ECOLOGICAL APPRAISAL REPORT

SOUTHLANDS SOLAR FARM AND BATTERY STORAGE
LAND SOUTH OF RUNWELL ROAD (A132), RUNWELL, WICKFORD
P19-EAR OCTOBER 2022

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1 INTRODUCTION

1.1 Background

1.1.1 This report has been prepared by Avian Ecology Ltd. on behalf of Enso Green Holdings J Limited and provides an assessment of ecological effects in relation to a proposed installation of a solar farm (the 'Proposed Development') on land south of Runwell Road (A132), Runwell, Wickford.

1.1.2 The preliminary Site boundary (the 'Preliminary Site') has subsequently been updated and the latest layout is reflected within this report (termed 'the Site'), as illustrated on the Site Location Plan (**Figure 1**). The underground cable route has not been included within this Report.

1.2 Site Overview

1.2.1 The Site, as shown by the red-line boundary in **Figure 1**, is situated on land south of Runwell Road (A132) and, approximately 375m north east of Runwell. The Site consists of a mix of arable and pastoral grassland fields bounded by hedgerows. A wet ditch bisects the Site and the River Crouch is located to the south.

1.2.2 The wider landscape consists of agricultural land, built up urban areas and small pockets of woodland.

1.3 Scope of the Assessment

1.3.1 The objectives of the assessment are to:

- Provide baseline information on the current habitats and ecological features both within the Site and immediate surrounding area;
- Identify the proximity of any designated sites for nature conservation interest and provide an assessment of any potential effects the Proposed Development may have on these;
- Identify the presence or potential presence of any protected species or habitats and provide an assessment of any potential effects the Proposed Development may have on these; and,
- Provide recommendations for further pre-construction checks and / or mitigation measures, if required, and provide an outline of proposed habitat enhancements.

1.3.2 The report is based on a desk-based review of existing ecological information, an extended habitat survey, breeding bird surveys and great crested newt *Triturus cristatus* (GCN) eDNA survey.

1.4 Legislative Framework, Planning Policy and Guidance

1.4.1 Reference has been made to the following key pieces of legislation, planning policy and guidance listed in **Table 1.1**.

Table 1.1: Key legislation, planning policy and guidance.

International
• Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (hereafter referred to as the 'the Ramsar Convention); • Convention on the Conservation of European Wildlife and Natural Habitats 1979 (hereafter referred to as the 'the Bern Convention'; and,

• UNESCO convention on the protection of the World Cultural and Natural Heritage (1972).
National
• The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[1]; • The 'Conservation of Habitats and Species Regulations 2017 (as amended); • The Wildlife and Countryside Act 1981 (as amended); • The Environment Act 2021[2]; • Infrastructure Act 2015; • Countryside and Rights of Way Act 2000; • The Invasive Alien Species (Enforcement and Permitting) Order 2019[3]; • Protection of Badgers Act 1992; • Hedgerow Regulations 1997; • Natural Environment and Rural Communities (NERC) Act (2006); • The National Planning Policy Framework 2 (NPPF2, 2021)[4]; • European protected species policies for mitigation licences (Natural England. 2022)[5]; • 'Birds of Conservation Concern 5' (Stanbury *et al*., 2021)[6] ; • The United Kingdom Biodiversity Action Plan (UK BAP); • The Bat Conservation Trust – Bat Surveys for Professional Ecologists; Good Practice Guidelines (3rd Ed.). (Collings et al., 2016)[7] • BS 42020:2013 Biodiversity – Code of Practice for Planning and Development; and, • BS 8683:2021 Process for designing and implementing Biodiversity Net Gain; and, • Biodiversity Net Gain. Good practice principles for development[8].
Local
• Essex Biodiversity Action Plan[9]

1.4.2 The Conservation of Habitats and Species Regulations 2017 (as amended) remains in place following the United Kingdom's (UK's) withdrawal from the European Union (EU) with only relatively minor changes coming into force on 31st December 2020, with the 2017 regulations being transposed into national (England and Wales) legislation via the Conservation of Habitats and Species Amendment (EU

[1] https://www.legislation.gov.uk/uksi/2019/579/contents/made
[2] https://services.parliament.uk/Bills/2019-21/environment.html
[3] https://www.legislation.gov.uk/uksi/2019/527/introduction/made
[4] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[5] https://www.gov.uk/guidance/european-protected-species-policies-for-mitigation-licences#policy-1-reduce-mitigation-measures-for-impacts-on-eps
[6] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114, pp. 723-747.
[7] Collins et al. (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd edition, BCT: London
[8] https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development-a-practical-guide/
[9] https://www.braintree.gov.uk/downloads/file/2436/e47-the-essex-biodiversity-action-plan-1999

Exit) Regulations 2019 which came into force on 31st December 2020. They are hereafter referred to as the 'Habitats Regulations'.

1.4.3 The 'UK Post-2010 Biodiversity Framework' succeeds the UK Biodiversity Action Plan (UK BAP) and 'Conserving Biodiversity – the UK Approach'. The lists of priority species and habitats agreed under UK BAP still form the basis of much biodiversity work and are therefore considered within this report in the context of the objectives of the Biodiversity Framework. BAPs identify habitats and species of nature conservation priority on a UK (UK BAP) and Local (LBAP) scale. UK BAPs formed the basis for statutory lists of priority species and habitats in England under Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006, and so are also relevant in the context of this legislation.

1.4.4 This report is provided in accordance with the provisions of British Standard 42020:2013 Biodiversity: *Code of practice for planning and development*.

2 METHODOLOGY

2.1 Desktop Study

2.1.1 A desk study was undertaken to identify existing information on the presence of designated sites for nature conservation, protected and notable species and habitats within proximity to the Site/Preliminary Site as follows:

- Non-statutory designated sites for nature conservation within 5km of the Site;
- Statutory designated sites for nature conservation, within 10km of the Site; and,
- Existing records of protected and notable faunal species, within 2km of the Preliminary Site (dated within the last 10 years).

2.1.2 The following key sources were consulted:

- Natural England and Joint Nature Conservation Committee (JNCC) websites[10];
- The Multi Agency Geographic Information for the Countryside (MAGIC) website[11];
- Woodland Trust Ancient Tree Inventory[12] and,
- Essex Field Club[13].

2.1.3 Reference was also made to Ordnance Survey maps of the wider area and online aerial images (www.google.co.uk/maps) in order to determine any features of nature conservation interest in the wider area, including potential ponds.

2.2 Field Survey

Extended Habitat Survey

2.2.1 An extended habitat survey of the Site was undertaken on the 14th and 15th June 2022 by K Ward *MSc* and L Quarton *MSc* both suitably experienced ecologists. The area is presented in **Figure 1.**

2.2.2 The survey methodology followed UK industry standard UKHab[14] Methodology, with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM), Technical Guidance Series 'Guidelines for Preliminary Ecological Appraisal, 2nd Edition' (CIEEM, 2017)[15.]

2.2.3 Habitats within and immediately adjacent to the Site as well as those within the Preliminary Site were mapped and described using a series of 'target notes' (TNs), to provide an overview of the study area. The survey was extended to include the additional recording of specific features indicating the presence, or likely presence, of protected species, invasive species and other species of conservation significance.

[10] http://jncc.defra.gov.uk/
[11] https://magic.defra.gov.uk/MagicMap.aspx
[12] https://ati.woodlandtrust.org.uk/
[13] https://www.essexfieldclub.org.uk/portal.php
[14] www.ukhab.org
[15] CIEEM. (2019). *Guidelines for Preliminary Ecological Appraisal, 2nd edition*. Chartered Institute of Ecology and Environmental Management, Winchester.

Breeding Bird Surveys

2.2.4 Detailed breeding bird survey methodologies and full results are presented as **Appendix 1**: *Breeding Bird Survey Report.*

2.2.5 Three breeding bird surveys were undertaken in April, May and July 2022 by J Hanlon, an experienced ornithologist. The study area for the breeding bird survey was the Preliminary Site and 100m buffer to include adjoining habitats (for example hedgerows and tree-lines along Site boundaries).

2.2.6 The methodology employed was based upon a scaled-down version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) technique, as detailed in Gilbert *et al*. (1989[16]). All bird registrations were recorded on suitably scaled field maps using standard BTO species codes and behaviour notations (such as singing, carrying food, active nest). The approximate locations of bird territories within the Site were determined using standard territory mapping techniques to identify and isolate areas within which birds consistently displayed breeding behaviours (following Gilbert *et al*. 1998).

