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LANDSCAPE, ECOLOGICAL AND SOIL MANAGEMENT PLAN

IN RELATION TO A PROPOSED 1MW SOLAR PHOTOVOLTAIC (PV):

KNOLTON FARMHOUSE CHEESE SOLAR INSTALLATION, OVERTON, CLWYD

FOR ACTIVE RENEWABLES LTD.

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APPENDIX A FIGURES

- **Drawings YOR.2447_01-A**

*(Taken from Landscape and Visual Impact assessment in relation to a proposed
1MW solar photovoltaic (pv): Knolton Farmhouse Chees, Solar Installation,
Overton, Clwyd (Pegasus Group Ltd – March 2015)*

1. INTRODUCTION AND SCOPE

- 1.1 Pegasus Group has prepared this management plan on behalf of Active Renewables Ltd for approval in writing in discharge of Conditions 3 and 9 of the planning permission Ref OVE P/2015/0249 granted on 2nd April 2015. This is in relation to a solar installation at Knolton Farmhouse Cheese, Overton, Clywd.
- 1.2 The purpose of this strategy is to set out the arrangements to be made for the management of the landscape, habitat and soil aspects of the development. A Landscape and Visual Impact Assessment (LVIA) was prepared by Pegasus Group Ltd in March 2015, and an Ecological Survey was prepared by Michael Woods Associates in March 2015 to support the planning application. This management plan draws on the findings and recommendations detailed in the above reports and in particular is based on the development proposals set out within drawings YOR.2447_01-A (**Appendix A**) of the LVIA.
- 1.3 This Plan sets out a management strategy for the first 10 years of operation of the solar farm. It is recommended that after the 10 years the objectives and prescriptions set out in the plan are reviewed and updated as necessary.

2. SITE CONTEXT

- 2.1 The site is approximately 1.7 hectares and lies directly to the south west of the Knolton Farmhouse Cheese factory to the south west of the village of Overton/Owerton.
- 2.2 The site currently comprises a single poor semi-improved grassland field, which was managed on an occasional basis. Separation from the B5069 to the south is provided by a bunded area of rough ground forming an area of tipped agricultural spoil and waste to the south. The western boundary consists of deciduous woodland, and the River Dee lies 460m to the north. The northern and eastern boundaries consist of Knolton Farm and factory buildings associated with cheese production. The surrounding landscape consists of arable and grazed improved grassland fields.

EXISTING LANDSCAPE / ECOLOGICAL FEATURES

- 2.3 The site includes the following landscape and habitat components:

Grassland

- 2.4 The majority of the site comprises poor semi-improved grassland which is managed by cutting on an annual basis. An area of dense scrub is present within this field along the western boundary adjacent to the woodland, which is dominated by bramble.

Bare Ground

- 2.5 A strip of recently formed bare ground is located running through the western part of the site, travelling roughly north to south. Michael Woods Associates (2015) noted that this appeared to be a result of trenching work, possibly to install underground services.

Hedgerows

- 2.6 A site visit in February 2015 identified that hedgerows were present along part of the eastern boundary of the site, where they were sparse and gappy. These were species poor and comprised hawthorn *Crataegus monogyna*. These were typically managed to a height of approximately 2m.

Woodland

- 2.7 Woodland is present along the western boundary of the site which forms part of Llan-y-Cefn Local Wildlife Site. Species recorded by Michael Woods associated (March 2015) within the woodland comprised beech *Fagus sylvatica*, cherry *Prunus avium*, elder, horse chestnut *Aesculus hippocastanum*, conifer species, sycamore *Acer psuedoplatanus*, goat willow *Salix caprea*, oak *Quercus robur* and ash *Fraxinus excelsior*.

Protected / Notable Species

BADGERS

- 2.8 Michael Woods Associates (2015) identified a disused badger sett in the west of the site which comprised one disused entrance. It was noted to be extremely overgrown and obscured with bramble, and as such, probably not been used for at least a year. No well used badger paths were identified within the site and no active setts found. However, Michael Woods Associates (2015) state that it is likely that badgers utilise the site on an occasional basis for foraging and moving around the landscape.

BATS

- 2.9 No mature trees or buildings were present within the site, therefore, no potential bat roosts were identified.
- 2.10 Michael Woods Associates (2015) note that only the woodland edge in the west of the site is likely to be utilised by commuting bats, as the remainder of the site lacked intact linear habitats.

