BIODIVERSITY ENHANCEMENT MANAGEMENT PLAN

SOAY SOLAR FARM AND GREENER GRID PARK

STATKRAFT UK LTD

JULY 2022

Prepared By:

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1 INTRODUCTION

1.1 Overview

Arcus Consultancy Services Limited (Arcus) has been instructed by Statkraft UK LTD (the Applicant) to produce a Biodiversity Enhancement Management Plan (BEMP) to support a planning application on land at Thornton, near York, East Riding of Yorkshire (the Site), approximately centred on National Grid Reference SE 76204 46514.

The planning application is for a proposed Solar Park and Greener Grid Park (the Development) which includes associated soft and hard landscaping. The Site is in a rural location comprising of large arable farmland fields with a low density of farmstead dwellings.

An Ecological Impact Assessment (EcIA), Biodiversity Metrics Assessment, Arboricultural Impact Assessment (AIA) and Landscape and Visual Appraisal (LVA) are also submitted as part of the planning application. The reports identify potential mitigation measures that would reduce the effects of the Development or protect and enhance landscape and biodiversity resources.

The layout and technical details of the Development are provided in the associated Planning, Design and Access Statement (PDAS) and accompanying figures. In addition to the proposed infrastructure, the Development includes the landscape and ecological mitigation and enhancement measures detailed in Section 5 of this BEMP. The proposed mitigation and enhancements are shown in Appendix A.

The Application was submitted in December 2021, following which the layout and technical details of the Development have been amended to incorporate minor design changes. Due to design minor design changes associated with the Development, this BEMP has been updated in July 2022.

1.2 Aims and objectives

The aims of this BEMP are:

- To ensure that biodiversity resources are protected during construction of the Development;
- To ensure that adequate enhancement measures are implemented at the beginning of the Development;
- To ensure that existing biodiversity resources and proposed mitigation and enhancement measures are managed appropriately during the operation of the Development to establish planting with greater ecological value than the existing arable land; and
- To ensure implemented planting and enhancement measures are monitored and any remedial actions are undertaken to ensure the success of landscape and ecology proposals; and
- In line with the Biodiversity Metric Assessment, demonstrate the practical approach required in achieving the identified biodiversity net gain within the Development.

1.3 Relevant Guidance

This BEMP has been produced with reference to the following guidance:

- TIN101 Solar Parks: Maximising Environmental Benefits[1];
- Biodiversity Guidance for Solar Developments[2];

[1] Natural England (2011) *TIN101 Solar Parks: Maximising Environmental Benefits*, Natural England

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

- Institute of Environmental Management and Assessment and Landscape Institute, 2013, Guidelines for Landscape and Visual Impact Assessment, 3rd Edition[3]; and
- National Plant Specification 'Handling and Establishing Landscape Plants'[4].

All plants and planting operations are to comply with the requirements and recommendations of all current relevant British Standard and guideline specifications including but not limited to:

- BS 8545. Trees: From Nursery to Independence in the Landscape[5];
- BS 3936-1:1992. Nursery stock. Specification for trees and shrubs[6];
- BS 3882:2015 - Specification for topsoil[7];
- BS 4428:1989. Code of practice for general landscape operations (excluding hard surfaces) (AMD 6784)[8];
- BS 5837: 2012 Trees in relation to design, demolition and construction. Recommendations[9];
- BS 3998:2010 Recommendations for Tree Work[10];
- The Hedgerow Regulations 1997[11];
- Biodiversity Guidance for Solar Developments[2]; and
- TIN101 Solar Parks: Maximising Environmental Benefits[1].

1.4 Relevant Reports

The BEMP should be read in conjunction with the following reports:

- Soay Solar Farm and Greener Grid Park PDAS (Arcus, 2021)[12];
- Soay Solar Farm and Greener Grid Park LVA (Arcus, 2021)[13];
- Soay Solar Farm, AIA (JCA, 2021)[14];
- Soay Solar Farm and Greener Grid Park Report to Inform a Habitat Regulation Assessment: Screening of likely significant effects. (Arcus 2021)[15];
- Soay Solar Farm and Greener Grid Park EcIA (Arcus, 2021)[16];
- Soay Solar Farm and Greener Grid Park, Biodiversity Metrics Assessment (Arcus, 2021)[17]; and
- Soay Solar Farm and Greener Grid Park Ornithological Impact Assessment (Arcus, 2021)[18].

[3] Landscape Institute and IEMA. (2013) *Guidelines for Landscape and Visual Impact Assessment: Third Edition.*
[4] The Committee for Plant Supply and Establishment (1995) The National Plant Specification – Handling and Establishment. [Online] Available at: https://www.csdhub.com/wp-content/uploads/2014/12/The-National-Plant-Specification-Handling-and-Establishment.pdf (Accessed 19/08/2021)
[5] British Standards Institution (2014) BS 8545. Trees: From Nursery to Independence in the Landscape. London: BSI.
[6] British Standards Institution (1992) BS 3936-1:1992. Nursery stock. Specification for trees and shrubs. London: BSI
[7] British Standards Institution (2015) BS 3882:2015 - Specification for topsoil. London: BSI.
[8] British Standards Institution (1989) BS 4428:1989. Code of practice for general landscape operations (excluding hard surfaces) (AMD 6784). London: BSI.
[9] British Standards Institution (2012) BS 5837: 2012 Trees in relation to design, demolition and construction. Recommendations. London: BSI.
[10] British Standards Institution (2010) BS 3998:2010 Recommendations for Tree Work. London: BSI.
[11] UK Government (1997) *The Hedgerow Regulations* 1997 [Online] Available at: https://www.legislation.gov.uk/uksi/1997/1160/contents/made (Accessed 16/07/21)
[12] Planning, Design and Access Statement, Soay Solar Farm and Greener Grid Park, Arcus (2021).
[13] Landscape and Visual Appraisal Soay Solar Farm and Greener Grid Park, Arcus (2021).
[14] Arboricultural Impact Assessment Soay Solar Farm and Greener Grid Park, Arcus (2021).
[15] Shadow Habitat Regulations Appraisal, Soay Solar Farm and Greener Grid Park, Arcus (2021).
[16] Ecological Impact Assessment, Soay Solar Farm and Greener Grid Park, Arcus (2021).
[17] Biodiversity Metrics Assessment, Soay Solar Farm and Greener Grid Park, Arcus (2021).
[18] Ornithological Impact Assessment, Soay Solar Farm and Greener Grid Park, Arcus (2021).

2 EXISTING ECOLOGICAL FEATURES AND CONSTRAINTS

2.1 Features

Further information on the description of habitat types, their importance for protected species, and location of habitats can be found on the EcIA, and the Phase 1 Habitat plan appended to that report. Existing ecological features within and in close proximity to the Site include:

- Hedgerows, often interspersed with mature trees, define the current arable field boundaries. Hedgerows were generally species poor, with the majority of hedgerows across the Site identified as intact or hedgerows with trees, however some defunct hedge lines were also present. Hedgerow species within the Site include oak, ash, horse-chestnut, alder, sycamore, hazel, hawthorn and bramble;
- A number of semi-natural and plantation woodland blocks are present within the Site or located adjacent to the Site. These include the Brickpit, Three Cocked Hat, Blanch plantation and the area of plantation woodland west of the Thornton Substation. Warren Wood and Allerthorpe Woods are located on the boundary and directly adjacent to the Site respectively;
- Both improved and poor semi-improved grassland habitat are present on-site. A small area of improved grassland was located in the north-west of the Site. Poor semi-improved grassland was recorded north of the substation to the south-east of the Site and is present on field boundaries throughout the Site. Grass species typical of poor semi-improved grassland, such as Yorkshire fog, perennial rye grass and cocksfoot, were found in this habitat. White clover, ribwort plantain, common daisy, dandelion and common groundsel were also present in improved grassland habitat;
- Dense bracken stands and scattered bracken are located within the northern extent of the Site, located adjacent to Pond 2;
- Watercourses found within the Site comprise a network of drainage ditches and three on-site ponds. One of these ponds (Pond 5a) supports a small population of Great Crested Newt (GCN). Off-site Ponds 1 and 4 support a small population of GCN;
- A number of trees on-site and along the Site boundaries have the potential to support roosting bats;
- The hedgerows, woodland and field margins have the potential to support foraging and commuting badgers. Information on badgers is provided in a separate confidential annex;
- A range of habitats suitable for breeding birds, wintering birds and nightjar are present within the Site and the wider landscape;
- Ditches on-site were identified with water vole potential, and presence was recorded within two ditches;
- Site habitats have the potential to support basking, foraging, and sheltering reptiles, particularly along the field margins where strips of semi-improved grassland, tall ruderal and hedgerow habitats are present; and
- Himalayan Balsam was recorded in woodland and ditches within the west adjacent to Warren House and in ditches to the north-east of the Site.