2.2.7 For the purposes of the assessment, although the estimated number of breeding territories for all species is provided, only the breeding territories of notable species are mapped, given these are the most relevant species to the assessment. Notable species consist of Birds of Conservation Concern (BoCC) 'amber' and 'red' list species ((Stanbury et al. 2021[17]), Annex 1/Schedule 1[18] raptors and owls and Local Biodiversity Action Plan (LBAP) species.

Great Crested Newt Presence/Absence Survey (eDNA)

2.2.8 Potential ponds which could be used by GCN for breeding, if present and suitable, were identified within a 250m radius of the Preliminary Site using OS and aerial mapping.

2.2.9 A total of eight ponds (P1-P8) were identified within 250m of the Preliminary Site, although none were found to be present directly on-Site. Pond locations are shown on **Figure 4.**

2.2.10 One pond P7 in the wider area was accessed during June 2022. It was assessed for its suitability to support GCN using the Habitat Suitability Index (HSI) Assessment methodology as developed by Oldham *et al*. (2000[19]) and as detailed within ARG UK guidance (ARG UK, 2010[20]). Pond P7 was also subject to eDNA survey sampling to determine the presence or likely absence of GCN.

2.2.11 Detailed survey methodologies and full results are presented as **Appendix 2**: *Great Crested Newt Presence/Absence (eDNA) Survey Report.*

[16] Gilbert, G., Gibbons, D.W & Evans, J. (1998) *Bird monitoring methods*. A manual of techniques for key UK species. RSPB.
[17] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D. & Gregory, R.D (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds* 108, 708–746.
[18] Annex 1 – species listed on Annex 1 of the EC Directive 2009/147/EC of the European Parliament on the conservation of wild birds and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).
[19] Oldham R.S., Keeble J., Swan M.J.S. and Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal, 10(4), pp. 143-155.
[20] ARG UK (2010) ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.

Limitations to Field Survey

Extended Habitat Survey

2.2.12 The extended habitat survey does not constitute a detailed botanical survey or a full protected species survey but, it enables competent ecologists to ascertain an understanding of the ecology of the study area in order to:

- Broadly identify the nature conservation value of a study area and assess the significance of any potential impacts on habitat/species recorded; and/or,
- Confirm the need and extent of any additional specific ecological surveys that are required to further establish the nature conservation value of the study area (if any).

Breeding Bird Surveys

2.2.13 No survey limitations were experienced.

Great Crested Newt (GCN)

2.2.14 Access to two of the ponds that had not been discounted due to barriers, (P5 & P8) was not possible at the time of survey, full details can be found in **Appendix 2.**

3 BASELINE

3.1 Designated Sites for Nature Conservation

Statutory Designated Sites

3.1.1 A review of MAGIC confirmed that the Site is not located within any statutory designated sites for nature conservation.

3.1.2 The search identified four nationally designated statutory sites within a 5km radius of the Site, consisting of two Sites of Special Scientific Interest (SSSI) and two Local Nature Reserves (LNR). There were six internationally designated sites consisting of three Special Protection Areas (SPA), two Ramsar sites and one Special area of Conservation (SAC) within a 10km radius of the Site as described in **Table 3.1** and shown in **Figure 2**.

Table 3.1: Statutory designated sites for nature conservation within 5km.

SSSI: *Site of Special Scientific Interest,* ***LNR:*** *Local Nature Reserves,* ***SPA:*** *Special Protection Areas****, SAC:*** *Special area of Conservation*

Designated site name	Designation	Approximate distance and direction	Description
Essex Estuaries	SAC	1.51km north west	The Site is designated for its estuarine and coastal habitats as well as species they support such as Spartina swards (*Spartinion maritimae).*
Crouch and Roach Estuaries	SSSI	1.51km north west	The Crouch and Roach Estuaries SSSI regularly support internationally important numbers of one species, and nationally important numbers of three species of wader and wildfowl. Additional

Designated site name	Designation	Approximate distance and direction	Description
			interest is provided by the aquatic and terrestrial invertebrates and by an outstanding assemblage of nationally scarce plants.
Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	SPA	1.51km north west	Conservation objectives include; dark-bellied brent goose *Branta bernicla* (non-breeding) and waterbird assemblages.
Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Ramsar	1.51km north west	Designated features include; dark-bellied brent goose, winter waterbird assemblage, wetland invertebrate assemblage and wetland plant assemblage.
Hanningfield Reservoir	SSSI	3.41km east	Hanningfield Reservoir is the second largest reservoir in Essex, situated about 5 miles south of Chelmsford. Its main scientific interest lies in its breeding and wintering wildfowl. These include nationally important numbers of Gadwall *Mareca strepera*. With other breeding and overwinter populations including pochard *Aythya ferina*, shoveler *Spatula clypeata,* teal *Anas crecca* and tufted duck *Aythya fuligula*.
Fenn Washland	LNR	3.5km east	This wetland reserve consists of newly created reedbed, marsh and ponds. The drained marshes comprise of many rare plants including sea barley *Hordeum marinum* and grass vetchling *Lathyrus nissolia* and are an important feeding ground for hundreds of over-wintering birds, including Brent geese.
Kendall Park	LNR	3.52km east	Natural Woodland set on the River Crouch which is attractive to a variety of birds, frogs, toads and plant life.
Benfleet and Southend Marshes	Ramsar	8.61km south	Designated features include; dark-bellied brent goose, grey plover *Pluvialis squatarola,* knot *Calidris canutus* and water bird assemblage.
Benfleet and Southend Marshes	SPA	8.61km south	Conservation objectives include; Ringed plover *Charadrius hiaticula* (non breeding), dark-bellied brent goose (non-breeding), grey plover (non-breeding), Red knot (non-breeding) and Dunlin *Calidris alpina* (non-breeding).
Outer Thames Estuary	SPA	9km east	Conservation objectives include common tern *Sterna hirundo* (Breeding), little tern, *Sterna*

Designated site name	Designation	Approximate distance and direction	Description
			albifrons (Breeding), red-throated diver *Gavia stellata* (non-breeding).

Non-statutory designated sites

3.1.3 A review of information requested from the Essex Field Club identifies that the Site is not located within any Essex Local Wildlife Sites (LOWS).

3.1.4 The data search returned four LOWS within 2km of the Site, with the closest site Rettendon Shaw located 890m north from the Site as described in **Table 3.2** and shown in **Figure 3**. Descriptions of the LOWS's were not provided by Essex Field Club.

Table 3.2: Non Statutory Designated Sites within 2km.

Designated site name	Designation	Approximate distance and direction	Description
Rettendon Shaw	LOWS	890m north	No information.
Gorse Wood	LOWS	1.1km north	No information.
Pitfield Shaw	LOWS	1.45km north	No information.
Moorgarden Wood	LOWS	1.75km north west	No information.

3.2 Existing Records of Priority Habitats

3.2.1 No habitats of Principal Importance (also known as priority habitat) under Section 42 of the NERC Act 2006 (NERC) and/or listed on the UKBAP are located within the Site. Review of the data provided by The Essex Field Club together with information sourced from MAGIC found six priority habitats were located within 2km of the Site.

3.2.2 Information on priority habitats within 2km of the Site is presented in **Table 3.3** below. Where numerous records of a particular habitat were recorded, only the closest record to the Site has been provided, in order to provide context for the Site and surrounding area.

Table 3.3: Priority habitats within 500m identified from MAGIC and Site habitat survey.

Priority Habitat Name	Designation	Approximate Distance from Site
Deciduous Woodland	UKBAP	Adjacent to the south
Coastal and floodplain grazing marsh	UKBAP, LBAP	250m west
Coastal saltmarsh	NERC S.41, UKBAP	440m east

Mudflats	NERC S.41, UKBAP	450m south east
Wood pasture and Parkland	UKBAP	480m west
Traditional orchards	NERC S.41, UKBAP	500m north east

Key:

NERC S.41: Natural Environment and Rural Communities (NERC) Act Section 41

UKBAP: UK Biodiversity Action Plan Priority Habitat

LBAP: Essex Local Biodiversity Action Plan Priority Habitat

3.3 Habitat Survey

3.3.1 This section should be read in conjunction with the Habitat Plan presented as **Figure 4,** target note descriptions in **Table 3.4** and photographs in **Appendix 5**.

3.3.2 The Site is dominated by of a number of arable and pastoral modified grassland fields with areas of scattered scrub. Field boundaries are dominated by a network of hedgerows and a ditch which flows through the centre of the Site. Small pockets of woodland are present adjacent to the Site.

