LANDSCAPE AND ECOLOGICAL MANAGEMENT PLAN

Grange Solar Farm

Prepared by

Solarplicity
Simply lower energy bills

Solarplicity Limited

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Introduction

1.1.1 This landscape and Biodiversity Management Plan has been created to support Discharge Notice Ref: H20-0937-13 dated 11-03-2014.

1.1.2 This report has been prepared by Solarplicity Limited for the solar array at Grange Solar Farm, Sutton St. James.

1.1.3 An ecological survey of the site was undertaken by Avianecology Ltd on 5th August 2013. (Attached as Appendix A)

1.1.4 A Landscape and Visual Impact Assessment survey was carried out by Crestwood Environmental Ltd the findings of which are incorporated into the methodologies used in this management plan (Attached at Appendix B)

1.1.5 This Management Plan draws on the findings and recommendations detailed in the above reports and is supported by As Built information from the Installer SolarPlicity Ltd formerly Sustain Solar Ltd.

1.1.6 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.

1.1.7 The proposed solar farm is an example of a development which presents considerable opportunity for biodiversity enhancement. This management plan has been prepared to ensure that the opportunities for enhancement are realised, The purpose of this management plan is:

- To set out the agreed objectives for landscape management of the site
- To set clear standards for the performance of landscape maintenance work
- To assist in the development of work programmes for landscape maintenance staff
- To establish landscape maintenance responsibilities
- To help monitor success and progress against the aims and objectives.

1.1.8 The Plan sets out a strategy for the first 10 years of operation of the solar farm.
It is recommended that after 10 years the objectives and prescriptions set out in the plan are reviewed and updated if required.

Aims

1.1.9 This plan sets out how the valuable ecological features of the site will be protected during the operational phase of the site, ecological enhancements are being managed to increase the value of the site for wildlife.

1.1.10 During the operation of the array, the habitat surrounding and beneath the panels will be managed to facilitate the establishment of a diverse grassland. The surrounding habitat features will be simultaneously enriched to provide a suitable habitat for a variety of wildlife species.

1.1.11 Subsequent management and monitoring of the site will be put in place to ensure the benefits are long-lasting.

1.1.12 The overall aim of this management plan is to ensure the features of existing biodiversity value on the site are protected following construction and that the potential biodiversity value of the operational site is realised.

Site Description

Description of the Development

1.1.13 The development consists of 13.054MW solar farm constructed on land at Grange Solar Farm, near Spalding, Lincolnshire. The development is located on 28.6 Hectares (ha) of farmland broadly 1.6 kilometres (km) north of the town of Sutton St James.

1.1.14 The solar farm was completed on the 31st March 2015 and connected to the national electricity grid.

1.1.15 The solar farm consist of rows of solar panels mounted on a supporting structure, orientated to face south in order to maximise the benefit from the sun. The panels are composed of photovoltaic cells and are designed to maximise the absorbency of the sun's rays and minimise solar glare, which would present a loss of potential solar energy.

1.1.16 Each solar array has been constructed to a maximum height of 2.1m from ground level and angled to 20 degrees horizontally.

1.1.17 The site has been secured by continuous Deer fencing which surrounds all borders of the site, the fencing has been installed to a height of 2.0 metres.

1.1.18 The site comprised two arable fields bounded by fields of mixed agricultural nature.

1.1.19 Habitats at the field boundaries, including waterways and watercourses were suitable for a number of protected and notable species, including roosting and foraging bats, reptiles, otter Lutra lutra, and white-clawed crayfish.

1.1.20 In addition, the arable field habitat provided potential foraging ground for flocks of wintering birds and nesting habitat for ground nesting birds such as skylark Alauda arvensis and meadow pipit Anthus pratensis.

Management Plan Objectives (operational phase)

1.1.21 The following operational phase objectives have been identified which, when achieved, will ensure the overarching aims of the plan are achieved.

