

Landscape and Ecological Management Plan

**In support of a planning application for the installation
of Standalone Solar PV modules and Associated
Infrastructure on land Heywood Grange, Dilhorne,
Staffs. ST10 2PL**

February 2015

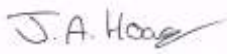
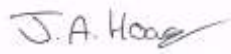
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On behalf of



Project Quality Control Sheet

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Contents

1	Introduction	1
1.1	Summary	1
1.2	Site Description	2
1.2.1	The Location.....	2
1.2.2	The Development.....	3
1.2.3	Existing Site Conditions	3
2	Aims and Objectives	5
2.1	Purpose of the Plan.....	5
2.2	Objectives.....	5
2.2.1	Design Objectives	5
2.2.2	Construction Phase Objectives	5
2.2.3	Operational Phase Objectives	6
3	Method	7
3.1	Construction Phase	7
3.1.1	Protection of retained habitats within and surrounding the site (Objective A1)	7
3.1.2	Creation of new habitats and landscape screening (Objective A2).....	7
3.1.3	Protection of badgers during construction (Objective A3)	10
3.1.4	Barn Owl Nesting Boxes (Objective A5) (G).....	10
3.2	Operational Phase.....	11
3.2.1	Management of grassland habitats for biodiversity and connectivity (Objectives B1)	11
3.2.2	Management Hedgerows (Objectives B2 & B4)	12
3.2.3	Protection & Enhancement of Wildlife (Objective B3)	14
4	Monitoring	15
Appendix 1: Landscape and Ecological Enhancement Scheme		1
Appendix 2: Management Plan Diary.....		1

1 Introduction

1.1 Summary

This Landscape and Ecological Management Plan has been prepared by:

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- Owen Crayshaw of Windrush Ecology (Ecologist)
- Angus Jeffrey of Landscape Visual Ltd (Landscape Architects)

This report has been prepared on behalf of Elgar Middleton Ltd in support of a Planning Application for a solar farm on land at Heywood Grange, Dilhorne, Stoke-on-Trent and is intended to be read and implemented in conjunction with the Landscape and Ecological Enhancement Plan drawing and the accompanying Management Plan Diary.

An extended phase 1 Ecology Survey of the site was undertaken by Windrush in October 2015. A Landscape and Visual Impact Assessment (LVIA) survey was carried out by Landscape Visual during December 2014 and January 2015. The findings of these surveys are outlined in two reports submitted with the planning application:

- Phase 1 Ecology Report
- LVIA Report

This report draws on the findings and recommendations detailed in the above reports to provide a long term management plan for the site.

The National Planning Policy Framework (NPPF) identifies ways in which the planning system should contribute to and enhance the natural and local environment (Paragraph 109), including minimising impacts upon biodiversity and promoting net gains where possible. Opportunities to enhance biodiversity in and around developments are to be encouraged and as such local authorities have a responsibility to ensure that such opportunities are taken.

The proposed solar farm is an example of a development within which considerable opportunity for biodiversity enhancements are present and this management plan has been prepared to ensure that these opportunities for enhancement are realised.

The purpose of this management plan is to:

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

Details of the development along with the locations of existing ecological features and proposed enhancements are shown in Appendix 1: Landscape and Ecological Enhancement Plan. The proposed schedule of works to be implemented throughout the lifetime of the development is shown in Appendix 2: Management Plan Diary.

1.2 Site Description

1.2.1 The Location

The site is located on land west of the village of Dilhorne, within the boundary of Staffordshire Moorlands District Council.

The site is located approximately 8.5km south east of Stoke-on-Trent, 3.0km north of Blythe Bridge and 4.5km north west of Cheadle. It is accessed via a farm track leading off from Tickhill Lane.

The immediate surroundings comprise of agricultural fields and woodland.

The site is shown in the context of its surroundings by the red line area on Figure 1 below.



Figure 1 – Location Plan

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The site comprises agricultural land totalling 14 ha as shown by the Proposed Site Plan. The site borders both Dilhorne Wood and Stansmore Wood to the east.

The field boundaries, which will be retained by the proposed development in order to provide natural screening, comprise mature hedgerows and trees.

The topography of the site is slightly undulating with elevation levels of approximately 241m AOD to 263 AOD.

1.2.2 The Development

The proposed development is for the erection of 32,270 solar photovoltaic (PV) modules, with associated infrastructure for export of renewable energy to the National Grid. There will be seven transformer / inverter buildings, as well as one private substation, one DNO Substation building and one storage container, located in the north east corner of the western field.

Groups of panels will be installed continuously in rows running west to east across the fields with appropriate space between the rows to allow for shading.

Associated infrastructure will include inverter/transformer buildings distributed across the site, as detailed in the submitted site plan. Each will collect the power generated at strategic points within the development. The height will be in keeping with the solar arrays and they will be positioned in alignment with the rows of PV panels.

The site will be enclosed within a 2m high wire mesh security fence. Additional security measures will include infrared security cameras and/or motion-sensitive devices around the perimeter of the arrays. The security fence is to be installed prior to the commencement of the installation of the PV arrays.