Ecological receptors will be protected from adverse impacts, during the construction and operational phases of the Development, provided that all mitigation is followed. Mitigation measures to reduce impacts to habitats and species are outlined within the EcIA[16] and Construction and Environmental Management Plan (CEMP)[19].

2.2 Constraints

Ecological constraints within and near the Site include:

[19] Arcus (2022) *Soay Solar Farm and Greener Grid Park: Construction and Environmental Management Plan (CEMP)*

- Ponds located within 250 m of the Site boundary, which are listed as Habitats of Principal Importance in England under the Natural Environment and Rural Communities (NERC) Act 2006. These ponds have the potential to support a range of wildlife species, with two off-site ponds and one on-site pond recording a small population of GCN;
- Brown hare, which is a Species of Principal Importance in England under the Natural Environment and Rural Communities (NERC) Act 2006, was observed commuting along hedgerows within the Site and wider area;
- Allerthorpe Common Site of Special Scientific Interest (SSSI), Local Wildlife Site (LWS) and Yorkshire Wildlife Trust (YWT) reserve. These sites are located adjacent to the north boundary of the Site. Allerthorpe Common supports a range of habitats including lowland heath, wet heath, dry heath, acid grassland, woodland, scrub, and open water. The habitats present support a variety of bird species including great spotted woodpecker, breeding nightjar, tree pipit and whinchat. Adder is also present; and
- Warren Wood, a Deleted LWS, is an area of deciduous woodland (listed as a Habitat of Principle Importance under the Natural Environment and Rural Communities (NERC) Act 2006) and is located adjacent to the eastern boundary of the Site.

3 PROPOSED MITIGATION AND ENHANCEMENT

3.1 Overview

The Updated Landscape and Ecology Mitigation and Enhancement Plan (July 2022) (Appendix A) illustrates all proposed mitigation and enhancements, which would introduce several different habitats to the Site, as set out in Table 3.1.

Table 3.1: Habitats Introduced

Habitat Type	November 2021 Layout	July 2022 Layout
Mixed native species hedgerow	3.9 km	4.1 km
Proposed native species hedgerow trees	Approx 560	Approx 559
Native deciduous woodland	1 hectare (ha)	1.12 ha
Native shrub mix	5.8 ha	0.6 ha
Tussock Grassland	4.8 ha	5.46 ha
Bird Cover Crop	0.7 ha	0.63 ha
Habitat Enhancement Area (HEA)	12 ha	13.64 ha
Native Species Grassland, and Wildflower Meadow	109.47 ha	107 ha

A description of habitats and features to benefit biodiversity is found below:

- 4.1 kilometres (km) of mixed native species hedgerow;
- Approximately 559 proposed native species hedgerow trees;
- 1.12 hectare (ha) of native deciduous woodland;
- 0.6 ha of native shrub mix;
- 6.46 ha of mixed native scrub and grassland planting;
- 107 ha of grassland beneath the solar panels and along verges within the Site (native species grassland planted in areas between and beneath solar panels, and wildflower meadow planting outside of these areas);
- 5.46 ha of Tussock Grassland mix;
- Four strips planted with Bird Cover Crop, to provide year-round foraging for birds and insects, covering an area of 0.63 ha;
- A Habitat Enhancement Area (HEA), composed of native grass and meadow mix, scrub and tree planting, totalling 13.64 ha;
- 16 bat boxes including a mix of cavity and crevice boxes suitable to support a range of species such as pipistrelle *sp.,* brown long-eared, noctule and myotis *sp;*
- 39 bird boxes including:
    - Two tree-mounted barn owl boxes;
    - Two kestrel boxes;
    - 20 tree sparrow boxes (28 mm hole);
    - Five starling boxes;
    - 10 further boxes for hole nesting species (five with 28 mm hole, five with 32 mm hole); and
- 30 Mammal Gates.

Note: All quantities are approximate measurements based on digital mapping and areas may vary when constructed.

The Development will retain and protect the existing trees and hedgerows within and surrounding the Site, except for *circa* 0.39 ha of category B Trees / hedgerows to

accommodate the proposed greener grid park and associated access tracks. All these trees for removal are either of negligible or low bat roost potential. This is detailed further in the AIA and EcIA, which accompanies the Application.

3.2 Planting and Seeding Preparation

3.2.1 *Clearance*

Where existing ground vegetation has re-established during the construction phase, where feasible, this natural regeneration may will be favourable to clearing and replanting. However, where clearance is required, the following clearance works should be undertaken prior to planting or seeding works:

- **Tree and Shrub Planting Areas**: All grass and perennial vegetation should be cut to a maximum of 25 mm above ground level including epicormic growth;
- **Proposed Wildflower Seeding Areas**: All grass and perennial vegetation should be cleared from site including epicormic and below ground growth;
- **All Areas**: Clear all rubbish and debris and stone pick all stones over 25 mm diameter; and
- All arisings should be removed from the Site.

3.2.2 *Cultivation*

Topsoil should be cultivated in-line with BS 3882: 2015 to a minimum of 400 mm over all planting areas or to a fine tilth 200 mm over all areas to be seeded and include basic levelling with levels graded to fall.

No cultivation should take place in wet/ waterlogged conditions and within the root protection areas of existing trees. Where necessary imported topsoil should be sustainably sourced and must be compliant with the BS 3882: 2015.

3.3 Planting Methods

In the interest of biodiversity protection, the following measures are detailed below:

- The use of herbicides should be kept to a minimum in the preparation or management of all planted and seeded areas;
- Biodegradable tree and shrub guards will be used throughout the Site;
- The handling of plants on-site must be in accordance with National Plant Specification 'Handling and Establishing Landscape Plants'[20];
- All plants and planting operations are to comply with the requirements and recommendations of all current relevant British Standard specification – outlined in Section 1.3;

All planting must be carried out during appropriate climatic conditions i.e., avoiding frozen ground conditions, in the optimal planting period of October through until March, inclusive.

The majority of the specified plants will be supplied as bare root specimens; therefore, care should be taken to ensure the roots do not dry out prior to planting.

Trees should be planted as soon as possible after delivery on-site. If this is not possible, rootballed and container grown trees should be stored closed together with the ball or container covered with sand or a moist cloth to prevent drying out.

[20] The National Plant Specification – Handling and Establishment (November 1995) [Online] Available at: https://www.csdhub.com/wp-content/uploads/2014/12/The-National-Plant-Specification-Handling-and-Establishment.pdf (Accessed 12/07/21)

3.3.1 *Planting Staking and Protection*

Newly planted trees and should be staked in-line with BS 4428: 1989 using a single stake and appropriate biodegradable tie and rubber buffer to prevent excessive movement during establishment. The stake should be positioned on the windward side of the tree and driven into the ground vertically.

All newly planted trees and shrubs should be protected from animal damage using a suitable tree or shrub guard.

Transplants will be protected from mammal damage with a single spiral guard (approximately 50 mm diameter, 60 cm high) and bamboo cane support per plant. Guards should be biodegradable and pushed up to 2 cm into the ground.

All feathered trees will be protected by a single tree guard (approximately 100 mm diameter, 60 cm high), an approximately 1.5 m high (above ground) timber tree stake and attached with adjustable tie. Posts will be marked with a white top so that its location is noticeable to operators of tractor flails during maintenance periods.

3.3.2 *Mulching*

All trees and shrub planting areas should be covered using a course bark mulch to a minimum depth of 75 mm, leaving the stem of the plant clear. Trees and shrubs should receive a minimum mulch area of 250 mm radius from stem, and hedge planting within 500 mm of proposed centreline hedge.

3.4 Planting Specifications

For details of planting specification refer to planting schedule on Drawing 3404_DR_LAN_101, Landscape and Ecology Mitigation and Enhancement Plan, Appendix A. The following section outlines planting specification and associated planting methods.

3.4.1 *Proposed Native Species Hedgerow*

Proposed native species hedgerow will be located as shown on the Updated Landscape and Ecology Mitigation and Enhancement Plan (July 2022) (refer to Drawing 3404_DR_LAN_101, Appendix A). Approximately 4.1 km of new mixed native species hedgerows will be planted as part of the Development.

Species have been chosen to attract wildlife and consist of species found in the locality. Hedgerow planting and enhancement will enrich and improve biodiversity present on the Site. This habitat will provide and improve habitat connectivity across the site and within the local area, create habitat buffers and provide foraging and sheltering opportunities for a range of species including mammals including bats, birds, GCN and reptiles. The native plant species which have been selected will benefit a range of invertebrates including pollinators such as bumblebees.