Objective O1: To manage grassland to ensure the development of a diverse sward beneath the array of solar panels.
The site will be managed to create a diverse grassland habitat which will benefit a wide range of wildlife. The site will be seeded using seed from suitable native species, and will be managed using a cutting regime or a combined cutting and grazing regime.

Objective O2: To manage other areas as a habitat for a range of species
The field boundaries will be maintained as coarse, tussock grassland to benefit a range of reptile species as well as invertebrates and small mammals. This will also provide habitat for harvest mice, should they be present on the local area.

Objective O3: To Install, manage hedgerows to enhance the aesthetic and wildlife value. Also to provide screening for local residents and passing traffic.
The hedgerows will be managed and maintained to develop a dense continuous hedge line with enhanced ecological value.

Objective O4: To monitor the site and assess the success of management
In order to deliver the proposed ecological objectives, monitoring of the effects of management prescriptions will be required in order to ensure that these are effective, and to inform any necessary refinement of the site management

Operational Phase Management Prescriptions

1.1.22 In order to achieve the objectives outlined in Section 4, the following management prescriptions have been identified.

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

1.1.24 **Management of Grassland Within the Array**
Contributes to Objective O1

Year 1

Newly seeded grassland will be subject to regular cutting during the first year of sowing in order to prevent annual weeds from establishing.

Arising's will be collected with a baler or rake to remove nutrients and thereby promote the establishment of a biodiverse sward.

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

Year 2

From year 2, the grassland will be managed through a combination of cutting and grazing.

January-February	Light grazing on any new growth (optional)
Early March	Remove grazing; this allows plants to grow and flower
August/September	Cut hay cut once the wildflowers have seeded; cut meadow slowly to a height of 15cm and allow opportunities for animals and birds to escape
Late September to end of December	Main grazing period with light grazing down to a short sward height (5cm); a mosaic of plant heights helps encourage insects

Should the area be grazed, grazing will only be undertaken by sheep. Cattle, horse or donkey grazing will not be possible due to the damage these species will be likely to inflict on the solar panel structures.

Stocking density of between 5 – 10 animals per hectare is recommended between late September and February. 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 will be given to lowering stocking density.

Management of Injurious Weeds

Contributes to Objective O1

The land will be managed to make certain any of the five injurious weeds (Weeds act, (1959) do not proliferate on site, and ensure they do not spread. The five species 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).

A flush of ruderals and weeds beneath the solar arrays is anticipated during the initial two years post-construction. Control of undesirable species beneath the arrays is therefore highly 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.

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.

Management of Field Boundaries

Contributes to Objective O2

The areas outside the security fencing, at the field boundaries, will be managed to form a species rich wildflower strip.
The marginal strips will be cut to 50mm after flowering. Mowing/cutting will take place in September, (outside of the bird nesting season (March to August inclusive)) during periods of dry weather to ensure that no waterlogged ground is damaged by machinery.

The marginal strips will be cut using a small vehicle such as an offset box cutter mounted to the back of a small tractor or quad bike. Following mowing, arisings will be collected and removed from the site.

Management of Trees and Hedgerows

Contributes to Objective O3

The existing and proposed hedgerows will be included in an annual management regime.

During the first five growing seasons, 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. The planting area will be kept weed free throughout this period by hand weeding in April, June and August and securing any pegs that work loose from the edge of the weed membrane will be re-secured.

Guards will be removed once they are no longer required to prevent rabbit damage and before they start to restrict growth.

During the first five growing seasons, hedgerow plants shall be trimmed as required to promote healthy, bushy growth and create a solid hedge of the required height as quickly as possible. The frequency of cutting will depend on growth rates and weather conditions and the requirement for cutting will therefore be assessed annually. Thereafter, new and existing hedges will be managed by rotational cutting (i.e. different hedges within the site will cut in different years) to create A-shaped hedges with adequate density throughout their height. Hedge cutting will always be timed to avoid the bird nesting season. The use of rotational hedge cutting will ensure that there are always some uncut hedges on the site that will provide

suitable habitats for mammals, invertebrates and nesting birds, whilst also preventing the hedges from becoming gappy and thin at their bases.