The proposed site design is of a sufficient height from the ground to ensure healthy grass growth underneath the panels throughout the operational phase. Sheep grazing could be used to preserve a partial agricultural use of the site; however implementation of this will depend on the local availability of a suitable flock.

1.2.3 Existing Site Conditions

The site comprises three fields of improved grassland with associated hedgerow boundaries. The agricultural land classification survey undertaken in support of this planning application summarises that all three fields are currently down to permanent pasture with some being cut for hay or silage and others being grazed by livestock. This report concluded that, in line with the Agricultural Land Classification Map of England & Wales, the entire site is grade 4 agricultural land.

The site is bordered to the north by a wooden fence along, which are occasional shrubs. The interconnecting woodlands of Stansmore Wood and Dilhorne Wood are located adjacent to the eastern boundary, beyond a post and rail fence. The southern boundary is marked by a post and rail fence and a line of semi-mature beech trees. The western boundary is denoted by a post and rail fence and a narrow strip of woodland.

The site and surrounding area does not fall within a nationally designated landscape. The site is however within land designated as Green Belt.

The landscape and visual impact assessment submitted alongside this application summarised the following:

- The strongest component of local character is derived from the underlying patterns created by the incised wooded valley topography, the spur of landform running north/south and the intricate mix of pasture and woodland cover.
- Long-distance views into the wider landscape are generally restricted to elevated viewpoints.
- The site and surrounding area contains features which detract from the quality of the underlying landscape, including the prominent electricity pylons and a telecommunications mast.

- Land-use patterns and landscape character are also influenced to a degree by the urban fringe.

The main ecological features of interest associated with the proposed development are summarised as follows;

- The hedgerow and boundary woodlands offer plentiful nesting opportunities to bird species which favour woodland and hedgerow habitats. A number of old nests were noted within hedgerows and boundary woodlands during the survey.
- A total of 15 bird species were recorded onsite during the survey with a number of red and amber conservation concern status. Overall the bird assemblage within the site is considered to be of local ecological value.
- No features within trees of the hedgerows onsite offer shelter to roosting bats and as a result bat roosts are considered to be absent from the site. However several trees outside the boundaries within adjacent woodlands were noted as having suitable bat roosting features.
- A large, active badger sett is located within the woodland strip along the western boundary of the site. At the time of survey the sett comprised 20 active entrances and 3 inactive entrances. The sett is large and considered to be a main breeding sett, likely to be long-established. Given its size and age, the presence of the badger sett is considered to be of local to district ecological value.
- The site is considered to be unsuitable for other mammal, reptile and amphibian species. The grass land lacks structural diversity and there are no water bodies present within the site.

2 Aims and Objectives

2.1 Purpose of the Plan

This plan has been constructed in order to clearly set out:

1. The measures which will be taken to protect the valuable ecological features during the construction phase
2. How ecological enhancements will be managed to increase the landscape and ecological value of the site.

Details of the development along with the locations of existing ecological features and proposed enhancements are shown in Appendix 1: Proposed Landscape and Ecological Enhancement Plan.

2.2 Objectives

2.2.1 Design Objectives

The landscape treatment has been designed to reflect the local landscape context in order to integrate the development into the landscape.

The landscape and ecological proposals seek to:

- Protect and enhance the quality of the surrounding landscape both during the construction and operation;
- Visually and ecologically integrate the development into the surrounding landscape;
- Enhance the biodiversity of the site.

The specific design measures aim to:

- Improve species diversity within existing grassland onsite.
- Increase ecological connectivity between adjacent woodland areas.
- Restore and enhance existing hedgerows to create continuous boundaries for screening and biodiversity.
- Retain access for badgers and other small mammals across the site.
- Enhance bird population through provision of appropriately sited nesting boxes.

2.2.2 Construction Phase Objectives

Construction phase objectives are designed to ensure protection of existing ecological assets on-site as well as offering a detailed process by which new habitats and landscape screening should be planted.

- Objective A1: To protect retained habitats within and surrounding the site from damage and unnecessary disturbance during construction.
- Objective A2: To create new habitats and landscape screening through planting of locally appropriate native species.
- Objective A3: To ensure badgers are adequately protected during construction.
- Objective A4: To ensure drainage ditches are not adversely impacted during construction.

- Objective A5: Creation of Barn Owl nesting boxes.

2.2.3 Operational Phase Objectives

Operational phase objectives are designed to provide management and maintenance direction.

- Operational B1: To manage the agricultural fields to establish and increase diversity in the creation of species rich grasslands;
- Objective B2: To manage existing and new hedgerows and planting to maximise their biodiversity, ecological connectivity and screening value;
- Objective B3: To ensure wildlife is adequately protected and populations enhanced during operation.

3 Method

3.1 Construction Phase

In order to achieve the construction phase objectives, the following management prescriptions have been identified.