DORMICE

- 2.11 Michael Woods Associates (2015) note that the woodland to the west of the site offered suitable habitat for dormice, however, the understory was limited and so the habitat lacked the structure which this species favours. No other suitable habitats were identified on site.

AMPHIBIANS

- 2.12 A small pond was present to the south west of the site, however, this was not thought to offer suitability for amphibians such as great crested newts.

REPTILES

- 2.13 Michael Woods Associates (2015) note that grassland within the site is cut annually and therefore does not provide the appropriate habitat which reptiles might utilise for shelter.

BIRDS

- 2.14 Michael Woods Associates (2015) note that it is likely that the area supports small numbers of breeding and overwintering birds typical of farmland habitats. Although the site and area is not suitable for use by ground nesting birds and does not offer nesting habitat for species such as skylark *Alauda arvensis*.
- 2.15 Woodland to the west was noted as being suitable for a range of nesting birds

INVERTEBRATES

- 2.16 No notable invertebrates were observed during the survey carried out by Michael Woods Associates (2015). A more suitable habitat would be located within adjacent woodland to the west.

3. LONG TERM AIMS AND OBJECTIVES

- 3.1 Individual components of the proposed development have their own management themes and strategies specific to their contribution to site and the proposed development.
- 3.2 This plan sets out how the valuable landscape, ecological and soil features of the site will be protected during the construction phase, and how during the operational phase of the site, ecological and landscape enhancements can be managed to increase the value of the site for visual amenity, landscape character, wildlife and biodiversity benefits.
- 3.3 The overall aim of this management plan is to ensure the features of existing landscape and ecological value on the site, including soil, are protected during construction, enhanced during the operation of the development. The detailed management and maintenance proposals have been prepared as guidance to ensure the continued upkeep of the site in order to enhance its visual amenity, landscape character and biodiversity / ecological value.
- 3.4 Key objectives of the Plan are set out below:
- To protect retained habitats and soil within and surrounding the site from damage and unnecessary disturbance;
 - To diversify ecological value through the retention of existing landscape features such as woodlands and hedgerows, and to enhance these through restoration and creation of habitats offering greater botanical and faunal interest to the site;
 - To safeguard the habitats with the potential for protected species;
 - To ensure development is appropriately softened and integrated within the surrounding landscape;
 - To enhance the landscape character and aesthetic value of the site and its surroundings;
 - To retain important landscape features, such as woodland to the west which currently provides physical and visual containment to the site. To ensure that the visual impact of the proposed development on adjacent users is minimised and the proposed development is seen to be well contained;

- To enhance hedgerows and improve connectivity between the site and wider surroundings;
- To use locally occurring native species of local provenance wherever appropriate;
- To increase ecological value through the creation of more varied habitats offering greater biodiversity interest to the site.
- To ensure wildlife are adequately protected during construction and operation; and
- To ensure soil is appropriately protected and managed across the site during construction and operation, to avoid soil compaction and ensure existing surface water infiltration rates are maintained.

PROPOSED DEVELOPMENT

- 3.5 During the operation of the solar array, the habitat surrounding and beneath the panels will be managed to facilitate the establishment of a diverse grassland.
- 3.6 Some hedgerow vegetation will be retained along part of the eastern boundary which will be enhanced by new native hedgerow will be planted along the eastern boundary. This hedgerow comprises a mixture of native species with standard trees planted along its length.
- 3.7 The woodland to the west will be protected from damage through the installation of security fencing prior to construction commencing. A 2m high deer fencing will be installed surrounding the site, allowing a buffer of at least 8m between the woodland and the fencing.
- 3.8 The buffer between the site boundary and security fencing will be managed as rough grassland. This will provide a transitional habitat between the woodland habitat and the development area.
- 3.9 An additional woodland copse / scrub planting is planned for the south western corner of the site. This comprises a range of species and will extend the woodland habitat and is located where existing woodland is at its thinnest.

4. MANAGEMENT PRESCRIPTIONS

4.1 In order to achieve the objectives outlined in Section 3, the following management prescriptions have been identified. These are based on drawing YOR.2447_01-A (**Appendix A**) which was produced as part of the LVIA within the planning application.