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In order to mitigate for the loss of potential winter foraging habitat for skylarks after development, two arable fields which lie to the south east of the site will be sensitively managed as cropped fields to provide a foraging resource for over-wintering birds for the duration of the operation of the PV array as well as a suitable compensatory nesting habitat for lapwing.

Provisions for Wintering Birds

Contributes to Objective O2

In order to mitigate for the loss of potential winter foraging habitat for skylarks after development, a minimum of 8ha of land with suitably open fields (location of which shown in Appendix A) will be managed sensitively to provide foraging resources for over-wintering birds for the duration of the operation of the PV array.
This field will be managed to provide a continuous source of winter forage either by being given over to grass pasture, sown with a winter crop, or through retaining over-wintered stubble, the site will not be ploughed or intensively grazed for the duration of the site lifespan.

Provisions for Ground Nesting birds

Contributes to Objective O2

In order to mitigate for the loss of potential breeding habitat for ground nesting birds, in particular lapwing, after development, a minimum of 4ha of land within suitably open fields (location of which shown in Appendix A) will be managed sensitively to provide suitable conditions for ground nesting birds for the duration of the operation of the PV array.

The field has drainage pits identified on ecological drawings (Appendix A.) that will be maintained throughout the project, the ground will continue to have natural furrows which will gather rainwater providing a natural feed source for birds and invertebrates. (See Appendix B. Completion Photographs)

This field will be managed to provide a continuous source of vegetation cover which remains at a height of between for the majority of the spring and summer months (March to July). This will be achieved through giving the land over to spring tilled cereal crop (not Brassica), or grazed pasture. If grass pasture is managed for this purpose, stocking densities will be kept low within the 4ha (at 1LSU/ha) to minimise the chance of trampling of nests by stock.

Monitoring

Contributes to Objective O5

1.1.25 During the initial two years of operation, monitoring will be undertaken on three occasions between March and October. These inspections will be undertaken by the land manager rather than the ecologist. These inspections are primarily aimed at identifying any vegetation failures and the monitor the establishment of tall ruderal herbs and weeds on the site. Habitat management may be required immediately upon completion of this inspection. The timing of the inspection should be coordinated with the periods in which undesirable species set seed. Findings from these inspections will be reported within the annual monitoring report.

1.1.26 Monitoring will be carried out in June/July by an experienced ecologist to assess the ecological development of the grassland sward in years 1, 2, 3, 5 and 10.

1.1.27 Monitoring will ideally focus upon several taxonomic groups which will act as indicators for the entire site, such as grassland botany, birds and potentially reptiles and amphibians.

1.1.28 Inspections of the bat/bird boxes and refugia will also take place to ensure continued suitability for target species.

1.1.29 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.

1.1.30 Recommendations may be made to amend the management prescriptions to promote a more diverse sward. Recommendation may include a change in management or supply of additional seed.

1.1.31 A monitoring report will be supplied to the Local Planning Authority subsequent to each monitoring visit.

Project Maintenance Programme and Management

1.1.32 As Owner and Managing Company Solarplicity maintain the project by undertaking regular maintenance of both the plant and the habitat it has been installed within. Activities such as grass cutting, hedge maintenance are monitored as part of the annual schedule of activities (Attached at Appendix C).

1.1.33 During the maintenance activities, Solarplicity will engage with local authority in any instance of deviation from planning approvals and will provide review of all ecological and environmental matters at each 5 year interval of the plant operation.

As Constructed Information

1.1.34 The Project Construction was completed and connected to the national grid on the 31st March 2015.

1.1.35 All landscaping activities have been completed in accordance with section 9 of this document. The first available planting window (January 2016) was utilised for lifting and planting of root stock for hedge planting in accordance with submitted planning documents submitted by GSS forming the submission for planning permission granted by South Holland District Council.