- Implementation of the construction phase measures will be co-ordinated by the main construction contractor;
- Ecological and arboriculture queries will be directed to the site operator.

3.1.1 Protection of retained habitats within and surrounding the site (Objective A1)

At the start of construction, a 2m high security fence will be erected around the perimeter of each field of the site. This will primarily protect the following features of the site as identified on the plan included as appendix 1:

- Existing hedgerows **(A1 – A3)**
- 8m grass margin buffer zone where no development will take place. **(B)**

The security fence will be as detailed in the Design and Access Statement submitted with this application and will be installed prior to the commencement of the installation of the PV arrays to ensure that construction activities do not encroach into the buffer areas. This security fence will protect the existing hedgerows, trees, habitats and wildlife on the site during the construction stage and will remain in situ surrounding the site during the operational period.

Storage of any materials or waste within the buffer zone is prohibited to maintain the biodiversity in the surrounding area and cause as little disruption as possible during the busy construction process.

Maintaining the buffer zone will allow wildlife to pass through and around the site, enabling connectivity of the existing hedgerows, tree lines and field margins to remain undisturbed.

3.1.2 Creation of new habitats and landscape screening (Objective A2)

New Planting

Locations proposed for new planting and screening are shown in Appendix 1. In addition to enhancements of the existing hedgerows, it is also proposed to establish new areas of planting, to provide an element of screening for the solar arrays and associated equipment.

On completion of the development, these will be planted with a mix of native species of local provenience. The proposed planting and screening locations are shown in Appendix 1. In addition to enhancements of the existing hedgerows, it is also proposed to establish new areas of planting along the site boundaries to provide an element of screening for the solar arrays and associated equipment. New planting is included in the form of:

- A new area of woodland planting along the northern boundary of the western field, primarily to provide additional screening for views from the paddock at Oak Tree Farm **(C1)**. This planting will be bordered on the north western boundary closest to Oak Tree Farm by a new hedgerow planted entirely of Holly to provide immediate and year round screening of the development. **(C5)**
- A new area of woodland planting along the boundary between the northern and southern fields primarily to improve woodland connectivity across the site. **(C2)**

- Restoration of the defunct hedgerow, which runs between the east and western fields. This includes significant blocks of planting with woody species to provide additional wildlife habitats and foraging opportunities for birds and other wildlife. **(C3)**
- Planting of flowering and fruiting shrubs adjacent to the badger sett and along the southern boundary of the site. **(C4)**

Planting Specifications:

- All tree planting to take place Nov - April to assist with establishment.
- The majority of the trees will be planted as feathered, bare-root stock at 45-60cm with single stakes and rabbit guards. The shrubs will be planted as 40-60cm transplants and protected with rabbit guards.
- Trees planted along the northern boundary at **C1** will be mature, well established transplants with a diameter of 12-14cm and a height of 3.5-4m.
- The area marked **C5** will border the newly created woodland planting with a new hedgerow comprising only Holly.
- The trees and shrubs should be planted from November to April and all plants mulched at the base with bark mulch to 1m diameters, or individual proprietary biodegradable mulch mats pegged into place.
- Any dead wood will be piled up in suitable places at the field margins in order to provide habitat for invertebrates, fungi, reptiles, amphibians and small mammals.
- In the summer season any dead or dying transplants will be marked, counted and replaced in the following planting season.
- The operator will assume all responsibility for the maintenance of the hedgerows and surrounding areas once the construction of the site has been completed.

Tree planting proposed onsite will contain appropriate mixtures of the following species;

- Oak *Quercus robur*
- Goat Willow *Salix caprea*
- Grey Willow *Salix cinerea*
- Silver Birch *Betula pendula*
- Alder *Alnus glutinosa*
- Ash *Fraxinus excelsior*
- Rowan *Sorbus acuparia*
- Beech *Fagus sylvatica*
- Hazel *Corylus avellana*

Planting of shrubs onsite will contain appropriate mixtures of;

- Hawthorn *Crataegus monogyna*
- Blackthorn *Prunus spinosa*
- Holly *Ilex aquifolium*
- Gorse *Ulex europeaus*

All plants shall conform to the relevant section of BS3936 and National Plant Specification. All plants to be true to size specified, healthy, pest and disease free, not dried out, wind burnt, pot bound,

waterlogged, leggy or weak. Trees shall be vigorous with good planting shape and well branched heads. All seeds, plants and trees should be UK grown of regional provenance and if possible local provenance.

Grassland Sward within the development area (D1-3)

Currently, the fields comprise improved grassland, which will be retained between the panels during operation. On completion of construction, areas between and around the arrays which have become bare will be seeded with a fine grass mix such as ESG2 or EG11 which includes yellow rattle seed to reduce the dominance of grass which will ultimately increase the diversity and number of species within the sward.

Given the agricultural improvement of the grassland, measures such as the sowing wildflower mixes over the whole site is not considered to be appropriate at this stage as the soils are likely to have fertility levels that are too high for such enhancement measures to be successful.