Hedgerows will consist of a double staggered row of bare root transplants, with rows at approximately 30 cm apart and plants spaced at 30 cm centres (seven plants per linear metre). Species will be mixed throughout the hedge line in random groups of 5-25.

A 600 mm wide trench will be excavated, and topsoil cultivated to 450 mm depth prior to planting. All native planting shall be of local provenance.

The hedgerows will comprise native species as shown in Table 3.2.

Table 3.2: Schedule of Native Species Hedgerow Planting

Scientific Name	Common Name	% Of the Mix	Size
Acer campestre	Field Maple	5	T 60-80 cm (1+1) BR
Corylus avellana	Hazel	2.5	T 60-80 cm (1u1) BR
Crataegus monogyna	Common hawthorn	60	T 60-80 cm (1+1) BR
Ilex aquifolium	Holly	2.5	C 60-80 cm 2L pot
Prunus spinosa	Blackthorn	25	T 60-80 cm (1+1) BR
Rosa canina	Dog Rose	5	T 60-80 cm (1+1) BR

Abbreviations: T = Transplant, BR= Bare Root, C= Containerised, 1+1 = 1 year seeding transplanted for 1 year, 1u1= 1 year seeding undercut and grown in situ for a further year

3.4.2 *Proposed Native Species Hedgerow Trees*

Trees will be located as shown on the Updated Landscape and Ecology Mitigation and Enhancement Plan (July 2022) (refer to Drawing 3404_DR_LAN_101, Appendix A). Trees will be planted centrally within the new hedgerow (along the centre line of the hedge). Trees will be planted in pits approximately 600 x 600 x 600 mm or the dimensions of the rootball whichever is greater.

Soil improver and approximately 140g Enmag slow-release fertiliser will be incorporated into the soil of all new tree pits.

Table 3.3: Schedule of Native Species Hedgerow Tree Planting

Scientific Name	Common Name	Size
Acer campestre	Field Maple	F 150 – 175 cm BR
Alnus gutinosa	Common Alder	F 150 – 175 cm BR
Crataegus monogyna	Common hawthorn	F 150 – 175 cm BR
Quercus robur	Pedunculate Oak	F 150 – 175 cm BR
Prunus spinosa	Blackthorn	Wh 125 – 150 cm BR

Abbreviations: F= Feathered, Wh = Whip BR= Bare Root, 1+2 = 1 year seeding transplanted for 2 years

Hedgerow planting will create habitat buffers and provide foraging, sheltering and habitat connectivity opportunities for a range of species including mammals, bats, birds, GCN, reptiles, and invertebrates.

3.4.3 *Proposed Native Woodland*

Native woodland will be located as shown on the Updated Landscape and Ecology Mitigation and Enhancement Plan (July 2022) (refer to Drawing 3404_DR_LAN_101, Appendix A). Trees will be planted centrally within the new hedgerow (along the centre line of the hedge). These will be planted at approximately 2 m centres and will consist of 60 - 80 cm bare root transplants.

Soil improver and approximately 140 g Enmag slow-release fertiliser will be incorporated into the soil of all planting pits.

Tree/shrub species will be planted in groups of 1, 3, 5 and 7 (of the same species) to reinforce a natural layout of species within the landscape. Trees/shrubs will be notch planted.

Woodland planting will create habitat buffers and provide foraging and sheltering opportunities for a range of species including mammals, bats, birds, GCN, reptiles, and invertebrates including bumblebees.

Table 3.4: Schedule of Native Species Woodland Planting

Scientific Name	Common Name	Size
Acer campestre	Field Maple	T 60-80 cm (1+1) BR
Alnus glutinosa	Common Alder	T 60-80 cm (1+1) BR
Betula pubescens	Downy Birch	T 60-80 cm (1+1) BR
Corylus avellana	Hazel	T 60-80 cm (1u1) BR
Crataegus monogyna	Common hawthorn	T 60-80 cm (1+1) BR
Pinus sylvestris	Scots Pine	T 60-80 cm (2+2) BR
Quercus robur	Pedunculate Oak	T 60-80 cm (1u1) BR
Salix Caprea	Goat Willow	T 60-80 cm (1+1) BR
Salix fagilis	Crack Willow	T 60-80 cm (1+1) BR

Abbreviations: T = Transplant, BR= Bare Root, C= Containerised, 1+1 = 1 year seeding transplanted for 1 year, 2+2 = 2-year seeding transplanted for 2 year, 1u1= 1 year seeding undercut and grown in situ for a further year

3.4.4 *Proposed Native Shrub Planting*

Native shrub planting to be located as shown on the Updated Landscape and Biodiversity Mitigation Plan (July 2022) (refer to Drawing 3404_DR_LAN_101, Landscape and Ecology Mitigation and Enhancement Plan, Appendix A).

Shrubs will be notch planted at approximately 1 m centres and will consist of 60 - 80 cm bare root transplants.

Soil improver and approximately 140 g Enmag slow-release fertiliser will be incorporated into the soil of all planting pits.

The proposed shrub planting will provide habitat and additional habitat linkages with the Site. New planting of trees and shrubs will create habitat buffers and provide foraging and sheltering opportunities for a range of species including mammals (such as bats), birds, GCN, reptiles and invertebrates.

Table 3.5: Schedule of Native Species Hedgerow Tree Planting

Scientific Name	Common Name	Size
Corylus avellana	Hazel	T 60-80 cm (1u1) BR
Crataegus monogyna	Common hawthorn	T 60-80 cm (1+1) BR
Frangula alnus	Buckthorn	T 60-80 cm (1+1) BR
Ilex aquifolium	Holly	C 60-80 cm 2L pot

Scientific Name	Common Name	Size
Prunus spinosa	Blackthorn	T 60-80 cm (1+1) BR
Salix cinerea	Grey Willow	T 60-80 cm (1+1) BR

Abbreviations: T = Transplant, BR= Bare Root, C= Containerised, 1+1 = 1 year seeding transplanted for 1 year, 1u1= 1 year seeding undercut and grown in situ for a further year

3.4.5 *Proposed Native Scrub Planting within Tussock Grassland*

Native scrub planting will be located within the Habitat Enhancement Area within the north of the Site as shown on the Updated Landscape and Ecology Mitigation and Enhancement Plan (July 2022) (refer to Drawing 3404_DR_LAN_101, Appendix A).

Plants will be notch planted at approximately 3 m centres and will consist of 60 - 80 cm bare root transplants.

Soil improver and approximately 140g Enmag slow-release fertiliser will be incorporated into the soil of all new tree pits.

Table 3.6: Schedule of Native Scrub Planting (Within Tussock Grassland)

Scientific Name	Common Name	Size
Corylus avellana	Hazel	T 60-80 cm (1u1) BR
Crataegus monogyna	Common hawthorn	T 60-80 cm (1+1) BR
Cytisus scoparius	Broom	C 60-80 cm 5L Pot
Frangula alnus	Buckthorn	T 60-80 cm (1+1) BR
Prunus spinosa	Blackthorn	T 60-80 cm (1+1) BR
Salix cinerea	Grey Willow	T 60-80 cm (1+1) BR

Abbreviations: T = Transplant, BR= Bare Root, C= Containerised, 1+1 = 1 year seeding transplanted for 1 year, 1u1= 1 year seeding undercut and grown in situ for a further year.

3.4.6 *Proposed Tussock Grassland*

Tussock Grassland will be planted throughout the Site and will be managed for the benefit of wildlife, providing foraging, commuting, and sheltering opportunities for GCN, reptiles, birds, mammals and invertebrates.

The seed mix will also contain a range of wildflowers to attract a variety of insects including bumblebees to further encourage foraging mammals.

The aim is to establish a grassland sward with greater ecological value than the existing arable land.

To achieve the above aim; it will first be necessary to determine the soil fertility of areas of land which will be planted with tussock grassland. This will involve

- Soil testing to determine the existing nutrient levels;
- Where areas to be seeded have higher nutrient levels than is suitable for wildflower seed sowing, it is recommended that a nurse crop or cover crop is sown such as barley or similar. This nurse crop will reduce the nutrient levels within the soil.
- When cutting the crop, all arisings must be collected and removed from the ground to reduce nutrients levels.

- Depending on the nutrient levels it may be necessary to undertake a repeated nurse crop for a to help reduce nutrients or until the soil nutrient level is suitable.
- Whilst undertaking this process, it is advisable that no further nutrient i.e., artificial fertilisers or herbicides are used.

Once the soil nutrient levels are suitable, ground preparation is necessary to establish a clean seed bed into which a grass seed mix can be sown, as detailed in Section 3.2.1.