1.1.36 Photographs of installed planting attached at Appendix D.

Mitigation Measures Undertaken

1.1.37 In addition to the solar PV arrays, there would be a plant building (point of connection facility including metering point), occupying a footprint of approximately 30 sq. m and 2.6 m in height, in the south-west corner of the site. The building would be designed to have the appearance of a small shed to so that it does not appear incongruous with other built form in the area. It is likely that for security the site would be bordered by 2m high fencing. Details of the solar PV array design and layout are set out in the Design and Access Statement that accompanies the planning application. The number of arrays along each row would vary according to the dimensions of the site. There is limited opportunity to significantly change the design of the arrays as their appearance is functional. Given that the PV array faces towards the sun, consideration of reflectivity is important. The Design and Access Statement states that: "The concept of efficient solar power is to absorb as much light as possible while reflecting as little light as possible. Standard solar module produces [sic} less glare and reflectance than standard window glass. Solar modules use "high transmission, low iron glass" which absorbs more light, producing smaller amounts of glare and reflectance than normal glass", Common construction materials, such as steel and glass (as used in greenhouses or unpainted metal roofing) and many features of the natural environment such as water and grass have higher reflectivity than solar PV arrays. Technical glint and glare assessment for solar PV arrays are therefore widely accepted as being unnecessary. As illustrated in Plate 2, taken where the sun is striking the panels and leaving a shadow behind the frames, the low reflectivity of the panels and frames do not create any additional visual impact over and above views of the panels themselves, e.g. in overcast conditions.

1.1.38 5.2.4 The objectives of the mitigation are to reinforce the landscape features within the site such that they better relate with the wider character, and to reduce the potential for potentially adverse impacts on landscape character or visual amenity. The scheme encompasses a number of inherent mitigation measures to reduce potential landscape and visual impacts. The paragraph below describes how a planting scheme, proposed as part of the development as mitigation, could be implemented if conditioned as part of a consent.

1.1.39 The entire perimeter of the Site adjacent to the peripheral ditch network would be planted with a native hedgerow mix, totalling circa 2.2km in length, to provide visual

screening of the proposals from ground level. Once established, the hedgerows should be brought into regular agricultural management and trimmed to a height of approximately 2-3m. A suggested species mix is listed below following review on site and with reference to the online Postcode Plants Database (Natural History Museum, n.d.) and local character assessment.

1.1.40 New hedgerow planting would consist of 45-60cm bare root whip plants at 300mm centres spacing as a double stagger hedge. The planting would either be protected by rabbit proof fencing or with individual shrub guards to protect the planting from browsing. Proposed hedgerow composition is set out below in Table 1. Any existing shrubs or trees would be incorporated in to the hedge line as appropriate. The proposed hedgerow mix would reinforce the linear peripheral ditch system, supplementing these existing wildlife corridors and encouraging further cross-interaction.

1.1.41 The existing crop would need to be taken off in order to facilitate the construction of the solar arrays. This would create the opportunity to restore a large area of grassland. The grassland should be managed through taking a hay cut or grazing. An appropriate seed mix would be agreed with the seed specialist and/or ecologist and local planning authority at the time of sowing.

1.1.42 The proposed scheme design, therefore, includes a range of landscape mitigation measures which would serve to reduce the level of potential landscape and visual effects. The section below sets out the assessment of landscape and visual effects at Year 1 (before the planting matures) and the residual effects which are predicted to arise as a result of the implementation of the Proposed Development following growth of the perimeter hedgerows.

Percentage Mix	Latin Name	Common Name
50%	Crataeaus monoavna	Hawthorn
10%	liqustrum vulgare	Wild Privet
20%	Prunusspinose	Blackthorn
5%	Rhamnus cathartica	Buckthorn
5%	Rosa canina	Dog-rose
5%	Sambucus niara	Elder
5%	Viburnum oouius	Guelder Rose