3.3.3 The modified grassland present to the north and east of the Site are dominated by rye grass *Lolium sp.* with white clover *Trifolium repens*, red clover *Trifolium pratense,* black medic *Medicago lupulina* and horsetail *Equisetum sp*. The grassland to the south of the Site had a mosaic of ruderal and scrub species transitioning into an area of dense scrub. The grassland was dominated by false oat grass *Arrhenatherum elatius* with cocks foot *Dactylis glomerata,* meadow grass *Poa*, creeping cinq foil *Potentilla reptans,* oxeye daisy *Leucanthemum vulgare*, thistle *Cirsium sp.*, St Johns wort *Hypericum sp.,* teasle *Dipsacus sp.,* hemlock *Conium maculatum,* plantain, yarrow *Achillea millefolium* and areas of scattered bramble *Rubus sp.* scrub. The area of dense scrub consisted of dense blackthorn *Prunus spinosa*, scattered bramble, immature ash *Fraxinus excelsior* and elder *Sambucus nigra*.

3.3.4 A small area of grassland is present between the arable fields to the west of the Site. The species consisted of goat rue *Galega officinalis*, false oat grass, bristly ox tongue *Helminthotheca echioides*, creeping buttercup *Ranunculus repens*, rye grass, crested dogs tail *Cynosurus cristatus*, black medick, thistle, reeds, ribwort plantain *Plantago lanceolata* and hemlock.

3.3.5 The arable fields to the south and west of the Site were planted with peas at the time of the survey. At the north east of the Site is a fallow field which at the time of the survey was approximately 80% bare earth with scattered species consisting of bristly ox tongue, black medic, scarlet pimpernel *Anagallis arvensis,* teasle, red clover, yarrow, clover and limited amounts of Yorkshire fog *Holcus lanatus* and false oat grass. The arable field margins were modified grassland with a short patchy sward.

3.3.6 The fields were bounded primarily by species poor hedgerows, the majority of which were intact and lines of trees varying in composition. The woody hedgerow species present consisted of blackthorn, elder, oak *Quercus*, field maple *Acer campestre*, hawthorn *Crataegus monogyna*, dog rose *Rosa canina*, elm, ash, apple *Malus sp.* and hazel *Corylus avellana.* The trees species within the Site consisted of ash, oak, horse chestnut *Aesculus hippocastanum*, sycamore *Acer pseudoplatanus*, apple and field maple. The hedgerows varied between 1m to 5m in height and 0.5m to 2.5 min width.

3.3.7 A ditch runs from north to south through the centre of the Site. This is split into sections, D1 is the northern section of the ditch and was dry at the time of the survey. Section D2 was also dry and flows alongside a line of trees. The ditch then becomes wet after it has culverted under a access track, section D3. The ditch when wet was static and banks of the ditch are steep, approximately 2m deep and 1.5m wide. The vegetation was dominated by bramble and nettles with a line of trees running along the eastern bank consisting of hawthorn, willow *Salix sp.* and elder. Another watercourse, the River Crouch is situated to the south of the Site.

Table 3.4: Target Notes

Target Note (TN*)	Description
TN1	A line of stacked tires running along the fence line, offer suitable reptile basking opportunities.
TN2	A shooting hide within a dry ditch. There were no features for bats and is considered to have negligible bat roost potential.
TN3	Himalayan balsam *Impatiens glandulifera* along river bank to the south of the Site.

3.4 Protected and Notable Species

Birds

3.4.1 The data provided by the Essex field club returned recent records of 175 different bird species within 2km of the Preliminary Site.

3.4.2 Of these, 27 Schedule 1 (Wildlife and Countryside Act 1981 (as amended), 14 Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act (2006), 87 red listed 'Birds of Conservation Concern' (BoCCs)[21]and 44 amber BOCC were identified within 2km of the Preliminary Site.

3.4.3 The arable and grassland habitats within the Site provide limited potential for ground nesting birds with the most suitable habitats restricted to the hedgerows, tree lines and woodland bounding the Site.

3.4.4 The breeding bird assemblage recorded within the Site is representative of typical farmland habitats, predominantly comprising common and widespread species. The Notable Species breeding assemblage was typically associated with vegetation along field boundaries, principally hedgerows and trees.

3.4.5 Ground nesting Notable Species which use open fields within the Site consisted of skylark and yellow wagtail.

[21] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114, pp. 723-747.

3.4.6 A total of 24 species were recorded as showing breeding behaviour within the Survey Area, including 12 Notable Species. All breeding species recorded along with an estimated number and indicative locations of territories are detailed in **Appendix 1**.

Bats

3.4.7 The data provided by the Essex Field club returned 333 recent records of bats including 8 species within 2km of the Preliminary Site. These species include; common pipistrelle *Pipistrellus pipistrellus*, brown long-eared *Plecotus auratus*, Daubentons bat *Myotis daubentonii*, noctule *Nyctalus noctule*, serotine *Epstesicus serotinus*, soprano pipistrelle *Pipistrellus pygmaeus,* whiskered bat *Myotis mystacinus,* Nathusius pipistrelle *Pipistrellus nathusii* as well as unidentified pipistrelle species, long-eared bat species and unidentified bat species. The closest record was located approximately 200m southwest from the Preliminary Site and the majority of records were recorded 825m north west of the Preliminary Site, in a housing estate.

3.4.8 Results from a search of MAGIC showed two European Protected Species licenses have been granted within 2km of the Preliminary Site for bats; licences related to common pipistrelle, brown long-eared bat and soprano pipistrelle issued between 2013 and 2023 (Natural England licence references EPSM2021-5006 and 2018-34832-EPS-MIT).

Roosting Bats

3.4.9 There are two small shooting hides located within the Site, neither building has bat roost potential. A number of trees are located within the Site, primarily along field boundaries. Some of the trees located within the Site have bat roosting potential. In the wider area, trees within the woodlands bordering the Site could also have bat roost potential.

3.4.10 Foraging and Commuting Bats

3.4.1 Fields dominated by arable fields, within the Site provide few opportunities for foraging and commuting bats. However pastoral grassland and field boundaries around the Site, such as woodland, long grassland, treelines, hedgerows, and ditches (both dry and wet) are considered to offer more favourable habitats. Habitat bordering the Site such as the watercourse to the south of the Site and adjacent woodland offer favourable habitat for foraging and commuting bats.

3.4.2 Overall, the habitats within and adjacent to the Site were considered to most closely fit the description for land of 'moderate' interest for foraging and commuting bats in accordance with Bat Conservation Trust (BCT) guidance, with '*continuous habitat connected to the wider landscape that could be used for commuting such as lines of tree and scrub. Habitat that is connected to the wider landscape that could be used by foraging such as trees, scrub, grassland and water'.*

Badger

3.4.3 The data provided by the Essex field club returned 16 records of badger *Meles meles* within 2km of the Preliminary Site. The closest record was located adjacent to the Preliminary Site.

3.4.4 No evidence of badger was observed within the Site. The Site does however offer suitable habitat for foraging, commuting and sett creation within the grassland, field boundaries, hedgerows and woodland.

Otter and Water Vole

3.4.5 The data provided by Essex field club returned no recent records of otter *Lutra lutra or* water vole *Arvicola arvicola* within 2km of the Preliminary Site.

3.4.6 One wet ditch ran through the Site which is considered to provide sub optimal habitat for otter and water vole. Woodland and field boundaries could be utilised by otter for commuting of holt creation. However, the water levels at the time of the survey were low limiting the potential food source available for otter.

3.4.7 The overgrown vegetation and steep banksides potentially offers refuge for water vole however food sources were limited with nettle dominant.

3.4.8 This ditch is well connected to the wider environment, with the River Crouch which is to the south of the Site. The River Crouch is likely to offer suitable otter and water vole habitat.

Hazel Dormouse

3.4.9 The data returned by Essex field club returned no recent records of hazel dormouse *Muscardinus avellanarius* and there are no ESMP licence returns within 2km of the Preliminary Site.

3.4.10 The majority of the Site (arable and grassland) is unsuitable for the species. The hedgerows and woodland within and adjacent to the Site could potentially support foraging, nesting and commuting dormice.

Amphibians

3.4.11 The data provided by Essex field club returned recent amphibian records within 2km of the Preliminary Site for common toad *Bufo bufo,* common frog *Rana temporaria* and GCN. The closest record for common toad was located 820m south, common frog 725m southwest and GCN 970m south west of the Preliminary Site.

3.4.12 No European Protected Species Mitigation (EPSM) licences have been granted for GCN within 2km of the Preliminary Site.

3.4.1 A total of eight ponds (P1-P8) were identified within 250m of the Preliminary Site, although none were found to be present directly on-Site.

3.4.2 Five of these ponds (P1-P4 and P6) were confirmed to be separated from the Site by natural or artificial barriers, such as the River Crouch, and kerbed A roads. Consequently, these were discounted from further assessment. Of the three remaining ponds (P5, P7 & P8), access and assessment was possible for only Pond P7. Access to ponds P5 and P8 was not possible at the time of survey.