To establish grassland sward:

- Seed mix will be directly sown into the prepared ground by machine or by hand at a rate of approximately 40 kg/ha (4 g/m²);
- Once sown, the seed should be lightly pressed into the seedbed by rolling or treading;
- Early autumn (August to mid-September) sowing is preferred as this favours species that germinate in autumn and species that require a period of cold to break their dormancy before they germinate in spring; and
- Sowing must take place when conditions are warm and moist, and so winter and drought periods must be avoided.

Table 3.7: Proposed Tussock Grassland Mix - Emorsgate EM10

%	Scientific Name	Common Name
Wildflowers 20%		
0.2	*Achillea millefolium*	Yarrow
1	*Agrimonia eupatoria*	Agrimony
1	*Angelica sylvestris*	Wild Angelica
1.5	*Arctium minus*	Lesser Burdock
2.5	*Centaurea nigra*	Common Knapweed
2	*Centaurea scabiosa*	Greater Knapweed
1	*Chaerophyllum temulum*	Rough Chervil
1.5	*Daucus carota*	Wild Carrot
1	*Dipsacus fullonum*	Wild Teasel
1	*Galium album - (Galium mollugo)*	Hedge Bedstraw
0.5	*Geranium pratense*	Meadow Crane's-bill
0.5	*Knautia arvensis*	Field Scabious
0.5	*Leucanthemum vulgare*	Oxeye Daisy - (Moon Daisy)
1	*Plantago lanceolata*	Ribwort Plantain
1.3	*Prunella vulgaris*	Selfheal
1.5	*Silene dioica*	Red Campion
0.5	*Torilis japonica*	Upright Hedge-parsley
1.5	*Vicia sativa ssp. segetalis*	Common Vetch
Grasses 80%		
2	*Alopecurus pratensis*	Meadow Foxtail
16	*Cynosurus cristatus*	Crested Dogstail
16	*Dactylis glomerata*	Cocksfoot
4	*Deschampsia cespitosa*	Tufted Hair-grass

24	*Festuca rubra*	Strong-creeping Red-fescue
2	*Holcus lanatus*	Yorkshire Fog
10	*Schedonorus arundinaceus - (Festuca arundinacea)*	Tall Fescue
6	*Schedonorus pratensis (Festuca pratensis)*	Meadow Fescue

3.4.7 *Proposed Native Species Rich Grassland and Wildflower Mix*

Around the perimeter of the Site and between infrastructure (primarily rows of solar panels), there will be strips of land not required for infrastructure. Beneath the rows of solar panels native species-rich grassland will be sown, and beyond the fence line, a wildflower mix will be sown. Both grasslands will be managed for the benefit of wildlife, as a source of food and shelter for mammals including bats, birds, and invertebrates.

Ideally, a seed mixture of local provenance, with a diverse range of grass and forb species, is recommended for the species rich grassland and wildflower planting. However, given the extent of proposed planting across the Development, this may not be practical, therefore Emorsgate EM3 – Special General Purpose Meadow Mixture has also been recommended (species shown in Table 3.8) and will be suitable for a range of soil and light conditions which vary across the Site.

The aim is to establish a grassland sward with greater ecological value than the existing arable land.

It will be necessary to establish the soil fertility within these areas as outlined in Section 3.4.6.

Once the soil nutrient levels are suitable ground preparation is necessary to establish a clean seed bed into which a grass seed mix can be sown, as detailed in Section 3.2.1.

In order to establish grassland sward:

- Seed mix will be directly sown into the prepared ground by machine or by hand at a rate of approximately 40 kg/ha (4 g/m²);
- Once sown, the seed should be lightly pressed into the seedbed by rolling or treading;
- Early autumn (August to mid-September) sowing is preferred because this favours species that germinate in autumn and species that require a period of cold to break their dormancy before they germinate in spring; and
- Sowing must take place when conditions are warm and moist, and so winter and drought periods must be avoided.

Table 3.8 details a suggested mix for use where mechanical management is anticipated. Should management be proposed using livestock, the suggested seed mix in Table 3.9 will be implemented.

Table 3.8 Proposed Native Species Grass and Wildflower Meadow Mix- Emorsgate EM3 – Special General Purpose Meadow Mixture

%	Scientific Name	Common Name
Wildflowers (20% of overall mix)		
0.5	*Achillea millefolium*	Yarrow
2.4	*Centaurea nigra*	Common knapweed
1	*Centaurea scabiosa*	Greater knapweed
0.6	*Daucus carota*	Wild carrot
0.6	*Filipendula ulmaria*	Meadowsweet

%	Scientific Name	Common Name
0.8	*Galium verum*	Lady's bedstraw
1.5	*Knautia arvensis*	Field scabious
0.3	*Leontodon hispidus*	Rough hawkbit
1	*Leucanthemum vulgare*	Oxeye daisy
1	*Lotus corniculatus*	Bird's-foot trefoil
0.1	*Origanum vulgare*	Wild marjoram
1	*Plantago lanceolata*	Ribwort plantain
0.5	*Plantago media*	Hoary plantain
1.8	*Poterium sanguisorba*	Salad burnet
0.5	*Primula veris*	Cowslip
2	*Ranunculus acris*	Meadow buttercup
1	*Rhinanthus minor*	Yellow rattle
0.6	*Rumex acetosa*	Common sorrel
1	*Silene dioica*	Red campion
0.2	*Silene flos-cuculi*	Ragged robin
1	*Silene vulgaris*	Bladder campion
0.1	*Trifolium pratense*	Wild red clover
0.5	*Vicia cracca*	Tufted vetch
Grasses (80% of overall mix)		
8	*Agrostis capillaris*	Common bent
40	*Cynosurus cristatus*	Crested dog's-tail
28	*Festuca rubra*	Slender-creeping red-fescue
4	*Phleum bertolonii*	Smaller cat's-tail

Table 3.9: Proposed Grazing Meadow Mix- Habitat Aid – Grazing Meadow Mixture

%	Scientific Name	Common Name
Wildflowers (5% of overall mix)		
5	*Achillea millefolium*	Yarrow
2.5	*Anthemis arvensis*	Corn Chamomile
2.5	*Betonica officinalis*	Betony
5	*Centaurea cyanus*	Cornflower
8.5	*Centaurea nigra*	Common knapweed
10	*Galium verum*	Lady's bedstraw
5	*Glebionis segetum*	Corn Marigold
2.5	*Knautia arvensis*	Field scabious
10	*Leucanthemum vulgare*	Oxeye daisy
3.5	*Lotus corniculatus*	Bird's-foot trefoil
5	*Onobruchis viciifolia*	Common Sainfoin

%	Scientific Name	Common Name
5	*Papaver rhoeas*	Field Poppy
7.5	*Prunella vulgaris*	Self Heal
5	*Rhinanthus minor*	Yellow rattle
3	*Rumex acetosa*	Common sorrel
5	*Sanguisorba minor*	Small Burnet
7.5	*Silene dioica*	Red campion
7.5	*Silene latifolia*	White Campion
4	*Trifolium pratense*	Red Clover
Grasses (95% of overall mix)		
4	*Alopecurus pratensis*	Meadow Foxtail
2	*Anthoxanthum odoratum*	Sweet Vernal
4	*Arrhenatherum*	Oat Grass
4	*Dactylis glomerata*	Cocksfoot
7.5	*Festuca arundinacea*	Native Fescue
4	*Festuca ovina*	Sheeps Fescue
32.5	*Festuca pratensis*	Meadow Fescue
4	*Lolium perenne*	Intermediate Perennial Ryegrass
4	*Lolium perenne L.*	Late Perennial Ryegrass
15	*Phleum pratense*	Timothy
7.5	*Poa pratensis*	Smooth Stalk Meadow Grass
7.5	*Poa trivialis*	Rough Stalk Meadow Grass

3.4.8 *Proposed Bird Cover Crop*

A mix of grassland and herbaceous planting has been specified within 4 linear areas across the Site and will be managed for the benefit of wildlife, as a source of food and shelter for birds, invertebrates, and small mammals throughout the year, specifically in the winter months. As a minimum the below species in Table 3.10 will be incorporated, however, additional planting of other species i.e., sunflowers would also be beneficial for birds, invertebrates, and small mammals.

Ground preparation is necessary to establish a clean seed bed into which the seed mix can be sown, as detailed in Section 3.2.1.

In order to establish planting:

- Seed mix will be directly sown into the prepared ground by machine or by hand at a rate of approximately 30 kg/ 1 ha as per manufacturers specification;
- Once sown, the seed should be lightly pressed into the seedbed by rolling or treading;
- Early autumn (August to mid-September) sowing is preferred because this favours species that germinate in autumn and species that require a period of cold to break their dormancy before they germinate in spring; and
- Sowing must take place when conditions are warm and moist, and so winter and drought periods must be avoided.