Ride Planting Areas (E1 – E2)

The design of the development includes two easement strips running underneath the overhead power lines, which provide an opportunity to maintain diverse areas of connectivity across the site.

On completion of construction the following works will be undertaken to establish these areas:

- **Stage 1:** Spray off existing grass with herbicide (e.g. glyphosphate) lightly cultivated or disced to encourage dormant annuals to germinate. Once the area has greened up and before any plants have set seed the area is to be cultivated again or sprayed with herbicide. It may require repeat treatment if land contains perennial weeds with extensive root systems (e.g. couch grass).
- **Stage 2:** Once the seedbed is consolidated sowing can be carried out ideally in September or spring, sowing is carried out with a standard drill adjusted so that the seed is dropped onto the soil surface and then rolled. The seed mix should be a fine grass mix (such as ESG2) and a wildflower mix (such as ESF2). Yellow rattle seeds should be incorporated in the mix.
- The following species should be avoided to aid the establishment of wildflowers;
 - Yorkshire Fog *Holcus lanatus*
 - Perennial Rye Grass *Lolium perenne*
 - Cocksfoot *Dactylis glomerata*
 - False Oat Grass *Arrhenatherum elatius*
 - Red Clover *Trifolium pratense*

Wet Scrapes (F1 - F2)

The proposal includes plans for the creation of two wetland scrapes. These are likely to be ephemeral wet and should provide damp ground for birds which probe for their food, such as thrushes and starlings, as well as providing habitats for wetland invertebrate and bird species such as reed buntings.

These habitat areas will be created on completion of the construction phase through:

- Scraping the ground to a sufficient depth lower than the area surrounding it;
- Allow areas to regenerate naturally and for the infertile sub-soil to develop a natural flora for wet grassland.

Throughout the operational phase of the development it may be necessary to manage dominant plant species such as brambles to maintain species diversity.

3.1.3 Protection of badgers during construction (Objective A3)

To ensure that direct impacts upon badgers are avoided a buffer zone with a diameter of 30m has been incorporated into the development plan, centred on the furthest west active entrance to the sett. The following measures will be adhered to during the construction phase of the development within the zone marked as **C4** on the accompanying plan.

- Within this zone, no excavation, digging, pile driving and vehicular movement will be permitted.
- Excavation work and heavy machinery will be kept well away from where it could result in damage to the sett or disturbance to any badger occupying the sett.
- The sett and the buffer zone surrounding the sett, will be clearly marked with both a visual and physical barrier, so that inadvertent disturbance, digging or vehicular movements do not take place close to the sett.
- Deep excavations, trenches, foundations etc. will be covered at night to prevent pit-fall hazards to badgers or planks of wood provided in shallow excavations to allow badgers to escape; and
- Badgers will be allowed free access through the site during construction and operation via mammal gates installed in the security fence

With this strategy in place, it is considered that significant impacts on badgers and the sett can be avoided. A badger licence is not necessary for the proposed works to proceed under the law, provided that the above mitigation is implemented.

After the construction phase of the project this area (**C4**), as outlined in section 3.1.2 of this report will be planted with flowering and fruiting shrubs, to provide foraging opportunities for badgers and habitat for the insects they feed on. The following species will be planted;

- Hawthorn *Crataegus monogyna*
- Blackthorn *Prunus spinosa*
- Holly *Ilex aquifolium*
- Gorse *Ulex europeaus*

3.1.4 Barn Owl Nesting Boxes (Objective A5) (G)

The retained and proposed habitats of woodland and wet, undisturbed grassy areas within the buffer zone and ride areas are ideal for hunting grounds for Barn Owls. On completion of construction three barn owl nest boxes will be installed on existing trees in the following locations:

- Within the southern buffer zone of field 1
- The eastern boundary of field 2; and
- The southern buffer zone of field 3

All boxes will be installed under the supervision of qualified ecologist in line with guidance issued by the Staffordshire Wildlife Trust.

3.2 Operational Phase

In order to achieve the objectives outlined in Section 2.2.3, the following management prescriptions have been identified:

Implementation of the management during the operational phase will be co-ordinated by the site operator.

The primary maintenance operations will include:

- Keeping planting areas generally free from weeds;
- Monitoring of existing and new planting;
- Replacing trees or shrubs that fail where necessary;
- Regular maintenance checks of wildlife mitigation equipment

3.2.1 Management of grassland habitats for biodiversity and connectivity (Objectives B1)

Margin Area Grassland within the Buffer Areas (B)

The margin area grasslands will be protected from the outset of development through the installation of the security fence.

It is proposed to implement a minimal management regime within these areas; leaving them largely unmanaged in order to develop into species rich habitats, increasing populations of birds, mammals and invertebrates onsite and creating hunting ground for Barn Owls. Following a two year set aside, annual cutting of the buffer area will be undertaken on rotational basis every three years during Oct-Feb as follows:

- Year two – Cut 50% of the width of the margins with no further management until year five
- Year Three - Cut remaining 50% of the width of the margins with no further management until year six
- Year Five – Recommence the cycle with same 50% as year 2
- The margin could be grazed over winter if suitable livestock are available.