3.4.3 An eDNA survey was carried out on pond P7 and this returned a negative result for the presence of GCN DNA. A full breakdown of survey results are found in **Appendix 2.**

3.4.4 The dominant arable farmland habitats on Site provides very low/negligible suitability as amphibian terrestrial habitat, however, pastoral grassland, field boundary features such as field margins, hedgerows and ditches provide more suitable habitat for shelter, dispersal and foraging.

Reptiles

3.4.5 The data provided by Essex field club returned recent reptile records within 2km of the Preliminary Site, including seven records of slow worm *Anguis fragilis* the closest record located 1.45km southwest of the Preliminary Site. One recent record of adder *Vipera berus* was returned located 811m east of the Site.

3.4.6 The Site is dominated by arable farmland, which is considered to be of a very low value for reptile species. However, the field boundary habitats comprising taller grassland field margins, hedgerows and woodlands do provide some opportunities for foraging/hibernation purposes. A line of stacked tires running along the fence line, also offers suitable reptile basking opportunities (TN1).

Other Notable Species

3.4.7 The data provided by Essex field club included recent records of hedgehog *Erinaceus europaeus* as well as a range of notable invertebrates.

3.4.8 Habitats within the Site could be utilised by small mammals such as hedgehog and brown hare.

3.4.9 The habitats within the Site are not considered to be of a floristic or structural quality which could support significant assemblages of invertebrates or notable species.

Invasive Non-native Species

3.4.10 Data provided by Essex field club returned records of invasive non-native species. These included Japanese knotweed *Reynoutria japonica,* Himalayan balsam *Impatiens glandulifera,* Spanish bluebell *Hyacinthoides hispanica,* and Canada goose *Branta canadensis.*

3.4.11 Himalayan balsam was recorded along the River Crouch, to the south of the Site during the habitat survey.

4 DISCUSSION

4.1.1 This section seeks to identify the potential for effects on protected and notable habitats and species. The Site's proximity to statutory and non-statutory designated sites and potential effects on their qualifying interests is discussed. Measures are proposed for the protection of sensitive habitats and species throughout the construction phase of development and recommendations are made for further pre-construction surveys and mitigation, if required.

4.1.2 This section also introduces opportunities for post-development habitat enhancement as part of the proposed project for the benefit of local biodiversity.

4.2 Designated Sites for Nature Conservation

4.2.1 The Site does not form part of any statutory designated site for nature conservation. The desktop study identified four statutory nationally designated sites within 5km of the Site and six internationally designated sites within 10km of the Site. The closest of these are located approximately 1.51km north west of the Site and include; Essex Estuaries SAC, Crouch and Roach Estuaries (Mid Essex Coast Phase 3) SPA and Ramsar and Crouch and Roach Estuaries SSSI.

4.2.2 The Crouch and Roach estuaries (Mid-Essex Coast Phase 3) SPA and Ramsar is designated for over-wintering dark-bellied brent goose and an over-wintering waterbird assemblage. Brent geese (and other wetland species) could potentially utilise the Site for inland feeding, as the Site comprises of grassland and arable, and due to the close proximity of the designated sites to the Site (given brent geese from the SPA will forage in arable and grassland close to the designated site)[22].

4.2.3 The Site has potential to being 'functionally linked' to the SPA and Ramsar. As such, the proposed development has potential to effect the Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA and Ramsar, through displacement of SPA qualifying species, particularly dark-bellied brent goose. A Habitats Regulations Assessment (HRA) is likely to be a requirement for the proposed development.

4.2.4 For the other designated sites with qualifying ornithological interests, due to considerable spatial segregation and/or the habitat requirements of the qualifying bird species (typically species which are exclusively coastal or marine species) effects on these sites from the proposed development are not anticipated.

4.2.5 For the designated sites which are not designated for their over-wintering bird assemblage, no direct or indirect effects are anticipated, given the spatial segregation between the sites, and the lack of connectivity between the sites. Furthermore, standard good practice drainage management and pollution prevention and runoff control measures will be implemented during the construction and operation of the proposed development to protect habitats outside the Site boundary.

4.2.6 An additional four non-statutory sites are located within 2km of the Site, the closest Rettendon Shaw LOWS is located 890m north from the Site, where no direct or indirect affects are anticipated

[22] https://monitoring.wwt.org.uk/wp-content/uploads/2015/03/RowellRobinson_DBB_feeding.pdf [accessed 26/06/2022]

4.3 Habitats and Flora

4.3.1 The Site is comprised of arable and modified grassland of low ecological value, as shown on **Figure 4**. Hedgerows, watercourses, trees and field margins provide higher biodiversity value at a local scale.

4.3.2 The construction of solar farms generally requires very low levels of direct and permanent land take (typically less than 5% footprint on the ground) for the infrastructure. Direct loss of habitat is therefore considered to be small and will comprise mostly of low ecological value arable and modified grassland, which is widely present in the local landscape.

4.3.3 Effects during construction relate to physical disturbance and removal of arable/modified grassland, primarily comprising temporary compaction and soil disturbance from plant machinery and vehicles. This disturbance will be temporary and of relatively limited duration (anticipated to be six months). Construction will proceed in phases and hence not all the Site will be disturbed at the same time. For the operational lifetime of the proposed development the intensively managed agricultural land will be replaced by a more species and structurally-diverse grassland, which will be managed throughout the lifetime of the operational solar farm to provide higher value habitat for a range of wildlife.

4.3.4 The proposed access tracks will exploit existing farm accesses and gaps in hedgerows, requiring only very localised disturbance of short sections of hedgerow (maximum 5m wide), similar to a farm machinery access. Access routes will avoid mature trees. Overall, the network of hedgerows and ditches will be retained and protected, maintaining habitat connectivity and linkages across the Site itself and with the surrounding wider landscape.

4.3.5 The layout of the proposed development has been designed to maintain a stand-off buffer from the boundary features (ditches, hedgerows and trees). Standard good practice construction methods including pollution prevention and control will ensure that there are no indirect effects on the ditches, or other neighbouring habitats. The perimeter fencing will include mammal gates of gaps at the base at suitable locations to maintain connectivity in the landscape for otters, badgers and other small mammals. In addition, the solar farm will not be lit once constructed, maintaining dark corridors around the Site as a whole and in particular along hedgerows and tree lines.

4.3.6 Measures including buffer zones around adjacent woodland, root zone protection and clear instructions on the location of materials storage areas away from trees and their root protection zones will be implemented.

4.3.7 Opportunities will be sought to provide an overall biodiversity gain; in line with BS 42020 – *A Code of Practice for Biodiversity in Planning and Development*. Habitat enhancement and management measures set out in the Biodiversity Management Plan (BMP) will enhance the Site for the benefit of local wildlife. The design and long-term management of the land seeks to maintain and improve functionality through protecting, creating and enhancing potentially important wildlife corridors i.e. through strengthening connectivity and linked habitats through native species hedgerow and tree planting, and through the creation of extensive species and structurally diverse grassland habitats under and around the solar panels and Site perimeter which will provide enhanced wildlife benefits over and above the low value arable land currently present. The inclusion of bat, bird and hedgehog boxes as well as an insect hotel/refuge and log piles is also proposed.

4.3.8 Habitat enhancement measures are proposed for the Site, set out in the Detailed Landscape Plan (DRGW: P22-1918_EN_003A) . These include:

- Native tree and hedgerow planting, including infilling of existing hedge gaps;
- Development of extensive areas of structurally and species-diverse grassland; and,
- The addition of bat, bird and hedgehog boxes as well as insect hotel/refuge and log piles.

4.4 Biodiversity Net Gain Assessment

4.4.1 In order to assess the biodiversity impacts associated with the proposed development the Natural England/Defra Biodiversity Net Gain Metric Calculator was utilised. Based on the information provided within the Detailed Landscape Plan (P22-1918.003B DLD), the calculation results show that the proposed development will result in a clear biodiversity net gain of 137.96% in Habitat Units, and over 85% in Hedgerow Units, as shown in the headline results extracted from the full Metric spreadsheet, reproduced below. The full Metric spreadsheet is provided separately to this report in **Appendix 4.** The provision of bird, bat and hedgehog boxes as well as insect hotels and log piles also provides biodiversity benefit which is not included in the Net Gain Calculation process.