Table 3.10: Proposed Bird Cover Crop – LG Seeds Bumblebird

Scientific Name	Common Name
Brassica oleracea	Kale
Brassica juncea	Mustard
Camelina sativa	Gold of Pleasure
Hordeum vulgare	Winter Barley
Lotus corniculatus	Birdsfoot Trefoil
Phacelia	Phacelia
Raphanus sativus oleiformis	Fodder Radish
Trifolium hybridum	Alsike Clover
Trifolium incarnatum	Crimson Clover
Trifolium pratense	Red Clover
Triticosecale	Winter Triticale
Vicia sativa	Common Vetch

3.5 Proposed Ecology Enhancements and Management Prescriptions

Unless stated otherwise, the illustrative location of ecological enhancements and prescriptions highlighted in the following sections are identified on the Updated Landscape and Ecology Mitigation and Enhancement Plan (July 2022) (Appendix A). Where site conditions are found to have changed and it is no longer possible to locate a prescription in a given location, the prescriptions will be 'micro-sited' to the nearest suitable location. Installation of ecological prescriptions will be under the supervision of a suitably experienced ecologist.

3.5.1 *Habitat Enhancement Areas*

A Habitat Enhancement Area (HEA) will be created within the Site in an area of 13.64 ha towards the northern boundary of the Site.

The HEA will comprise grass, scrub, and tree planting, with the overall aim to strengthen the habitat connectivity between Pond 2 and Allerthorpe Common SSSI which is located immediately to the north of the Site. This will also provide suitable habitat for a range of species including GCN, reptiles, mammals, and birds (woodlark and other bird species).

GCN were recorded within Pond 5a, which is located on the western boundary of the Site. The HEA includes habitat that provide opportunities for foraging and sheltering GCN, which is considered a significant improvement to the arable land currently present. Combined with the other proposed habitat enhancements, opportunities for GCN to commute across the Site will be improved, by increasing good quality habitat availability and by improving habitat connectivity by joining up habitats of value to GCN.

Such improvements will also benefit foraging and breeding birds, mammals, and foraging/ commuting reptiles (reptiles have not been recorded within the Site itself; however, adder is known to be present within Allerthorpe Common SSSI).

3.5.2 *Badger*

Woodland, hedgerows, bracken, and tall ruderal vegetation present within the Site and on the boundary of the Site offer suitable habitats for foraging and commuting badger. The broadleaved woodland to the south and south-west of Warren House and woodland habitats which borders the Site to the north and east were also considered to provide suitable opportunities for sett creation.

Enhancements

The HEA will provide greater habitat diversity and complexity for commuting, foraging and potentially sett building opportunities. Connectivity throughout the Site, with woodland to the east and woodland in the Allerthorpe Common SSSI to the north, will be significantly improved and thus, provide greater opportunities for badger in the wider landscape.

Management Prescriptions

Mammal gates, fence under-passes or small openings (of approximately 300 mm diameter) will be installed in the perimeter fence to enable badger and other mammals (e.g., hedgehog and brown hare) to retain their existing commuting routes to off-site resources and access the newly created habitats once the Development is operational.

3.5.3 *Bats*

Woodland and hedgerows present within the Site and on the boundary of the Site offer suitable habitats for foraging, commuting and roosting bats.

Enhancements

The bat boxes will be located on trees with negligible or low bat roost potential that are being retained to offer enhanced opportunities for a range of roosting bat species such as pipistrelle *sp.,* brown long-eared, noctule and myotis *sp*. The boxes will be preferentially situated in locations that provide immediate and good quality foraging and commuting pathways for bat species such as along hedgerows, ditches, or woodland edges, to increase the potential for bat box occupancy.

The planting of new species rich hedgerows with trees, new meadow grassland and the HEA will provide stronger commuting features for bats and additional foraging resources. This represents an enhancement in bat habitat from the existing open arable field features.

Management Prescriptions

A total of 16 bat boxes comprising of an equal mix of cavity and crevice boxes such as the Schwegler 1FF and 2F designs (or a suitable alternative) are to be installed on existing trees in pairs. The affixed bat boxes are to be installed under the supervision of a suitably experienced ecologist and remain in place for the duration of the Development.

These bat boxes are to be affixed to trees at a height of approximately 3 to 5 m above ground, with a 2 m drop below the entrance hole, sheltered from strong winds and facing in a south to east direction. The boxes will be of a long lasting woodcrete construction. The open underside of the Schwegler 1FF bat box allows bat droppings to fall cleanly away from the box, so no cleaning is required, whilst the Schwegler 2F is accessible from the front for inspection by a licenced bat worker.

3.5.4 *Birds*

The existing rural landscape, with hedgerows, woodland, mature trees, and grassland field margins provide suitable habitat for a range of foraging and nesting farmland birds, including woodlark (an increasingly rare bird in the north of England, and listed under Schedule 1 of the Wildlife and Countryside Act, 1981(as amended)) that was identified on-site during bird surveys at the Site in April and June 2020. Further information on breeding birds can be found in the separate Ornithological Impact Assessment report[18].

Enhancements

Strengthening of hedgerow habitats within the Site, including use of evergreen and fruit-bearing species beneficial to birds (e.g., rowan, hawthorn, and holly, among others), will provide year-round resources for a range of bird species.

Specific habitat improvements to benefit woodlark will include:

- The HEA, located in the north of the Site, will be managed, in part, for woodlark including creation of a diverse semi-natural grassland, maintained with varied sward height); and
- Maintenance of patches of bare/disturbed ground through intermittent physical disturbance techniques, e.g., rotovating, ploughing or turf-stripping, to provide enhanced foraging areas[21,22]. Patches will be varied in location from year-to-year, within a pre-agreed area that minimises potential impacts to other ecology interests within the Site (e.g., GCN).

Nest boxes will be provided to increase the opportunities for breeding birds. These will be placed in strategic locations around the Site and targeted toward species of conservation concern to increase their conservation value. All boxes will be tree-mounted, and (excluding the barn owl box) will be made of woodcrete, or similar material, to ensure durability.

As a minimum, nest boxes will include:

- Two tree-mounted barn owl boxes, one in the north of the Site and one in the south (locations to be confirmed on-site but placed following best practice guidance23);
- Two kestrel boxes, one in the north of the Site and one in the south (locations to be confirmed on-site);
- Twenty tree sparrow boxes (28 mm hole) will be placed in two areas following best practice guidance on siting of individual boxes[24];
- Five starling boxes will be placed in suitable locations throughout the Site;
- Ten further boxes for hole nesting species (five with 28 mm hole, five with 32 mm hole) will be scattered in suitable locations throughout the Site.

Locations of tree mounted bird boxes for kestrels and barn owls will be determined on-site by a suitably experienced ecologist or ornithologist, whilst the location of all other bird boxes are identified through the Landscape and Ecology Mitigation and Enhancement Plan.

Management Prescriptions

The Schwegler 1B nest box (or suitable alternative) will be installed on trees. This nest box type will attract a wide range of species, with at least a 28 mm hole size selected to attract great, blue, marsh, coal and tree and house sparrow. The nest boxes will be attached to each tree using an aluminium nail or by hanging over a branch. Although birds will gather new nesting material at each nesting attempt, the front panel is removable for inspection and cleaning if required.

The affixed bird boxes are to be installed under the supervision of a suitably experienced ecologist or ornithologist and remain in place for the duration of the Development.

3.5.5 *GCN*

The on-site ponds, tall ruderal, hedgerow, and woodland habitat provide suitable habitat for GCN. These high value habitats will be retained throughout the Development. The existing arable land provides limited opportunities for GCN.

Enhancements

[21] Hawkes, R.W., Smart, J., Brown, A., Jones, H. and Dolman, P.M. (2019*), Experimental evidence that ground-disturbance benefits Woodlark Lullula arborea*. Ibis, 161: 447-452. https://doi.org/10.1111/ibi.12696

[22] Natural England (2019) *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. Breckland Special Protection Area (SPA)*

[23] Barn Owl Trust (2021) Guidance on Siting Boxes for Barn Owl [Online] Available at: https://www.barnowltrust.org.uk/barn-owl-nestbox/owl-boxes-for-trees/ (Accessed 13/07/21)

[24] RSPB (2021) Guidance on Siting Boxes for Tree Sparrow [Online] Available at: https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/farming/advice/helping-species/tree-sparrow/. (Accessed 13/07/21)

The HEA created in the north of the Site, will improve foraging, commuting and sheltering opportunities for GCN, providing a habitat mosaic for GCN, enhancing the variety and quality of the vegetation that is suitable to support GCN. The HEA will improve habitat connectivity between Pond 2 and Allerthorpe Common SSSI, located adjacent to the Site boundary.