4.2 Implementation of the construction phase measures will be co-ordinated by the main construction contractor.

MP1: PROTECTION OF RETAINED HABITATS

4.3 Trees, hedgerows, and field margins on and adjacent to the site will be protected during the construction phase by installing site security (deer) fencing. The security fencing will be 2.0 metres in height and shall be installed prior to the commencement of any other works on site, as indicated on drawing YOR.2447_01-A (**Appendix A**). The fencing will be in accordance with the specification set out with BS5837: 2012.

4.4 An offset buffer of 8m will be instated adjacent to the woodland area to the west. This buffer should be delineated by installing security fencing prior to construction commencing. The fencing will act as tree protection fencing and no vehicles/machinery will be driven within this area or materials stored here. This fencing and the woodland edge should be periodically monitored throughout construction to ensure that the fencing remains intact and there are no adverse effects upon the woodland. The buffer should be managed as rough grassland to provide transitional habitat between the woodland habitat and the development area.

4.5 The security fencing will be installed at an appropriate distance from existing and proposed hedgerows (as shown on drawing YOR.2447_01-A (**Appendix A**), to the east of the site and will again act as hedgerow protection fencing, as well as protection of other habitats at the field boundaries. No vehicles/machinery will be driven within this buffer area or materials stored here.

MP2: PROTECTION OF PROTECTED AND NOTABLE SPECIES

General

- 4.6 A toolbox talk will be carried out to all contractors working on the site prior to construction commencing. This will provide an overview of the identification of protected species which may be encountered during construction works and the correct steps to take should this occur.
- 4.7 Hedgerows, trees and field margins will be protected through installing the security fencing prior to construction commencing, ensuring these habitats are retained as suitable for bats, amphibians, reptiles, birds, and hedgehogs.

Badgers

- 4.8 No active badger setts were identified on site. However, as more than 6 months have elapsed between the time the Ecological Survey was carried out by Michael Woods Associated (2015) on 4th March 2015, and the onset of construction, a badger survey is to be conducted to ensure no new setts have been excavated or the disused sett has not come back into use. This should be carried out approximately 1 month prior to works commencing.
- 4.9 Security fencing around the site should incorporate gaps of at least 100mm high to allow badgers and other mammals to utilise the site post construction. Gaps should be incorporated along all boundaries of the site to ensure that the site does not fragment wider badger territories.
- 4.10 Any excavations over 1m in depth will be covered overnight to prevent badgers and other mammals from becoming trapped.

Bats

- 4.11 Existing hedgerows and adjoining woodland will be retained and protected by the installation of site security fencing prior to the construction of the array. The provision of a buffer between the woodland and the development will ensure that this habitat is protected for use by bats.
- 4.12 Minimal artificial lighting will be used during the construction of the solar array in order to keep disturbance of nocturnal animals to a minimum. Use of motion sensitive, downward facing lights will help to minimise any impact upon foraging and commuting bats. In the event that significant levels of artificial lighting are

required a lighting strategy should be prepared in consultation with an appropriately experienced ecologist. This may need to be informed by further bat surveys to allow the impact of artificial lighting to be fully assessed.

Dormice

- 4.13 Adjoining woodland will be retained and protected by the installation of site security fencing prior to the construction of the array. The provision of a buffer between the woodland and the development will ensure that this habitat is protected for use by dormice. No construction machinery will be driven within this area or materials stored in the buffer zone.
- 4.14 Subject to the precautions as noted above for bats, minimal artificial lighting will be used during the construction of the solar array in order to keep disturbance of dormice to a minimum.

Amphibians

- 4.15 Although it is considered highly unlikely that great crested newts are present within the site, as a precautionary approach, a toolbox talk should be conducted by an ecologist to contractors working on the site to ensure they are familiar with the identification of great crested newts and steps to take in the unlikely event that they are encountered during construction works.

Reptiles

- 4.16 The area of spoil, rubble and tyres to the south of the site was considered suitable for reptiles as areas for shelter and basking were present. Should any of the habitat outside of the site to the south require clearance, reptile surveys would be required prior to this work in order to identify presence/absence, species and likely population size.

Birds

- 4.17 The adjoining woodland is to be retained and protected through the installation of security fencing at least 8m from the woodland edge.
- 4.18 Should any hedgerow or scrub habitat require removal outside of the site to the south, this should be discussed with an ecologist as protected species may be impacted. If the vegetation is to be removed during the main nesting season (March to August inclusive), a nesting bird check would be required no more than 48 hours prior to removal. This would be conducted by an ecologist and

should a nest be found clearance would need to be postponed until the nest fledges.