Biodiversity Net Gain Calculation Headline Results (Defra metric 3.1)

Southlands Solar Fram

Headline Results

Return to results menu

On-site baseline	*Habitat units*	121.46
	Hedgerow units	16.92
	River units	0.00
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	289.03
	Hedgerow units	31.32
	River units	0.00
On-site net % change (Including habitat retention, creation & enhancement)	*Habitat units*	137.96%
	Hedgerow units	85.10%
	River units	0.00%
Off-site baseline	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	167.57
	Hedgerow units	14.40
	River units	0.00
Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	137.96%
	Hedgerow units	85.10%
	River units	0.00%

4.5 Protected and Notable Species

Breeding Birds

4.5.1 Depending on the timing of construction, there is potential for breeding birds present within and adjacent to the Site to be affected by the construction of the Proposed Development due to displacement or direct impacts associated with vegetation and site clearance. The majority of the species (including Notable Species) were associated with vegetation along field boundaries in the Site. Skylark and yellow wagtail are ground-nesting Notable Species which use open habitats, while the

other Notable Species will typically nest within or close to hedgerows and trees, so are mostly associated with vegetation along field boundaries.

4.5.2 The breeding bird assemblage recorded within the Site is representative of typical farmland habitats, predominantly comprising common and widespread species. A total of 24 species were recorded as showing breeding behaviour within the Survey Area, including 12 Notable Species.

4.5.3 The survey recorded breeding evidence for a total of 12 notable species within the Survey Area. This included six Amber List species (stock dove, song thrush, dunnock, wren, whitethroat, reed bunting), and six Red List species (skylark, house sparrow, yellow wagtail, linnet, greenfinch and yellowhammer). Of these, eight species are listed as rare and most threatened species under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act (2006) (skylark, song thrush, dunnock, house sparrow, yellow wagtail, linnet, reed bunting and yellowhammer). Four species (skylark, song thrush, linnet and reed bunting) are also listed as Essex Biodiversity Action Plan species. The number of breeding territories of these species were typically low within the Site, with the only notable species exceeding four territories being skylark with four territories and wren with 12 territories.

Protecting Active Nest Sites

4.5.4 All wild birds, their nests and eggs are, with few exceptions, protected under the Wildlife and Countryside Act 1981 (as amended). Species listed under Schedule 1 of the Act, have special protection with increased penalties for offences committed towards these birds. Additional protection is provided to species listed under Directive 2009/147/EC on the conservation of wild bird (the 'Birds Directive').

4.5.5 In order to avoid impacts on nesting birds and to ensure compliance with the provisions of the Wildlife and Countryside Act 1981 (as amended), it is recommended that Site clearance or vegetation removal takes place outside of the bird breeding season (March-August inclusive). If vegetation works are necessary during the breeding season, suitable nesting habitat should be hand-searched by a suitably experienced ecologist prior to works commencing. Only when the ecologist is satisfied that no offence will occur under the legislation will works be permitted to proceed.

Habitat Loss

4.5.6 The footprint of a solar farm is relatively low, and the proposed development will only result in the loss of approximately 30ha of arable land, with the habitat in and around the proposed development scheme being changed from intensively managed arable land to create extensive areas of grassland, which will benefit a range of ground-nesting species.

4.5.7 Arable cropping regimes strongly affect the actual breeding success of ground nesting birds, and it is considered that a suitably managed low intensity grassland habitat is likely to enhance breeding opportunities as well as foraging resources for the local bird populations, including Notable Species.

Displacement

4.5.8 The main potential effect of construction of the proposed development is the displacement of foraging and nesting birds. Notable Species were typically associated with vegetation along field boundaries onsite, principally hedgerows. These boundary features are not expected to be directly impacted by the proposed development. These features will be protected, with an appropriate buffer zone, to ensure this vegetation (and root systems) are not impacted by the works. With these measures adhered to, those nesting species along field boundaries are likely to be unaffected by the works and are considered at low risk from displacement.

4.5.9 Birds nesting on open ground, such as skylark and yellow wagtail, may potentially be permanently displaced due to the Proposed Development utilising the open arable habitats within the Site; however, in the context of comparable habitats locally, the area lost will be small and will comprise

habitats of sub-optimal quality; with nesting suitability effected by seasonal cropping regimes that are likely to be influenced by rotational crop use within and surrounding the Site. Furthermore, it has also been noted in the literature4 that ground-nesting bird species may potentially nest between rows of solar panels, so displacement is unlikely to be permanent.

Solar Farm Use by Breeding Birds through Habitat Enhancement

4.5.10 The proposed development will create over 41ha of new grassland, replacing existing arable land. This grassland will provide improved breeding habitats for ground-nesting birds, such as skylark, and where adjacent to hedgerows, species such as yellowhammer.

4.5.11 A study looking at changes in biodiversity between solar farms and undeveloped sites by Montag *et al*. (2016)[5] found that overall diversity and abundance of birds was higher in solar farms compared to adjacent 'control' sites. The study documents that solar farms may provide an important resource for declining species, such as skylark, as this species utilises habitats within the solar development footprint. The study found the difference in skylark number within solar farms and control plots to be non-significant. Recent studies conducted by the Royal Society for the Protection of Birds (RSPB)[23] further support high bird usage of solar farms by farmland bird species, including ground-nesting species.

4.5.12 Habitat enhancement opportunities which form a major part of the solar farm developments will benefit a variety of breeding bird species. Measures, including replacing arable fields and/or pasture with species-rich wild-flower grassland, planting hedgerows, 'gapping-up' existing defunct hedgerows, woodland buffer and deploying bird boxes will enhance nesting and foraging opportunities for the bird assemblage within and adjacent to the Site.

4.5.13 With mitigation measures adopted to ensure that any works associated with the proposed development during the breeding bird season do not negatively impact nesting birds, it is concluded that the breeding bird assemblage is unlikely to be adversely impacted by the proposed development, and in the longer term may actually benefit from the habitat change.

Wintering Birds

4.5.14 As discussed in **Section 4.2**, there is the potential for effects on the Crouch & Roach Estuaries SPA & Ramsar, through habitat loss and displacement of qualifying species such as the Brent goose. Wintering bird surveys are currently ongoing and results will be used to inform a HRA, if required.

Bats

4.5.1 All species of British bat are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Bats are further protected under the Habitats Regulations. The Act and Regulations make it an offence to:

- kill, injure or take any wild bat;
- damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection; and,
- intentionally or recklessly disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection.

4.5.2 Seven bat species in the UK are also listed as species of principal importance for the purpose of conserving biodiversity under Section 41 of the Natural Environment and Rural Communities Act 2006 (the "NERC Act"). One bat, common pipistrelle was also listed within the Essex Biodiversity Action Plan.

[5] https://community.rspb.org.uk/ourwork/b/biodiversity/posts/bird-use-on-solar-farms-final-results Accessed 28/05/2021.

Roosting bats

4.5.3 There are two structures (concrete bird hides) located within the Site which had negligible bat roost potential. Some trees within the Site had bat roost potential located within the north east field.

4.5.1 Although no trees are currently proposed to be affected, should this change suitable checks for roosting bats will be undertaken in advance of any removal. If bats are confirmed to be roosting within any tree to be impacted by proposed works, the data gathered would be used to inform potential design amendments to avoid or reduce impacts or, failing that support a licence application to Natural England to destroy/disturb the bat roost.

4.5.2 It is proposed to include a minimum of ten bat boxes on suitable trees within the Site, combined with landscaping proposals for the Site, this will enhance local opportunities for roosting bats.

Foraging and commuting bats

4.5.3 The arable fields within the Site have limited potential for foraging and commuting bat species. However, other habitats including field margins, lines of trees, hedgerows and woodland all provide foraging and commuting opportunities for bats. These will be largely retained and protected, maintaining connectivity within and around the Site.

4.5.4 Landscape proposals include planting of species rich grassland, the planting of scattered trees and the enhancement of hedgerows. It is considered that these features will improve foraging and commuting opportunities for bats through increasing invertebrate prey abundance at the Site and improving connectivity to the wider landscape.

4.5.5 Any lighting required during the construction and operational periods will be highly restricted and directed away from retained boundary habitats. Light spill can be avoided in a number of ways, including the use of low-level lighting and use of hoods and careful selection of lighting; further information is available in *Bats and Lighting in the UK, Bats and the Built Environment Series, Bat Conservation Trust and Institute for Lighting Engineers*[24]. Lighting will be designed and implemented in a sensitive manner, and therefore no discernible effects are anticipated on foraging/commuting bats.

Badger

4.5.6 Badgers are afforded legislative protection under the Protection of Badgers Act 1992. The Act makes it an offence to:

- kill or harm a badger;
- damage an active sett; or
- disturb a badger while occupying a sett.

4.5.7 Sett interference includes damaging or destroying a sett, obstructing access to a sett, and disturbing a badger whilst it is occupying a sett. It is not illegal, and therefore a licence is not required, to carry out disturbing activities in the vicinity of a sett if no badger is disturbed and the sett is not damaged or destroyed. Where an activity is likely to result in an offence under the Protection of Badgers Act 1992 a licence from Natural England is required.