Grassland Sward within the development (D1-3)

In order to prevent shading of panels, scrub colonisation and build-up of fertility through accumulation of dead vegetation the grassland between the arrays will be managed as a hay meadow. This will involve the following

- Cut or graze until end may (2-3 cuts)
- May-Sep no further action
- Sep/Oct cut and remove arisings
- Final cut & collect Nov/Dec
- Hand cutting of any plant shading panel, undertake as required

Ride Planting Areas (E1-2)

The two ride areas will be established from seed, following construction in order to ensure a diverse range of species. The management process can be divided into three phases;

Year 1 - Establishment

The ride areas should be kept mown down to 4-6 inches through the first season by mowing or strimming two or three times on a dry day and remove cuttings. This is to ensure that any residual dormant annuals are kept reasonably short so as they do not outgrow the wild flowers that are struggling to get established.

Particular attention should be made of the emergence of dock or Yorkshire fog. If any dock are seen within the field they should in the autumn be spot treated with a suitable herbicide. If Yorkshire fog becomes prevalent yellow rattle plugs can be planted in spring or early summer to control the grass.

Year 2-6 High Initial Fertility

- a) 2-3 cuts March through to end May
- b) June - early September no further action
- c) Cut as low as possible and collect September / October
- d) Cut and collect November

Year 7 Onwards

After 7 years the fertility levels should have dropped and less intensive management should be required as the field reaches equilibrium.

The above regime will be reviewed yearly in the first 7 years by a suitably qualified ecologist to ensure the ride areas are establishing and to provide guidance on any changes required in the management regime for the following 12 months.

Management of Injurious Weeds

The land will be managed to make sure none of the five injurious weeds do not proliferate on-site, and ensure they do not spread under the Weeds Act, (1959). These weeds are:

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

If any of the above becomes a problem on the site it will be controlled by spot treatment to control the plants growth stage prior to setting seed.

Particular attention is required during the initial 3 years following the installation, where there will be spot checking and immediate remedial action taken as required. Appropriate PPE should be worn by personnel applying the herbicides.

3.2.2 Management Hedgerows (Objectives B2 & B4)

Existing Hedgerows and Trees (A1-3)

The existing hedgerows (**A1, A2, and A3**) are noted to be gappy in places and could benefit from laying and additional tree planting, allowed to mature to fill the gaps in the hedgerow. A long-term hedgerow management regime as detailed below will be adopted to encourage them to become denser and wider.

- To create the best conditions for a range of ecological requirements, there is a compromise to reach between not allowing hedges to become gappy and leggy on the one hand, and allowing them to fruit and be occupied by small mammals, etc, on the other. Therefore each side of all hedges will be cut on a staggered seven-year rotation.
- Trim hedge to form an A shape in section trimming in spring and autumn, outside bird breeding period of late March to early September.
- Avoid wholesale annual hedge cutting as this is detrimental to a range of invertebrate groups.
- Late winter cutting can reduce insect larval populations in spring. Do not undertake all cutting management at this time.

Hedge trimming should be reviewed at year by a suitably qualified ecologist and then every 5 years after this throughout the life of the solar PV farm with the aim of assessing the progress of the following targets:

- No loss of extent to width, length of height of the hedge;
- Native trees and scrubs developing along the hedgerows to produce a hedge that will attain a height of 4m;
- Increased hedgerow density.

To assist in achieving these outcomes it may be necessary to lay hedgerows throughout the operational phase of the development.

New Planting (C1-5)

All areas of new planting will need to be carefully managed to ensure successful establishment. The following maintenance operations will be undertaken within the first three years, following operation of the site:

- Keep planted areas in a weed free condition and treat emerging weeds appropriately throughout the growing season;
- Check for pest and disease attack throughout the growing season and treat by hand or chemical control;
- Check for root firmness in spring and autumn;
- Monitor strength of limbs and keep clear stem as specified;
- Selectively prune trees to remove any dead, damaged or diseased shoots and to create a balanced form in the spring and autumn;
- Keep trees weed free around base during establishment;
- Check for pest and disease attack throughout the growing season and treat by hand or chemical control;
- Keep trees upright and check for root firmness in spring and autumn;
- Check stakes and ties for firmness and adjust as necessary in spring and autumn and after periods of extreme winds.

The maintenance programme for new planting will be reviewed after three years and an appropriate management regime implemented depending on the success of the planting.

3.2.3 Protection & Enhancement of Wildlife (Objective B3)

Maintaining Access for Badgers

The design of the fencing to include mammal gates will ensure that small mammals such as badgers can access the site freely for foraging purposes throughout the operational period. These gates will be checked during maintenance visits to ensure that they are kept free from overgrown vegetation and remain in working order.