Other Protected Species and Species of Conservation Concern

- 4.19 The woodland edge was considered suitable habitat for hedgehogs. This habitat is to be retained. The gaps provided in the security fencing for badgers will also allow small mammals such as hedgehogs access into the site.

MP 3: SOWING OF SEED MIX IN EXISTING GRASSLAND

- 4.20 Any existing bare areas within the grassland or those resulting from the installation works are to be sown with a diverse grassland seed mix, such as DLF Trifolium Pro Flora 2 Acid Soils Mix or similar and approved at a sowing rate of 5g/m².
- 4.21 Prior to seeding, the ground will be harrowed and rolled, using a tine harrow in order to avoid damaging underground wiring. However, if there are any areas which have suffered high soil compaction, for instance due to heavy machinery being deployed, these 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.
- 4.22 Seeding will take place in spring (late March to May) or autumn (August or September) following completion of construction, and be broadcast by machine such as a fertiliser spreader (although no fertiliser should be used), slug pellet applicator (no slug pellets should be used) or grass seed box. The ground should then be 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, seeding in these areas will be broadcast by hand.
- 4.23 Newly seeded grassland within the array will be subject to bi-monthly cutting during the first year of establishment in order to prevent annual weeds from establishing. Arisings will be collected, if possible, with a baler or rake to remove nutrients and thereby promote the establishment of a biodiverse sward.

- 4.24 After the first year, the seeded grassland areas will be treated in the same way as the rest of the site, with a combination of grazing and mowing or mowing alone. The grassland can then be managed with a single autumn cut in September after the wildflowers have dropped their seed. All arisings will be collected and removed off site with a baler or rake.
- 4.25 If grazing occurs, it should only to be undertaken by sheep. Cattle, horse or donkey grazing will not be possible due to the damage these species will likely inflict on the solar panel structures. Sheep grazing will be restricted to periods outside of the main bird nesting season (i.e. no grazing between March & August inclusive), should nesting birds be present

MP4: NATIVE HEDGEROWS AND TREES PLANTING

- 4.26 Native hedgerow planting will be established along the eastern boundary of the site, along with a number of proposed hedgerow trees.
- 4.27 As soon as possible following construction, during the next available planting season (between the months of October to March, when deciduous plants are dormant), hedgerows and trees will be planted along this part of the site, as shown on drawing YOR.2447_01-A (**Appendix A**).

Native hedgerows

- 4.28 The following native species will be utilised at the rates outlined:

Table 1: Hedgerow Species Mix

Species	Specification	%	H1
<i>Acer campestre</i>	600-800mm 1+1 bare root	20	118
<i>Corylus avellana</i>	600-800mm 1+1 bare root	8	47
<i>Crataegus monogyna</i>	600-800mm 1+1 bare root	40	236
<i>Fagus sylvatica</i>	600-800mm 1+1 bare root	8	47
<i>Ilex aquifolium</i>	3L 600-800mm	8	47
<i>Prunus spinosa</i>	600-800mm 1+1 bare root	8	47

<i>Quercus robur</i>	600-800mm 1+1 bare root	8	47
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Ground Preparation

- 4.29 Where possible, a 1m wide strip will be screefed (vegetation cleared by scraping back with a spade) in areas of proposed hedgerow planting. Any trailing stems or intervening vegetation from existing adjacent hedge species should be trimmed or pruned to allow for sufficient space for growth and light for the establishment of new transplants.
- 4.30 All extraneous matter such as plastic, wood, metal and stones greater than 100mm diameter will be removed from the planting areas and disposed of offsite.
- 4.31 Areas of proposed planting will be carefully sprayed with a systemic herbicide by an approved landscaping contractor

Planting

- 4.32 Hedging plants are typically 60-80 cm high, 1+1, bareroot, healthy and vigorous transplants, except for Holly which will be planted as 3 litre container grown plants.
- 4.33 Hedge plants shall be notch planted in a double staggered row, 450mm apart, at the rate of 5 plants per linear metre (using T-, H- or L- shaped or straight notches) 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 accordance with BS 4428 (1989).
- 4.34 All stock shall be planted to the root collar, well firmed in place and thoroughly watered in. All transplants shall be protected with a 400mm high plastic spiral rabbit guard supported by a 750mm stake or cane. Stock proof fencing should be erected to protect hedging from grazing as required. After planting a 50mm layer of approved composed fine bark nom size 1-10mm shall be spread along the whole hedge line (min width 500mm).