Currently, GCN are restricted to the narrow linear habitat features on-site. The existing negligible-value arable habitats, where the solar panels will be installed, will be managed as native species-rich grassland (area between and beneath the solar panels), with wildflower meadow grassland managed outside of these areas.

This native species-rich grassland and wildflower meadow habitats, will be a significant enhancement to GCN, creating extensive foraging, commuting habitat, and improving connectivity across the entire Site.

Creating hibernacula/ log piles and locating these strategically across the Site will also improve sheltering and hibernating opportunities for GCN. These will be located adjacent to existing woodland and treelines. Indicative locations are shown on the Landscape and Ecology Mitigation and Enhancement plan; however, exact locations will be determined by a suitably experienced ecologist. In addition to benefitting GCN, the log piles will provide suitable shelter and overwintering sites for reptiles and invertebrates.

3.5.6 *Reptiles*

The existing arable land present limited opportunities for reptiles. Existing habitat such as the field margins, hedgerows and woodland provide suitable habitat to support basking, foraging, and sheltering reptiles. The majority of suitable habitat will be avoided and retained throughout the Development.

Enhancements

As suitable reptile habitat is currently limited to narrow linear features on-site, the conversion of arable land to managed native species-rich grassland wildflower meadows present a significant enhancement to reptiles, creating extensive foraging, commuting, basking, and sheltering opportunities.

In addition to benefitting GCN, the HEA will provide greater habitat diversity and complexity for reptiles. The planning of the shrub, tussocky and wildflower grassland will improve connectivity throughout the Site and to off-site habitats such as Allerthorpe Common SSSI, where species of reptile, including adder, has been recorded. The creation of hibernacula/ log piles within the HEA will also improve sheltering and hibernating opportunities for reptiles within the local area.

3.5.7 *Brown Hare*

Habitats within the Site were considered suitable to support brown hare. The proposed meadow grassland, hedgerow and tree belts will provide foraging and sheltering habitat therefore enhancing the area for brown hare, which favours a mosaic of arable fields, grasses, woodland edge, and hedgerows.

The Development will create a more structured environment with boundaries. Evidence suggests that this change can be beneficial to brown hare, assuming they have access to the Site, by creating a refuge with secure boundaries that provides food and shelter throughout the year. There is evidence that brown hare numbers on such sites have increased considerably[25]. To maintain connectivity for brown hare in the wider landscape, mammal gates will be installed.

[25] H. Montag, G Parker & T. Clarkson (2016) The Effects of Solar Farms on Local Biodiversity; A Comparative Study. Clarkson and Woods and Wychwood Biodiversity.

3.5.8 *Invertebrates*

The Site in its current form presented limited opportunities for invertebrates due to its largely intensive agricultural habitats. The planting of shrub, tussocky and wildflower grassland will improve opportunities and support a diverse range of invertebrate species, including pollinators.

Insect hotels and/or log piles will be installed strategically within the HEA to further attract invertebrates to the area and provide enhanced sheltering opportunities.

Insect hotels can be installed ready-made or created from natural material such as moss, brash and logs and discarded construction materials (including wooden pallets, tiles, and bricks)[26].

The log piles and insect hotels will be located adjacent to existing woodland and treelines. In addition to benefitting invertebrates, the log piles provide suitable shelter and overwintering sites for reptiles and amphibians.

Deadwood is an essential habitat for many species, especially invertebrates, bryophytes, and fungi. Removal of deadwood and 'tidying-up' leads to relatively sterile conditions and takes away an essential habitat. Where possible, all future wood from windblown sources, or arising from management operations, will also be left on-site in suitable locations in log piles or as low brash.

4 PROPOSED MANAGEMENT PRESCRIPTIONS

4.1 Overview

Proposed planting management prescriptions for landscape and ecological enhancements and mitigation are outlined below. Details on establishment monitoring and compliance assessment monitoring of habitats can be found in Section 7 of the BEMP.

4.2 Proposed Native Species Hedgerow and Hedgerow Trees

4.2.1 *5-Year Aftercare Management Prescriptions*

Plants that have failed will be replaced in the subsequent planting season to achieve at least 90% survival and maintain a gap free hedgerow to enable small mammals to disperse along the hedge line.

All shelters/guards, and stakes will be checked twice per year and secured or replaced where necessary. Shelters will be removed from all plants and will be disposed of off-site (subject to satisfactory establishment and growth) in Year 5.

A 75 mm layer of bark mulch 0.5 m either side of the centre of the hedge will be topped up annually along the length of the hedge and around hedgerow trees, to suppress competing grass/weed growth and retain soil moisture. Until established (3 - 5 years), all plants will be kept free of competing weed growth. It is likely that some pernicious weeds (e.g., thistle, ragwort, or dock) will persist following the ground preparation and can be treated by hand pulling if not too extensive or using spot treatment with a suitable herbicide if more widespread.

All plants will be re-firmed annually until sufficiently established.

Hedgerow trees should be pruned annually to maintain a clear stem.

Trees should be monitored for any pests and diseases and crossing branches/dead and dying branches should be removed.

[26] RSPB (2021) Build a Bug Hotel [Online] Available at: https://www.rspb.org.uk/get-involved/activities/give-nature-a-home-in-your-garden/garden-activities/build-a-bug-hotel/ (Accessed 15/07/21)

Hedge trimming will be undertaken outwith the bird nesting season (March to August inclusive) to encourage bushy growth and to increase its value for wildlife. Hedgerow should be maintained at a height of 3 m.

4.2.2 *Long Term Management Prescriptions*

A cutting regime will be established (Dec-Jan) on a three-year cycle, as most tree or shrub flowers are produced on year old twigs, which annual cutting removes, resulting in no flowers, or berries being produced.

Hedge trimming will be undertaken to encourage bushy growth at the base of the hedge to increase its value for wildlife. Care should be taken to avoid damage to hedgerow trees during cutting and hedgerows to be maintained at 3 m high.

No work which might harm nesting birds or destroy their nests should be undertaken between the main bird nesting period (1st March - 31st August inclusive).

4.3 Proposed Native Species Woodland and Shrub Planting

4.3.1 *5-Year Aftercare Management Prescriptions*

Plants that have failed will be replaced in the subsequent planting season to achieve at least 90% survival and maintain a gap free hedgerow to enable small mammals to disperse along the hedge line.

All shelters/guards, and stakes will be checked twice per year and secured or replaced where necessary. Shelters will be removed from all plants and will be disposed of off-site (subject to satisfactory establishment and growth) in Year 5.

A 75 mm layer of bark mulch 250 mm radius at the base of each plant will be topped up annually to suppress competing grass/weed growth and retain soil moisture. Until established (3 - 5 years), all plants will be kept free of competing weed growth. It is likely that some pernicious weeds (e.g., thistle, ragwort, or dock) will persist following the ground preparation and can be treated by hand pulling if not too extensive or using spot treatment with a suitable herbicide if more widespread.

Trees and shrubs should be monitored for any pests and diseases and crossing branches/dead and dying branches should be removed.

All plants will be re-firmed annually until sufficiently established.

4.3.2 *Long Term Management Prescriptions*

Due to the species and density of planting proposed, the mature heights of plants will be relatively low and due to the requirement to create a natural planting area, maintenance should be minimal. Beyond the first 5 years and for the duration of the Development, planting should be left to fully naturalise in shape and form adapting to the conditions of the Site.

4.4 Proposed Tussocky Grassland

4.4.1 *5-Year Aftercare Management Prescriptions*

A flush of weeds is to be expected in the first season after sowing and these can be managed by a cutting regularly within the first year. It is likely that some pernicious weeds (e.g., thistle, ragwort, or dock) will persist following the ground preparation and can be treated by hand pulling if not too extensive or using spot treatment with a suitable herbicide if more widespread.

Year 1 - The grassland will be cut up to four times to manage the flush of annuals however, will not commence until a sward is established.

From year 2 onwards once established, tussocky grassland requires minimal maintenance and should be periodically cut on a 3-year rotation during October to February to maintain a diverse structure. For wildlife, this cutting is best done on a 3-year rotation so that no more than a third of the area is cut in any one year leaving part as an undisturbed refuge.

4.4.2 *Long Term Management Prescriptions*

Periodic rotational cutting of tussock grassland every 3 years as described above to maintain a diverse structure.

Mechanical treatment or by hand methods to control invasive non-native species as required.

4.5 Proposed Native Species Rich Grassland and Wildflower Mix (EM2) - Mechanical Management

4.5.1 *5-Year Aftercare Management Prescriptions*

A flush of weeds is to be expected in the first season after sowing and these can be managed by a cutting regularly within the first year. It is likely that some pernicious weeds (e.g., thistle, ragwort, or dock) will persist following the ground preparation and can be treated by hand pulling if not too extensive or using spot treatment with a suitable herbicide if more widespread.