Barn Owl Nest Boxes (G)

In order to ensure effectiveness of the installed Barn Owl boxes, a qualified ecologist will undertake the following monitoring/maintenance measures:

- Visit the site in late spring/early summer to check for breeding activity;
- If nesting has occurred, return once the young have fledged to clean out debris;
- Annually check condition of boxes and repair if necessary

If after two years the boxes are not found to be used for nesting, the ecologist should consider relocating them, taking into account the progress of the habitats created as part of the solar development.

4 Monitoring

It is proposed that initial monitoring be carried out during the first spring following commissioning of the solar park with results reported to the Planning Authority within one month of monitoring being completed.

For the following 3 years post construction monitoring of the site will be undertaken annually. Thereafter it will be undertaken every 5 years. The monitoring will be undertaken by a trained ecologist.

If the inspection in year 10 proves that the management of the site has been successful, the management plan will be updated to reflect continued management under the approach taken within this document. The future inspections will only be required every 5 years until the decommissioning of the site.

Given the ecosystem on the site and the potential for creating new and more diverse habitats the site will have key indicators to help with the above inspections and these will be:

- Grassland plants (quadrat-based Phase 2 botanical surveys)
- Invertebrates (standard entomological surveys)
- Birds (including use of nesting boxes and features)

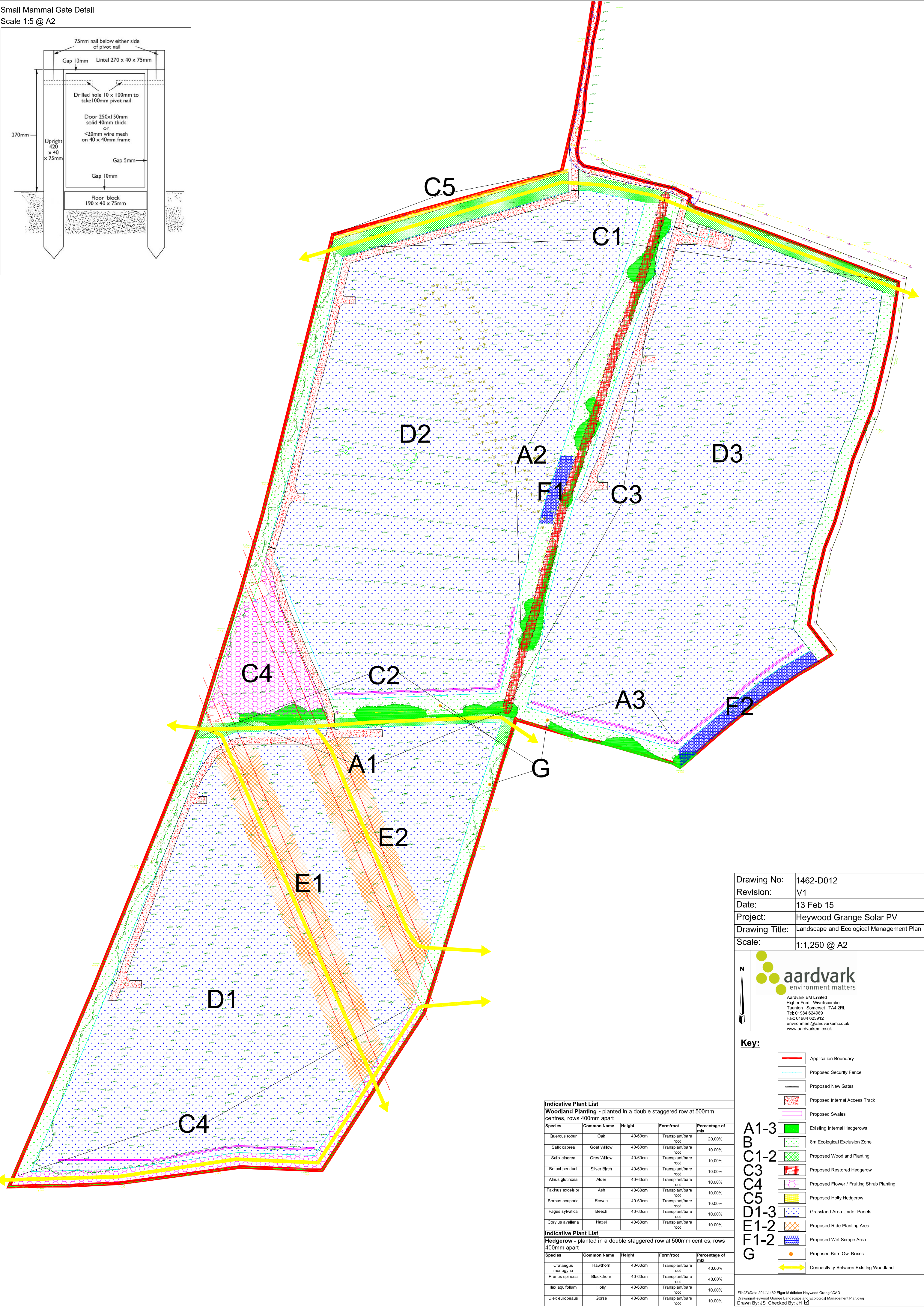
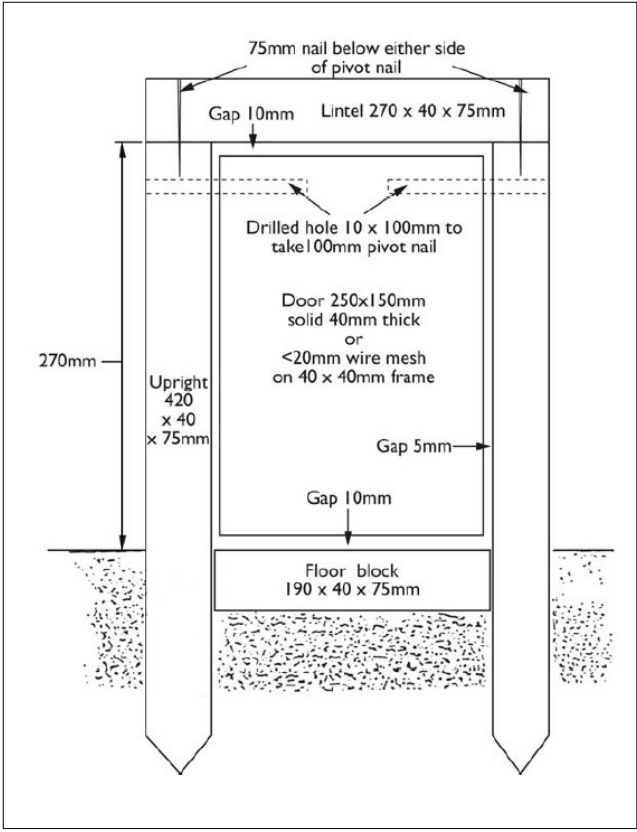
Recommendations may be made to amend the management prescriptions to promote a diverse sward. Inspections will also take place to ensure continued sustainability on the site to improve the surrounding areas.