- 4.35 The hedge is to be maintained for a period of 5 years following planting, ensuring adequate watering and fertilising is carried out to ensure good establishment and that all dead, diseased or damaged plants are replaced annually where required, mulch is also to be maintained at 50mm depth over full length and width.
- 4.36 The planting area will be kept weed free throughout this period by hand weeding in April, June and August. Guards will be removed once they are no longer required to prevent rabbit damage and before they start to restrict growth.
- 4.37 The frequency of cutting will depend on growth rates and weather conditions and the requirement for cutting will therefore be assessed annually for the first 5 years.
- 4.38 Hedge cutting will always be timed to avoid the bird nesting season (ie not during March to August inclusive).
- 4.39 The use of rotational hedge cutting will ensure that there is always some uncut vegetation each year that will provide suitable habitats for mammals, invertebrates and nesting birds, whilst also preventing the hedges from becoming gappy and thin at their bases.
- 4.40 During the first five growing seasons, plants shall be trimmed as required to promote healthy, bushy growth. Established height to be maintained at 2m plus.

Standard Trees

- 4.41 The following native species will be utilised at the numbers outlined below and along Hedgerow 1 as identified on drawing YOR.2447_01-A (**Appendix A**):

Table 2: Tree Species Mix

Species	Specification	H1
<i>Quercus robur</i>	12-14 Heavy standard 350- 425cm height	2
<i>Prunus avium</i>	12-14 Heavy standard 350- 425cm height	3

<i>Sorbus aucuparia</i>	12-14 Heavy standard 350- 425cm height	3
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- 4.42 If the formation level is compacted it will be ripped through before topsoiling. Where necessary existing weeds will be treated with a suitable glyphosate-based herbicide and a suitable period allowed to elapse, as recommended by the manufacturer, for the herbicide to take effect.
- 4.43 Trees to be planted in pits 1m x 1m. The bottom and sides shall be forked to break up the subsoil. All extraneous matter such as plastic, wood, metal and stones greater than 50mm diameter in any dimension will be removed from site.
- 4.44 Trees are to be planted at 15m centres back filled with one part tree planting compost to two parts topsoil. Trees shall be planted as per the planting pattern set out in the plant schedule on drawing YOR.2447_01-A (**Appendix A**).
- 4.45 Trees shall be well firmed-in and secured with two untreated softwood stakes 1.4m in length and suitable ties. A spiral rabbit guard is to be fitted to the base of each tree.
- 4.46 All trees shall be watered in at the end of each day of planting.

Woodland Copse / Scrub

- 4.47 The following native species will be utilised at the rates outlined below and as identified on drawing YOR.2447_01-A (**Appendix A**):

Table 3: Woodland Copse / Scrub Species Mix

Species	Specification	%	H1
<i>Alnus glutinosa</i>	600-800mm 1+1 bare root	10	192
<i>Corylus avellana</i>	600-800mm 1+1 bare root	14	276
<i>Crataegus monogyna</i>	600-800mm 1+1 bare root	14	276
<i>Fagus sylvatica</i>	600-800mm 1+1 bare root	10	192

<i>Ilex aquifolium</i>	3L 600-800mm	10	192
<i>Prunus spinosa</i>	600-800mm 1+1 bare root	7	138
<i>Quercus robur</i>	600-800mm 1+1 bare root	20	394
<i>Sorbus aucuparia</i>	600-800mm 1+1 bare root	15	276

- 4.48 Woodland copse/scrub plants are typically bareroot, healthy and vigorous transplants, except for Holly which will be a 3 litre container grown plants; all of which are to be planted in 450mm x 450mm pits back filled with one part tree planting compost to two parts topsoil 2m centres apart, (0.25 plants per m²). All stock shall be planted to the root collar, well firmed in place and thoroughly watered in.
- 4.49 All stock shall be protected with plastic tubes supported by a 750mm stake. Stock proof fencing should be erected to protect planting from grazing as required. After planting a 50mm layer of approved composed fine bark nom size 1-10mm shall be spread 1m diameter over each station.
- 4.50 The planting is to be maintained for a period of 5 years following planting, ensuring adequate watering and fertilising is carried out to ensure good establishment and that all dead, diseased or damaged plants are replaced annually where required, mulch is also to be maintained at 50mm depth over full 1m diameter circle.