[24] Institution of Lighting Professionals & the Bat Conservation Trust. (2018). *Guidance Note 08/18: Bats and artificial lighting in the UK Bats and the Built Environment series*

4.5.8 No setts were identified within or immediately adjacent to the Site. The Site does however, provide suitable habitats which badgers could utilise, and badgers may be present within the Site and the surrounding landscape.

4.5.9 As badgers are highly mobile, as a precaution a pre-construction survey will be undertaken to confirm continued absence of badger setts within and adjacent to the Site prior to the commencement of works. If a sett is found, suitable advice will be sought from the project ecologist to ensure necessary protection, avoidance or mitigation measures are in place before works proceed.

4.5.10 Once constructed, the Proposed Development (with panels raised off the ground) will not sever potential commuting routes used by badgers, with linear features such as hedgerows and ditches to be retained and protected as part of the Proposed Development. Gaps or mammal gates will be installed at suitable intervals and locations along the perimeter fence line to allow badgers and other small mammals free movement into and out of the Site, providing enhanced opportunities for foraging and refuge within what will be a relatively protected and undisturbed area. This will ensure continued habitat connectivity in the wider environment.

4.5.11 In addition, it is considered that the creation of species rich grassland, tree planting and native woodland buffers will enhance this area for foraging badger.

Otter and Water Vole

4.5.12 Otters are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); they receive further protection under the Habitats Regulations. The Act and Regulations make it an offence to:

- Deliberately capture, injure or kill an otter;
- Damage or destroy a breeding site or resting place;
- Deliberately disturb an otter, particularly in a way which is likely to:

  a) to impair their ability to survive, breed or reproduce, rear or nurture young; and,

  b) to affect significantly the local distribution or abundance of the species.

4.5.13 Otter is also listed under Section 41 of the NERC Act 2006 and is therefore, a material consideration within the planning process.

4.5.14 Water vole and its habitats receive full legal protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Water vole is also is listed under Section 41 of the NERC Act 2006 and within the Warwickshire Biodiversity Action Plan and is therefore, a material consideration within the planning process.

4.5.15 No signs of otter or water vole were found during the surveys, indicating otters are not using the on Site ditch to breed or as a regular resting area. However, suitable habitat is present within the wider area, and if present otters may forage or commute along the River Crouch, with the potential to use onsite habitats. Habitat is also sub-optimal for water voles and with no records for either species in the area, it is considered unlikely the species are present.

4.5.16 Minimum 5m stand-off buffers will be maintained around ditches and hedgerows will be largely retained and protected. In addition, standard good practice measures will be employed to ensure runoff control and pollution prevention to protect aquatic/bankside habitats both on Site and in the wider ditch network.

4.5.17 As a precautionary measure, for any works in or within 5m of the on Site ditch or adjacent River Crouch, a pre-construction survey for otter and water vole would be completed by a suitably

experienced ecologist prior to the commencement of works to check for new signs of activity and/or newly created holts in the vicinity.

4.5.18 If the pre-construction survey were to confirm presence of otter and water vole in the vicinity of the proposed works, suitable avoidance or protection measures will be set in place, in certain circumstances a licence may be required if disturbance cannot be avoided.

4.5.19 In ditch sections where the species are found to be likely absent, the temporary construction works could be undertaken under Reasonable Avoidance Measures (RAMs) and in line with a Construction Environmental Management Plan (CEMP).

4.5.20 Upon completion of construction, the ditches will remain available for water voles and otters to utilise, if they colonise the area in the future.

4.5.21 Habitat enhancement and ongoing management throughout the lifetime of the operational solar farm could benefit otter and water voles in the future, in the event that they colonise the area. The establishment of structurally and species diverse grassland, under and around the solar panels and at field margins that run adjacent to the ditches as well as hedgerow creation, could benefit water voles and otters (if present). The change in management practices on the Site could also be of benefit to the species, with permanent grassland creation, the cessation of annual cultivation and likely inputs of pesticides and fertilisers, all contributing to local improvements in water quality.

Hazel Dormouse

4.5.22 Hazel dormice are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 5 of Conservation of Habitats and Species Regulations 2017 (as amended). The Act and Regulations make it an offence to:

- Deliberately capture, injure or kill hazel dormice;
- Damage or destroy a hazel dormouse resting place or breeding site;
- Deliberately or recklessly disturb a hazel dormouse while it's in a structure or place of shelter or protection; and/or,
- Block access to structures or places of shelter or protection.

4.5.23 Additionally, the hazel dormouse is listed as priority species under Section 41 of the NERC Act 2006 and is also listed within the Essex Biodiversity Action Plan.

4.5.24 The arable fields and grassland within the Site, has negligible potential for hazel dormice, and while hazel dormouse may occasionally utilise the tree lines and hedgerows, they are considered sub-optimal as they are species poor with limited favourable species.

4.5.25 For these reasons it is considered that the risk of adverse impacts to dormouse are low, and therefore it is proposed to undertake works following a RAMs method statement. This will be applicable to any small-scale works affecting hedgerow/ tree lines, such as for the creation of access points.

4.5.26 Hedgerows will be largely retained and protected during the proposed development, as well as more favourable habitats in the wider area such as woodland and scrub. In addition, hedgerow planting, scrub creation and woodland buffers either within or around the Site will serve to provide further habitat for dormice as well as strengthening linkages to existing habitat in the wider area.

4.5.27 Due to the retention of hedgerows and the availability of more extensive areas of suitable habitat in and around the survey area, no adverse effects on habitat connectivity and or foraging/refuge opportunities are anticipated for hazel dormice (if present).

Amphibians

4.5.28 GCN and their habitats are protected under the Wildlife and Countryside Act 1981 (as amended) and the Habitats Regulations. The Act and Regulations make it an offence to:

- kill, injure or take a great crested newt;
- damage, destroy or obstruct access to any place that a great crested newt uses for shelter or protection; and,
- intentionally or recklessly disturb a GCN while it is occupying a structure or place that it uses for shelter or protection.

4.5.29 Common reptile species namely the common lizard, slow-worm *Anguis fragilis*, grass snake and adder are protected against killing, injuring and sale under the Wildlife & Countryside Act 1981 (as amended). Great crested newt, common toad and widespread reptile species (common lizard, slow worm, grass snake and adder) are listed as priority species under Section 41 (England) of the NERC Act 2006 and UK BAP.

4.5.30 No ponds are located within the Site and seven ponds were located within 250m of the Site. The eDNA returned negative results for P7 suggesting that GCN are not present within this pond.

4.5.31 Overall, the Site provides limited terrestrial habitats for GCN, however the small areas of scrub ditch and hedgerows provide higher value habitat for amphibians.

4.5.32 The higher value habitats for amphibian species (e.g., hedgerows and ditch) will largely be retained and protected during construction and operation of the development, with only minor localised hedgerow works potentially required for access. Reasonable Avoidance Measures (RAMS) will be implemented as a precaution to avoid any risk of accidental harm to individual amphibians during minor removal of suitable habitat. These measures will reflect legislation and guidance applicable at the time (outline measures are presented within the Biodiversity Management Plan in **Appendix 3**.)

4.5.33 The proposed development will also have no direct effects on neighbouring habitats and with standard good practice pollution prevention and runoff control measures in place during both construction and operation phases, these off-site features and the species they support can be suitably protected from the risk of indirect effects.

4.5.34 Given the measures of mitigation planned, the proposed development will not affect the favourable conservation status of any amphibian species, or risk harm to individual animals as a result.

4.5.35 As a result of habitat enhancements, including the creation of new grassland, hedgerow, scrub and woodland buffers, the completed development will provide higher value terrestrial habitat for wildlife, including amphibians and reptiles.

Reptiles

4.5.36 Widespread reptile species are protected against killing, injuring and sale under the Wildlife & Countryside Act 1981 (as amended). A number of these (common lizard, slow worm, grass snake and adder) are also listed as priority species under Section 41 (England) of the NERC Act 2006 and are UK BAP species.

4.5.37 The arable fields and intensively managed modified grassland offer limited potential for reptile species. The areas of long grass at field margins, scrub, hedgerows and row of tires along the fence at the north of the Site (TN3) are suitable to support common species of reptile, while habitat mosaics of woodland and grassland in the wider area are also suitable for reptiles.

4.5.38 All tree lines and hedgerows will be retained with the exception of a small area of hedgerow to be removed to allow Site access. RAMS for amphibians will also protect reptile species, if present during the small-scale hedgerow removal works.

4.5.39 Habitats on Site will be enhanced for reptiles through the creation of relatively undisturbed species rich grassland, hedgerow enhancement and planting of scattered trees.