Biological monitoring will ensure the habitats are establishing as planned in the ecological reports. It will also measure the success of such ecological enhancement schemes and help build an evidence base to inform other future projects on the success, or otherwise, of such conservation interventions.

By monitoring the site the early warning signs of injurious weeds or vegetation failure can be detected and remediated immediately.

The management plan and any associated monitoring will end when the site is decommissioned.

Appendix 1: Landscape and Ecological Enhancement Scheme



Drawing No:	1462-D012
Revision:	V1
Date:	13 Feb 15
Project:	Heywood Grange Solar PV
Drawing Title:	Landscape and Ecological Management Plan
Scale:	1:1,250 @ A2



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Key:	
	Application Boundary
	Proposed Security Fence
	Proposed New Gates
	Proposed Internal Access Track
	Proposed Swales
	Existing Internal Hedgerows
	8m Ecological Exclusion Zone
	Proposed Woodland Planting
	Proposed Restored Hedgerow
	Proposed Flower / Fruiting Shrub Planting
	Proposed Holly Hedgerow
	Grassland Area Under Panels
	Proposed Ride Planting Area
	Proposed Wet Scrape Area
	Proposed Barn Owl Boxes
	Connectivity Between Existing Woodland

Indicative Plant List				
Woodland Planting - planted in a double staggered row at 500mm centres, rows 400mm apart				
Species	Common Name	Height	Form/root	Percentage of mix
Quercus robur	Oak	40-60cm	Transplant/bare root	20.00%
Salix caprea	Goat Willow	40-60cm	Transplant/bare root	10.00%
Salix cinerea	Grey Willow	40-60cm	Transplant/bare root	10.00%
Betula pendula	Silver Birch	40-60cm	Transplant/bare root	10.00%
Alnus glutinosa	Alder	40-60cm	Transplant/bare root	10.00%
Fraxinus excelsior	Ash	40-60cm	Transplant/bare root	10.00%
Sorbus acuparis	Rowan	40-60cm	Transplant/bare root	10.00%
Fagus sylvatica	Beech	40-60cm	Transplant/bare root	10.00%
Corylus avellana	Hazel	40-60cm	Transplant/bare root	10.00%
Indicative Plant List				
Hedgerow - planted in a double staggered row at 500mm centres, rows 400mm apart				
Species	Common Name	Height	Form/root	Percentage of mix
Crataegus monogyna	Hawthorn	40-60cm	Transplant/bare root	40.00%
Prunus spinosa	Blackthorn	40-60cm	Transplant/bare root	40.00%
Ilex aquifolium	Holly	40-60cm	Transplant/bare root	10.00%
Ulex europaeus	Gorse	40-60cm	Transplant/bare root	10.00%