Year 1 - The grassland will be cut up to four times to manage the flush of annuals however, will not commence until a sward is established.

In Years 2-5, cut grass to a height of 50 mm in late July/ August after flowering, leaving arisings in situ for a period of 7 days then clear and remove from site. Cut again in October to a height of 50 mm. Carefully dig out or spot treat any residual perennial weeds such as docks as required throughout establishment.

4.6 Proposed Native Species Rich Grassland and Wildflower Mix (Habitat Aid Grazing Meadow Seed Mix) - Livestock Management

4.6.1 *Grazing Maintenance Regime (If required)*

Should grazing be adopted to maintain meadow within the Site, optimum maintenance requires a low intensity grazing regime to create varied pasture.

A stocking rate of 0.4 – 0.6 Livestock Units (LU) per ha (approximately 4 lowland sheep) would be used initially; however, this should be monitored depending on ground conditions and livestock should be removed before patches of bare earth become visible.

A grazing regime is dependent on livestock availability and is subject to ground conditions on-site; however, where a grazing regime is chosen as a grassland management approach, then the selected timing of grazing and the stocking density (i.e., LU per ha) will ensure that the proposed benefits to biodiversity will be achievable, with consideration to nesting birds and pollinating insects. This detail will be confirmed within an agreed and finalised Habitat Management Plan (HMP).

4.6.2 *Long Term Management Prescriptions*

Long term management will include ongoing monitoring of the grassland establishment and an annual hay cut to maintain the sward.

4.7 Proposed Bird Cover Crop

4.7.1 *5-Year Aftercare Management Prescriptions*

The aim of this seed mix and maintenance methodology is to provide an abundant supply of small seeds pollen and nectar-rich flowers.

In the first spring after establishment, 50 kg/ha of nitrogen should be spread to help increase seed production in the following winter.

A few centimetres below the tops of the flowering plants should be cut in the spring of the second year to remove any overwinter seed plants. This cutting allows flowering plants to develop with less competition.

The seed bed should be cleared and cultivated by machine or by hand biennially and the seed mix re-sown between August and mid-September, at an overall seed rate of around 30 kg/ha and retained for two years before re-establishment.

4.7.2 *Long Term Management Prescriptions*

Long term management prescriptions should follow that described in section 4.7.1 and be repeated throughout the life of the Development.

4.8 Himalayan Balsam Management

Himalayan balsam is present within woodland and ditches adjacent Warren House. Himalayan balsam may have the potential to impact other plants by:

- Outcompeting native plants with similar habitat preferences;
- Leaving ditch banks exposed to erosion following winter dieback;
- Increased risk of flooding in summer due to constricted water flow, siltation of water courses and increasing bank instability; and
- Attracting pollinators away from native species.

Due to the limited extent of Himalayan balsam within the Site and location within the riparian corridor, hand pulling of individual plants will be undertaken to remove the plants from the Site, where possible. Where hand pulling is not practicable, mechanical removal such as cutting, or strimming may be undertaken. Due to the sensitivity of the ditch network, chemical treatments should be avoided. Management will entail the following:

- Hand pulling to be undertaken on an annual basis prior to seed formation between March and June for five years following completion of the Development. Himalayan balsam has a relatively small, shallow root network which is easily pulled out with the rest of the plant if the plant is pulled firmly from the base;
- Within the first year of management, follow up monitoring in the same growing season to deal with any regrowth (e.g., post-cutting) or plants missed in the initial treatment;
- Pulled plants should not be placed on soil or in damp areas as they can readily re-root. Arisings will be retained onsite (e.g., bunded or buried as per Defra guidance with permission from the Environment Agency[27]) whenever possible and only disposed of off-site as a last resort;
- Re-vegetation of cleared soils with suitable native species; and
- After five years, monitoring with follow up treatment, when necessary, will be maintained until at least one year has passed with no Himalayan balsam growth.

[27] UK Government (2019) Stop Invasive Non-Native Plants from Spreading [Online] Available at: https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants (Accessed 13/07/21)

5 MAINTENANCE SCHEDULE

Table 5.1: Landscape Maintenance Schedule[28]

Operation	Target	Frequency Per Annum	Season	Y1	Y2	Y3	Y4	Y5	Y6 Onwards
Hedgerow Tree and Woodland Planting	Hedgerow Trees 100% establishment Woodland 100% establishment								
Inspect and formative prune in accordance with good Arboricultural practice to BS 3998:2010. Maintain a clear stem for all hedgerow trees annually after Year 3 in order for hedgerow trees to be distinguishable.		1	Nov - Mar	✓	✓	✓	✓	✓	Ongoing
Replace dead or dying trees.	Next available planting season	1	Nov - Mar	✓	✓	✓	✓	✓	
Check ties and stakes, and remove if no longer required.	As necessary	2	-	✓	✓	✓	✓	✓	
Maintain full thickness of bark mulch (75 mm).	Maintain bark mulch to suppress weeds	Biennially	-		✓		✓		
Keep planting clear of weeds by hand pulling if not too extensive or using spot treatment with a suitable herbicide if more widespread.	Maintain weed free area at the base of each tree	1-2	Apr-Aug	✓	✓	✓	✓	✓	
Establishment monitoring and compliance assessment monitoring visit by landscape architect/suitably experienced ecologist	Maximise species biodiversity in line with Biodiversity Net Gain requirements		May/June	✓	✓	✓	✓	✓	✓
Hedgerow Planting	Vigorous and healthy establishment without gaps and bushy base								
Keep planting clear of weeds by hand pulling if not too extensive or using spot treatment with a suitable herbicide if more widespread.	Maintain weed free area at the base of hedgerow planting.	1-2	-	✓	✓	✓	✓	✓	

[28] Please refer to Table 4.1 if a grazing regime is adopted as an alternative to mechanical maintenance within the extent of the Site.

Operation	Target	Frequency Per Annum	Season	Y1	Y2	Y3	Y4	Y5	Y6 Onwards
Maintain full thickness of bark mulch (75 mm).	Maintain bark mulch to suppress weeds	Biennially	-		✓		✓		
Replacement of dead stock.	Next available planting season	1	Nov	✓	✓	✓	✓	✓	
Formative prune to achieve required hedge height and form, generally 2 - 3m across the Development.	To achieve required height and form	Cut on a three-year cycle.	Jan-Feb		✓	✓	✓	✓	Ongoing on a 3-year cutting cycle across the Site
Maintain depth of loose bark mulch.	75 mm depth minimum	1	-	✓	✓	✓	✓	✓	
Shrub Planting	Vigorous and healthy establishment								
Keep planting clear of weeds by chemical/ mechanical control.		1-2	-	✓	✓	✓	✓	✓	
Replacement of dead stock.	Next available planting season	1	Nov	✓	✓	✓			
Tussock Grassland	Vigorous and healthy establishment								
Year 1, post seeding, mow 4 times per year to maintain a minimum height of 40- 60mm	A heathy, dense sward	4	April – October	✓					
Year 2 onwards cut to 100 mm minimum every 3 years, between October and February. Cutting to be done on a 3-year rotation, cutting 1/3 of area each year. Remove arisings.	Reduce soil fertility and encourage diverse sward	1	July/August & October		✓		✓		✓
Establishment monitoring and compliance assessment monitoring of grass growth and species and review cutting regime.	Maximise species biodiversity in line with Biodiversity Net Gain requirements			✓	✓	✓			

Operation	Target	Frequency Per Annum	Season	Y1	Y2	Y3	Y4	Y5	Y6 Onwards
Control of pernicious weeds	Maintain a weed-free sward			✓	✓		✓		✓
Native Grassland and Wildflower Mix	Vigorous and healthy establishment								
Year 1, post seeding, mow 4 times per year to maintain a minimum height of 40 - 60mm	A heathy, dense sward	4	April – October	✓					
Year 2 onwards cut biannually in late August and October. After flowering in July or August take a hay cut to a height of 100 mm. Leave for 1-7 days to dry and remove. Cut again in October to a height of 100 mm.	Reduce soil fertility and encourage diverse sward	1	July/August & October		✓	✓	✓	✓	✓
Establishment monitoring and compliance assessment monitoring of grass growth and species and review cutting regime.	Maximise species biodiversity in line with Biodiversity Net Gain requirements			✓	✓	✓	✓	✓	✓
Control of pernicious weeds	Maintain sward			✓	✓	✓	✓	✓	
Bird Crop Cover	Vigorous and healthy establishment								
Year 2 onwards clear, cultivate and re seed every 2 years, between August and September.	Maintain dense planting and food resource	1	August/ September		✓		✓		✓
Spread nitrogen at a rate of 50 kg/ha. Cut a few centimetres below the tops of the flowering plants in the spring of the second year to remove any overwinter seed plants.	Maintain dense planting and food resource	Biennially	March-May		✓		✓		✓
Monitoring growth and species				✓	✓	✓	✓	✓	✓
Control of pernicious weeds	Maintain a weed-free planting			✓	✓		✓		✓

Operation	Target	Frequency Per Annum	Season	Y1	Y2	Y3	Y4	Y5	Y6 Onwards
All Areas									
Invasive non-native species to be controlled by hand pulling or mechanical means.	Eradication where practicable	As required	Apr-Sept	✓	✓	✓	✓	✓	ongoing as required

6 MANAGEMENT RESPONSIBILITY

It is assumed that the Applicant is responsible for the funding and implementation of the proposed mitigation and enhancements. The Applicant is also responsible for the long-term maintenance and management for the duration of the operational period of the Development.