Other species

4.5.40 Notable species such as hedgehog and brown hare, could potentially be using the habitats within and around the Site. Both mammal species are listed as a priority species under Section 41 (England) of the NERC Act 2006 and UK BAP.

4.5.41 The loss of a small area of modified grassland associated with the proposed development is not considered to affect local populations of these species, especially when considered in the context of the extensive availability of suitable habitats in the wider area.

4.5.42 The enhanced grassland habitat and hedgerow planting as well as insect hotels and log piles will benefit these species as landscape connectivity will be increased and further foraging, commuting and overwintering habitat will be created. Installation of hedgehog boxes will provide greater refuge opportunities for this species. No other species are considered pertinent in relation to the proposed development.

4.5.43 Security fencing located around the Site perimeter will have gaps or mammal gates positioned at several locations along the base of fences in order to allow mammal species such as brown hare, and hedgehog (amongst others) to continue to use the habitats on Site during the operational period. Such gaps or mammal gates will thereby maintain dispersal routes and opportunities to access relatively undisturbed habitat within the secured Site and connect to the wider landscape.

4.5.44 The retention/enhancement of hedgerows, and creation of species-diverse grassland, scrub and woodland will provide a variety of invertebrate species with suitable habitats. The development of grassland beneath and surrounding the proposed solar development along with new native species planting and the cessation of agricultural chemical spraying will enhance the Site's potential to support a diverse invertebrate assemblage.

Invasive Non-native Species

4.5.45 Himalayan balsam was found along the banks of the River Crouch, which is located to the south of the Site. This is listed under Schedule 9 of The Wildlife & Countryside Act 1981 (as amended) It is an offence to plant or otherwise cause to grow in the wild species listed within Schedule 9; this includes allowing the species to grow/spread, spreading the species or transferring polluted ground material from one area to another. Any waste containing these species can only be removed from Site under appropriate waste management documentation (under the Environmental Protection Act 1990).

4.5.46 A pre-construction check will be undertaken to determine the extent of which the invasive species has colonised the Site. Suitable biosecurity measures will be employed to prevent the accidental introduction or spread of such species during or after construction, including control or eradication measures as appropriate.

4.5.47 Should any new area of invasive species be encountered or suspected on Site, prior to or during construction, the advice of a suitably qualified ecologist should be sought and the appropriate measures taken.

5 SUMMARY - ECOLOGY PRIORITY MATRIX

5.1.1 **Table 5.1** summarises the ecological constraints and opportunities associated with the development and makes recommendations for pre-construction survey work and/or mitigation measures as required.

Table 5.1: Ecological Constraints and Opportunities

Feature		Details
Statutory and Non-statutory designated sites for Nature Conservation	Constraints & Opportunities	a. The Site does not form part of any statutory or non-statutory designated sites. b. The Crouch and Roach estuaries (Mid-Essex Coast Phase 3) SPA and Ramsar is located 1.51km from the Site and is designated for over wintering dark-bellied brent goose. Wintering Bird surveys are currently being undertaken and the results will inform a HRA, if required. c. No other impacts are anticipated on any statutory or non-statutory designated sites by the implementation of good practice measures.
Habitats & Flora	Constraints & Opportunities	d. The habitats within the Site which will be affected by the proposed development comprises arable fields and modified grassland, both of low ecological value. e. Small sections of hedgerow is required to be removed to facilitate site access. f. Adjacent habitats including neighbouring woodland and field boundary tree lines will not be impacted by the proposed works. g. The Proposed Development includes for the creation of areas of species rich grassland, tree planting and native woodland buffers, which will serve to enhance the Site's value for wildlife and strengthen habitat connectivity in the landscape. h. The proposed development results in measurable net gains of +137.96% of habitat units and +85.10% of hedgerow units.
	Protection Measures	i. Standard measures to protect retained trees, ensure runoff control and pollution prevention will be implemented during construction; these measures will safeguard habitats on and immediately surrounding the Site.
Birds	Constraints & Opportunities	j. The grassland on Site provides limited opportunities for breeding birds. k. Breeding Bird Surveys recorded a typical assemblage of bird species for an arable landscape. The majority of the species recorded (including Notable Species) were associated with vegetation along field boundaries within and bordering the Site. Skylark and yellow wagtail were the only ground nesting Notable Species recorded breeding within open habitats on Site. l. There is potential for effects on the Crouch & Roach Estuary SPA & Ramsar through habitat loss and displacement of SPA/Ramsar qualifying species such as brent goose. m. Bird boxes will be installed on trees around the Site and tree planting will enhance opportunities for nesting birds.
	Legislative Compliance – WCA**	n. Vegetation works should be undertaken outside of the bird breeding season (01 March to 31 August inclusive). If vegetation clearance works are necessary during the breeding season, suitable nesting habitat should be searched by a suitably experienced ecologist prior to works commencing. Only when the ecologist is satisfied that no offence will occur under the legislation will works be permitted to proceed. o. Wintering bird surveys are currently being undertaken and results of which will inform an HRA, if required.
Bats	Constraints & Opportunities	p. Some trees within hedgerows have potential to support roosting bats, and will be retained and protected throughout the construction of the Proposed Development. q. Woodland and tree line habitats within and adjacent to the Site are likely to provide foraging and/or commuting habitat for local bat populations but will be retained and protected by the proposed development.

Feature		Details
		r. Bat boxes will be installed on suitable trees around the Site which together with proposed grassland creation, woodland buffer and tree planting enhancements will provide increased opportunities for roosting, foraging and commuting bats.
	Legislative Compliance – WCA**, HR***	s. Any lighting required during construction and/or operation will be directed away from hedgerows and trees (further information is provided in *Lighting in the UK, Bats and the Built Environment Series*, Bat Conservation Trust and Institute for Lighting Engineers).
Badger	Constraints & Opportunities	t. No setts were identified within or immediately adjacent to the Site. However, the Site and surrounding habitats could support foraging badgers and be used for sett excavation.
	Legislative Compliance – PBA****	u. A pre-construction badger survey will be undertaken immediately prior to the commencement of development to check for any constructed setts in / within 30m of construction. v. If an active badger sett is identified within the Site or within approximately 30m, a suitable protection / mitigation strategy will be produced under the advice of an ecologist and if necessary, works in proximity to a sett will only proceed under a licence from Natural England.
Amphibians and Reptiles	Constraints & Opportunities	w. The eDNA survey found great crested newts to be absent from P7 and no ponds will be directly affected by the proposals. x. The solar panel array will also be constructed within habitats that are considered to be sub-optimal for amphibians including GCN (arable & modified farmland); direct loss is suitable GCN habitat is therefore considered to be minimal. y. The area for solar panel array layout has been designed to avoid impact to the majority of hedgerows, field margins, ponds and ditches within and surrounding the Site. It is considered there will be no adverse effects on any local amphibian or reptile populations. z. The creation of species rich grassland and hedgerow planting, will benefit amphibian and reptiles potentially present in the future, creating additional foraging, commuting and hibernation habitat.
	Legislative Compliance - WCA*, HR**	aa. RAMs will be implemented to ensure no harm to individual amphibians or reptiles present within the Site.
Hazel dormouse	Constraints & Opportunities	bb. Habitats such as arable and modified grassland within the Site have negligible potential to support hazel dormouse. Trees, woodland and hedgerows on and around the Site provide limited habitat for this species, if present. cc. It is considered unlikely that hazel dormice will be present, with the lack of records and favoured food sources within the habitats on Site. dd. The retention of existing trees, woodland buffer creation and tree planting will benefit the species, maintaining and improving hibernation, foraging and commuting habitat.
	Legislative Compliance - WCA*, HR**	ee. Works affecting suitable habitat will be undertaken under RAMs on a precautionary basis.
Otter & Water Vole	Constraints & Opportunities	ff. One wet ditch runs through the Site which provides sub optimal habitat for otter and water vole. gg. A minimum 5m buffer around the ditch will be implemented. hh. Standard pollution prevention measures will be employed to ensure runoff control and standard pollution prevention to protect aquatic/marginal habitats potentially used by water vole/ otter.