Maintenance during first growing season

- 4.51 All dead, dying or diseased trees/shrubs 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.
- 4.52 The site will be visited biannually to undertake the following operations:

Weed clearance: All planting areas will be kept weed free by hand weeding or herbicide treatment.

Checking trees/shrubs: All tree ties and stakes will be checked and adjusted if too loose, too tight or if chafing is occurring. Any broken stakes will be replaced.

Formative pruning: Any damaged shoots/branches will be pruned back to healthy wood. Plants will be pruned in accordance with good horticultural practice to maintain healthy well-shaped specimens.

Watering during first growing season

- 4.53 The requirement for watering of newly planted trees will generally be dependent on weather conditions during the first growing season following planting. In a dry season watering may be required on a fortnightly basis from immediately after planting until the end of the growing season, but in a wet season watering may not be required at all. Therefore trees shall be monitored regularly by test digging down to root level to assess the water content of the soil, with watering undertaken as required to ensure that the soil is at field capacity 2-3 days after watering.

MP5: MANAGEMENT OF INJURIOUS WEEDS

- 4.54 Control of undesirable species beneath the arrays is likely to be required. The need for treatment would be identified during a spring, summer and autumn inspection by the land manager that would be conducted during the initial 2 years post-construction.
- 4.55 The land will be managed to make sure that certain injurious weeds, such as common ragwort (*Senecio jacobaea*); spear thistle (*Cirsium vulgare*); creeping or field thistle (*Cirsium arvense*); broad-leaved dock (*Rumex obtusifolius*); and curled dock (*Rumex crispus*) do not proliferate on site.
- 4.56 If any species becomes a problem it will be controlled through spot-treatment using selective herbicide during the plant's growth stage and prior to setting seed.

MP6: PROVISION OF BAT, BIRD AND DORMOUSE BOXES

- 4.57 Long lasting bat and bird boxes will be placed within the site and within woodland, although permission would be required in order to install these boxes in the adjacent woodland.

4.58 A total of 10 wooden FSC heavy duty dormouse boxes (or Schwegler dormouse dreys) could be installed in the woodland area, with permission.

4.59 The following bat and bird models will be utilised:

Table 4: Suitable Bat Boxes for the Site (taken from Michael Woods Associates Ecological Survey 2015)

Number	Description and Image	Positioning
1	Schwegler 1FW Bat Hibernation Box 	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. Thick cavity walls so provides a stable temperature for both summer and winter roosting. Large size so will accommodate a colony of bats. Should be cleaned by a licenced bat surveyor periodically.
3	Schwegler 1F Bat Box 	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. Does not require maintenance. Suitable for a range of crevice dwelling bat species.

Table 5: Suitable Bird Boxes for the Site (taken from Michael Woods Associates Ecological Survey 2015)

Number	Description and Image	Positioning
1	Schwegler 1FW Bat Hibernation Box 	To be purchased from Barn Owl Trust or homemade using specifications (http://www.barnowltrust.org.uk/infopage.html?id=42) To be placed on a large mature tree on the woodland edge, with unobstructed access to the entrance. The creation of a rough grassland buffer in the west of the site would provide suitable hunting habitat for this species.
4	Schwegler 1F Bat Box 	To be placed at least 2m above the ground in a quiet and sheltered area of site on mature trees. Ensure the boxes are protected 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.

MP7: HIBERNACULA CREATION

- 4.60 A wildlife hibernacula will be created, comprising partially buried logs, brash and rubble, to provide to provide shelter and an over-wintering refuge for reptiles, amphibians, small mammals and invertebrates.
- 4.61 The refuge will be placed at the periphery of the site adjacent to the woodland edge
- 4.62 The creation of the refuge will take place at the end of the construction phase. The refuge will ideally utilise existing wood and brash generated during site preparation works. However, should no brash exist, materials necessary to create the refuge will be brought onto site.

MP8: MONITORING

- 4.63 Monitoring by experienced ecologists should be carried out in June/July to assess the development of the grassland sward in years 1-5 & 10. Inspections of bat/bird/dormouse boxes and refuges will take place. Monitoring will also give early-warning signs of any injurious species.