7 MONITORING WORKS

7.1 Monitoring Visits and Identifying Plant failures

7.1.1.1 General Planting Monitoring

To ensure a reasonable level of establishment, newly planted areas of the Site should be monitored biannually each year and maintained for a period of 5 years following completion of planting works.

Any shrubs, hedgerow plants and trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification during the next available planting season (November to March).

This replacement policy may change if certain species are regarded as being unsuccessful or become commercially unavailable and will be replaced with more successful or readily available species.

Where persistent failures occur, revised planting locations may be considered in agreement with relevant consultees, such as East Riding of Yorkshire Council.

7.1.1.2 Compliance Assessment Monitoring

Beyond the establishment monitoring within the initial first five years, compliance assessment monitoring will be completed periodically for each habitat type within the time period to meet the target condition specified within the Defra Metrics Biodiversity Net Gain spreadsheet. Compliance assessment monitoring will be in line with Natural England guidance documents. Following monitoring visits, compliance will be reported to East Riding of Yorkshire Council, with corrective actions taken and detailing approach taken to remedy non-compliance, such that target condition can be achieved for each habitat type and appropriate net gain is achieved.

7.1.1.3 Grassland / Brid Crop Monitoring

A suitably experienced ecologist or ornithologist will visit the Site in spring (May) and summer (July/August) in Year 1 to check the establishment of seed mix and weeds. Assuming that the seed mix has established successfully after Year 1, a suitably experienced ecologist or ornithologist will visit the site in late spring (May) in Years 2, 3 and 5 to assess the success of management prescriptions.

Any remedial actions will be communicated to the Applicant and relevant consultees at the earliest opportunity.

7.2 Ecology Monitoring Visits

7.2.1 *Bat box Inspection Monitoring*

To monitor the efficacy of the bat box installations, it is proposed that bat boxes are monitored during late spring or summer by a bat licenced ecologist annually within the first 5 years of the Development to confirm use.

Should the bat boxes not have evidence of use by roosting bats after this time, it is recommended that the location of the bat boxes be re-evaluated, and alternative locations considered.

When the bat boxes are inspected for bat presence, the condition of the bat boxes can be examined and where bats are absent and there is no material obstructing access or restricting the interior volume of the box, it can be relocated to another suitable location.

7.2.2 *Bird box Inspection Monitoring*

To monitor the efficacy of the bird box installations, it is proposed that bird boxes are monitored during late spring or summer by a suitably experienced ecologist or ornithologist annually within the first 5 years of the Development to confirm use.

Should the bird boxes not have evidence of use by nesting birds after this time, it is recommended that the location of the bird boxes be re-evaluated, and alternative locations be considered.

When the bird boxes are inspected for bird nesting, the condition of the bird boxes can be examined and where birds are absent and there is no material obstructing access or restricting the interior volume of the box, it can be relocated to another suitable location.

8 CONCLUSION

The proposed mitigation and enhancements created because of the Development will increase species diversity with a range of wildflowers and grasses on land which is currently a monoculture used for crops.

Native wildflower grass planting will encourage a diverse range of invertebrates creating increased foraging opportunities for bats and reptiles. Areas of a longer sward (e.g., grass verges) will also be beneficial for sheltering reptiles and small mammals.

Proposed shrub and hedge planting will deliver a diverse range of pollen, nectar, berries, and shelter resources throughout the year, benefitting multiple protected species (e.g., foraging bats, nesting and foraging birds, and providing shelter to reptiles and small mammals).

Overall, the enhancements proposed as part of the Development will see the creation of ecological features and habitats that will complement those already existing within the Site.

The prescriptions and management actions recommended for each of the proposed habitats to be created (or retained) within the BEMP, will be subject to compliance assessment monitoring, which will ensure the successful establishment of each habitat type can be measured against the time to achieve target condition and that biodiversity benefits are in line with those proposed within the Defra Metrics Biodiversity Net Gain spreadsheet.

Enhancements for protected species will be achieved and species protected within the Development during construction, provided that the mitigation within the Non-Licenced Method Statement (NLMS)[29], Ecological Impact Assessment[16] and Construction and Environmental Management Plan (CEMP)[19] is followed.

As a result of the updates to the Development, the habitats introduced have increased in value (in comparison to the November 2021 layout) in terms of mixed native species hedgerow, native deciduous woodland, tussock grassland and the size of the HEA. There is a very slight reduction in the number of proposed native species hedgerow trees, native shrub mix, bird cover crop and native species grassland and wildflower meadow. Please note all prescription quantities and mixes are approximate measures, and may be subject to exchange with similar where there are shortages of supply.

[29] Arcus (2022) *Soay Solar Farm and Greener Grid Park: Great Crested Newt Non-Licenced Method Statement*

As a result of the updated to the Development, the overall conclusions of the BEMP remain unchanged from those presented in the original BEMP (November 2021).

APPENDIX A – UPDATED LANDSCAPE AND ECOLOGY MITIGATION AND ENHANCEMENT PLAN (JULY 2022)

N

Allerthorpe Woods

Habitat Enhancement Area

Tank Plantation

A

B

C

E

F

G

H

I

J

K

L1

L2

M1

M2

N3

O

P

Q

Common Lane

Warren Wood

Warren House

Brickpit Plantation

Existing Use to Continue

Existing Use to Continue

National Grid Substation

Existing Use to Continue

Thornton

KEY

- Planning Application Boundary
- Existing Overhead 66kV Powerline
- Existing Overhead 400kV Powerline
- 9m Buffer of Existing Overhead 66kV Powerline
- 14m Buffer of Existing Overhead 400kV Powerline
- Existing Track To Be Retained
- Existing Public Rights of Way
- Existing Trees/ Hedgerows To Be Retained
- Existing Trees/ Hedgerows To Be Removed
- Existing Trees/ Hedgerows RPA
- Existing Grass Verge To Be Retained
- Existing Drainage Ditch
- Existing Pond
- Habitat Enhancement Area
- Proposed Native Species Tree
- Proposed Native Species Hedgerow
- Proposed Native Species Woodland Mix
- Proposed Native Species Shrub Planting
- Proposed Mixed Native Scrub Planting within Tucksock Grassland Mix
- Proposed Native Speceies Grass and Meadow Mix Suitable for Sheep Grazing if required (located around and under solar panels)
- Proposed Native Species Grass and Wildflower Meadow Mix
- Proposed Tussock Grassland
- Proposed Track
- Proposed Fence
- Proposed Entrance Gate
- Proposed Half Solar Panel
- Proposed Full Solar Panel
- Proposed Inverter / Transformer
- Proposed CCTV
- Proposed Scrape
- Proposed Hibernacula
- Proposed Bird Crop Cover Strips
- Proposed SuDS Pond
- Proposed Bat Box Location
- Proposed Mammal Gate Location
- Proposed Tree Sparrow Box Location
- Proposed Starling Box Location
- Proposed Boxes for Hole Nesting Species Location

NOTES:

1. All locations of proposed bird / bat boxes and mammal gates to be micro sited on site by a qualified ecologist.
2. For detail of BESS refer to drawing 4259-DR-P-0001.

REVISION SCHEDULE

Rev	Date	Description
A	05.07.22	Revised HEA boundary (WM)

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. ALL DIMENSIONS , CHANGES, LEVELS AND COORDINATES ARE IN METERS UNLESS DEFINED OTHERWISE.
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GRID REFERENCE: SE 764464

PROJECT: Soay Solar Farm and Greener Grid Park

TITLE: Landscape and Ecology Mitigation and Enhancement Plan

CLIENT: Statkraft UK

DATE: 24.06.22 SCALE: 1:3000@A0

DRAWN: WM DRAWING NO.: 5052-DR-LAN-101

CHECKED: CH REVISION: A

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