Appendix 2: Management Plan Diary

Heywood Grange Solar: Management Plan Diary

Landscape and Ecological Features		Construction		Operation			
		During Construction	At the end of construction	Year One	Year two	Year three	Every 5 years
A	Existing Internal Hedgerows	To be protected as described in 3.1.1 Installation of security fence to create 8m buffer zone	Maintenance regime as described in 3.2.3 to commence Hedge laying to occur in first winter following construction between October and March.	15% of hedgerows cut as part of a seven year staggered rotation All hedgerows to be maintained at 4m high	15% of hedgerows cut as part of a seven year staggered rotation All hedgerows to be maintained at 4m high	15% of hedgerows cut as part of a seven year staggered rotation All hedgerows to be maintained at 4m high	Monitoring for no loss of extent, increasing density and an average height of 3 to 4 metres Review management regime
B	Margin Grassland Buffer Zone	Existing grassland and margin habitats to be protected during construction through installation of the security fence No works to be undertaken within these buffer areas			Cut 50% of the width of the margins with no further management until year five	Cut remaining 50% of the width of the margins with no further management until year six	Recommence the cycle with same 50% as year 2
C	New Trees, Hedgerows and Shrub planting		To be undertaken in the first growing season between October and March. Transplants in double staggered rows. Protected using rabbit guards Any dead wood to be piled up in suitable places at the field margins to provide habitat for invertebrates, fungi, reptiles, amphibians and small mammals. The operator will assume all responsibility for the maintenance of the hedgerows and surrounding areas once the construction of the site has been completed.	Water regularly Maintain 1 m dia weed free circle by hand Selectively prune removing dead, damaged or diseased shoots in Spring and Autumn Keep trees upright and Trim back half of growth in first winter following planting Check for root firmness in spring and autumn Check for pest and disease and treat by hand or chemical control or replace where necessary	Maintain 1 m dia weed free circle by hand Trim lateral and lead branches in winter Check for pest and disease and treat where necessary Monitor strength of limbs and keep clear stem height Selectively prune removing dead, damaged or diseased shoots in Spring and Autumn Check stakes and ties for firmness and adjust in spring and autumn and after periods of extreme winds Replace any dead trees during the planting season	Maintain 1 m dia weed free circle by hand Check for pest and disease and treat where necessary Monitor strength of limbs Selectively prune removing dead, damaged or diseased shoots in Spring and Autumn Check stakes and ties for firmness and adjust in spring and autumn and after periods of extreme winds 15% hedgerows cut every year Monitoring for no loss of extent, increasing density and an average height of 3 to 4 metres	• Monitor strength of limbs • Selectively prune removing dead, damaged or diseased shoots in spring and autumn • 15% hedgerows cut every year • Monitor cutting cycle to promote wildlife benefits. • Monitoring for no loss of extent, increasing density and an average height of 3 to 4 metres • Check for pest and disease and treat where necessary
D	Grassland Sward within Solar Arrays		Areas between the array to be seeded with a fine grass mix such as ESG2 or EG11	Monitor growth and allow sward to re-establish.	a) 2-3 cuts March through to end May b) June - early September or October no further action c) Cut as low as possible and collect September d) Cut and collect November		Monitoring for increased species diversity and control of weed species Review success of management regime
E	Ride Planting Areas		Ride areas to be lightly cultivateed or disced to encourage dormant annuals to germinate Once the area has greened up and before any plants have set seed the area wil be cultivated again or sprayed with herbicide Once the seedbed is consolidated sowing can be carried out ideally in September or spring.	Mown to 4-6 inches through first season. Check emergence of dock species and Yorkshire Fog, treat as necessary	a) 2-3 cuts March through to end May b) June - early September or October no further action c) Cut as low as possible and collect September d) Cut and collect November		Monitoring for increased species diversity and control of weed species Review success of management regime After year 7 less intensive management will be employed as the areas reach equilibrium.

Heywood Grange Solar: Management Plan Diary

Landscape and Ecological Features		Construction		Operation			
		During	At the end of construction	Year One	Year two	Year three	Every 5 years
F	Wet Scrape for wetland Invertebrates		Remove top soil to establish lower ground level Allow to vegetate naturally	Check vegetation establishment	Ecologist to monitor for species diversity	Ecologist to monitor for species diversity	
	Badger Protection Zone	A 30m buffer zone will be established around the badger sett. Within this zone, no excavation, digging, pile driving and vehicular movement will be permitted. Buffer area to be marked with a visual and physical barrier to prevent any activity within the area Badger gates be included and installed within the security fence prior to commencemnt of construction Ensure no trenches left open overnight within the construction area	Mammal gates to be checked on completion of construction to ensure in working order	Check all mammal gates are in working order	Check all mammal gates are in working order	Check all mammal gates are in working order	Check all mammal gates are in working order
G	Proposed Barn Owl Boxes		Installation of three Barn Owl Nesting Boxes on trees within the buffer areas of the site Ecologist to advise suitable trees	Check condition of nest boxes Ecologist to survey boxes for signs of use If used for nesting, return to site after chicks have fledged to clean out nest box	Check condition of nest boxes Ecologist to survey boxes for signs of use If used for nesting, return to site after chicks have fledged to clean out nest box	Check condition of nest boxes Ecologist to survey boxes for signs of use If used for nesting, return to site after chicks have fledged to clean out nest box	Check condition of nest boxes Review success of boxes and change locations if necessary