planting	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	(67 lin m)	*(15 lin m)*	*(22.5 lin m)*	*(17.5 lin m)*	*(400 lin m)*	*(800 lin m)*	*(285 lin m)*	*(580 lin m)*	*(80 lin m)*	*(245 lin m)*	*(240 lin m)*
Transplant											
Acer pseudoplatanus	50no.	11no.	17no.	13no.	300no.	600no.	214no.	435no.	60no.	184no.	180no.
Corylus avellana	50no.	11no.	17no.	13no.	300no.	600no.	214no.	435no.	60no.	184no.	180no.
Crataegus monogyna	134no.	30no.	45no.	35no.	800no.	1600no.	570no.	1160no.	160no.	490no.	480no.
Ilex aquifolium	34no.	8no.	11no.	9no.	200no.	400no.	143no.	290no.	40no.	123no.	120no.
Prunus spinosa	17no.	4no.	6no.	4no.	100no.	200no.	71no.	145no.	20no.	61no.	60no.
Rosa canina	17no.	4no.	6no.	4no.	100no.	200no.	71no.	145no.	20no.	61no.	60no.
Sambucus nigra	34no.	8no.	11no.	9no.	200no.	400no.	143no.	290no.	40no.	123no.	120no.

Proposed Hedgerow Planting	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII
	(325 lin m)	*(245 lin m)*	*(385 lin m)*	*(18.5 lin m)*	*(100 lin m)*	*(260 lin m)*	*(95 lin m)*	*(150 lin m)*	*(75 lin m)*	*(280 lin m)*
Transplant										
Acer pseudoplatanus	244no.	184no.	289no.	14no.	75no.	195no.	71no.	113no.	56no.	210no.
Corylus avellana	244no.	184no.	289no.	14no.	75no.	195no.	71no.	113no.	56no.	210no.
Crataegus monogyna	650no.	490no.	770no.	37no.	200no.	520no.	190no.	300no.	150no.	560no.
Ilex aquifolium	163no.	123no.	193no.	9no.	50no.	130no.	48no.	75no.	38no.	140no.
Prunus spinosa	81no.	61no.	96no.	5no.	25no.	65no.	24no.	38no.	19no.	70no.
Rosa canina	81no.	61no.	96no.	5no.	25no.	65no.	24no.	38no.	19no.	70no.
Sambucus nigra	163no.	123no.	193no.	9no.	50no.	130no.	48no.	75no.	38no.	140no.

Revisions:
First Issue- 11/03/2021 JN
A- (11/03/2021 JN) Planting proposals revised
B- (17/03/2021 JN) Site layout updated

Landscape Proposals
Bubney Solar Farm

Client: Renewable Connections Developments Ltd

DRWG No: **P20-1083_11** Sheet No:_ REV: B

Drawn by : JN Approved by: AMS/RF

Date: 17/03/2021

Scale: 1:1500 @ A0

Pegasus Design

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