MP9: PROTECTION AND MANAGEMENT OF SOILS

- 4.64 The following soil management measures will be employed to avoid soil compaction in order to ensure existing surface water infiltration rates are maintained.
- 4.65 The site is generally level and the current land cover is grass. This will be maintained, and any bare patches re sown as per MP3. This will help to stabilise the soil across the site and reduce soil erosion.
- 4.66 No soil will be removed from site, due to the installation of the solar panels which will be driven into the ground at a depth of between 1m and 1.5m.
- 4.67 The associated cabling will be concealed in trenches. As such, there will be some requirement for temporary stockpiling of soil for a short period of time. Where such soil stripping occurs, topsoil and subsoil should be stored on opposite sides of the cable trench in order to avoid the mixing of soil types, and also to facilitate subsequent soil replacement.

- 4.68 Access to the site will be via the access track in the north eastern portion of the site and will include an area of hard standing suitable for maintenance vehicles visiting the site.
- 4.69 Unnecessary soil disturbance should be avoided where possible. During construction, vehicle movements should be minimised where possible, and suitable vehicles with low tyre pressures should be used, such as tractors and 4 x 4 vehicles. Vehicle movements should be restricted to suitable dry conditions only, trafficking and construction on soils when they are wet should be avoided as this will cause potential compaction. The highest use portions of the site, such as around the entrance, delivery and unloading areas, should be temporarily protected using ground protection matting. For example, GrassProtecta – Ground Reinforcement Mesh supplied by Ground Trax, www.groundtrax.com or similar and approved. The Heavy (14mm) grade, or similar, should be utilised.



(Image source <http://www.groundtrax.com/grassprotecta-ground-reinforcement-mesh/#>! - Copyright © 2015 Groundtrax Systems Limited. All rights reserved.)

- 4.70 During the operational phase, vehicle movements beyond the hardstanding area will be those associated with normal agricultural movements associated with cutting hay, etc. (though this is likely to be managed by sheep), and will be restricted to suitable dry conditions.
- 4.71 During decommissioning the method statement set out for the construction phase will be followed to avoid soil compaction across the site. Hardstanding will

be carefully removed and any local compaction of the area relieved, re-soiled and re-seeded as per MP3.

5. MANAGEMENT PLAN DIARY

Management Prescriptions	Construction Phase											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Demarcation of an 8m offset buffer from the woodland to the west</i>	<i>Prior to construction</i>											
<i>Installation of security fencing in accordance with BS5837: 2012</i>	<i>Prior to construction</i>											
<i>Installation of GrassProtecta – Ground Reinforcement Mesh, or similar and approved</i>	<i>Prior to construction</i>											
<i>Update badger survey</i>	<i>Badger Survey to be carried out approximately 1 month prior to the onset of construction</i>											
<i>Gaps in site perimeter fencing created for badgers if gaps not already present</i>	<i>Prior to construction</i>											
<i>Toolbox Talk by Ecologist</i>	<i>At start of construction</i>											
<i>All lighting used for site work should be kept to a minimum. Use of motion sensitive, downward facing lights</i>	<i>Throughout construction period</i>											
<i>Ongoing management of soils</i>	<i>Throughout construction period</i>											

Management Prescriptions	Construction Phase											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sowing of Grassland Seed Mix				Sowing period				Sowing period				
Planting of New Hedgerows and Trees	Planting of new Hedgerows/Trees									Planting of new Hedgerows/Trees		
Installation of Habitat Boxes <i>Bat, bird and dormouse boxes installed</i>	Upon completion of construction											
Creation of Reptile Hibernacula	Upon completion of construction											
Grassland Management within Newly Seeded Areas – Year 1	Regular bi-monthly cutting throughout the year											
Grassland Management within Newly Seeded Areas and Existing Areas – After Year 1									Single cut			
Management of Injurious Weeds on site during Year 1 & 2			3 inspections									
Hedgerow / Tree / Woodland Copse Management	Annual Tree Inspection		Avoid grazing						Trimming of hedges and carrying out of necessary tree works			
Weeding of hedgerow, tree and woodland copse areas – hand weeding												
Replacement of dead or dying plant material	In years 1-5 where necessary									In years 1-5 where necessary		
Monitoring and maintenance of bat, bird and dormouse boxes and Hibernacula and grassland sward						Years 1-5 & 10						

APPENDIX A – FIGURES

- Drawings YOR.2447_01-A

(taken from Landscape and Visual Impact assessment in relation to a proposed 1MW solar photovoltaic (pv): Knolton Farmhouse Chees, Solar Installation, Overton, Clwyd (Pegasus Group Ltd – March 2015)