Feature		Details
	Legislative Compliance - WCA*, HR**	ii. A pre-construction otter/water vole survey will be required prior to any works in or within 5m of the ditch or adjacent watercourse. jj. Suitable protection, avoidance or mitigation measures will be implemented to ensure legislative compliance, if required.
Other Species	Constraints & Opportunities	kk. Hedgehog and brown hare may utilise the Site and adjacent land. ll. The adoption of standard good practice measures during construction and RAMS for amphibian will also protect small mammal species. mm. The creation of undisturbed field boundary grassland and tree planting will benefit these and other species including invertebrates by creating additional foraging, commuting and overwintering habitat.
	Legislative Compliance - WCA*	nn. n/a
Invasive Non-native Species	Constraints & Opportunities	oo. No invasive non-native species were recorded on the Site during the survey, however Himalayan Balsam was recorded on the adjacent river boundary.
	Legislative Compliance – WCA**	pp. An invasive species check will be conducted prior to construction works starting on Site. If any invasive species are encountered onsite during this check, suitable biosecurity measures will be implemented to prevent the inadvertent introduction or spread of such species.

Legislative Compliance Key

* The Hedgerows Regulations 1997

**Wildlife & Countryside Act 1981 (as amended)

***The Conservation of Habitats and Species Regulations 2017 (as amended)

****Protection of Badgers Act 1992

FIGURES

Figure 1: Site Location Plan

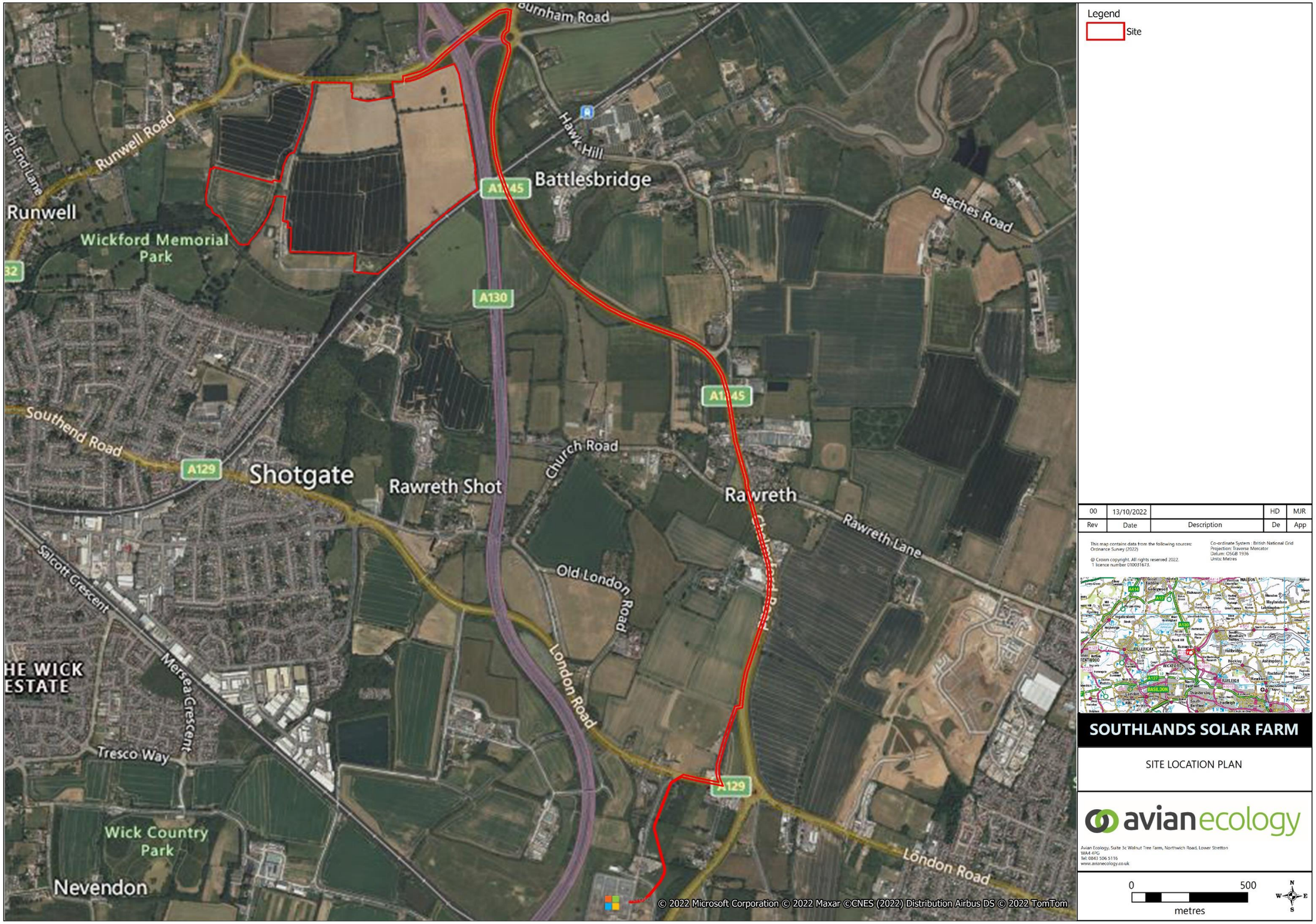


Figure 2: Statutory Designated Sites

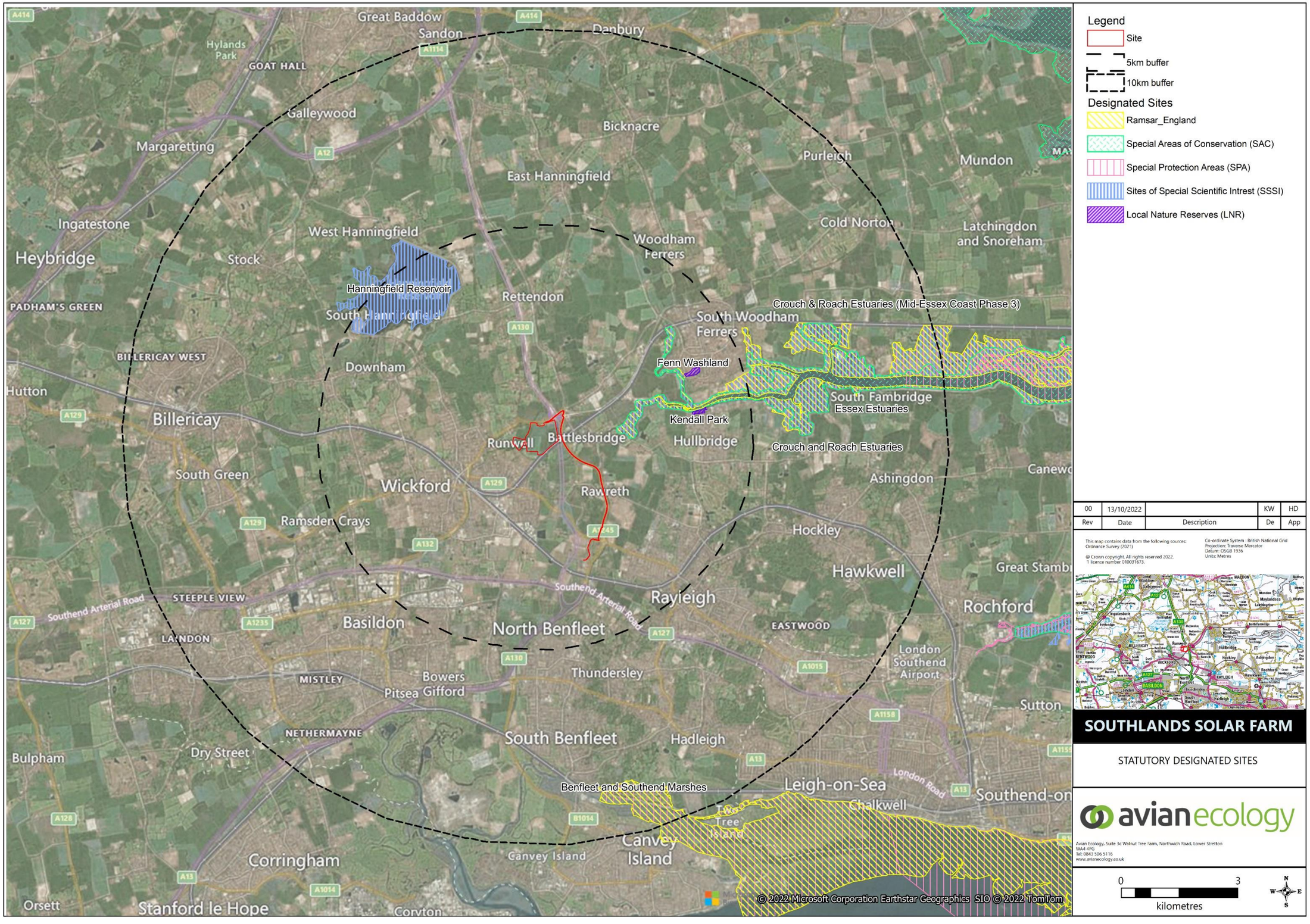


Figure 3: Non-Statutory Designated Sites

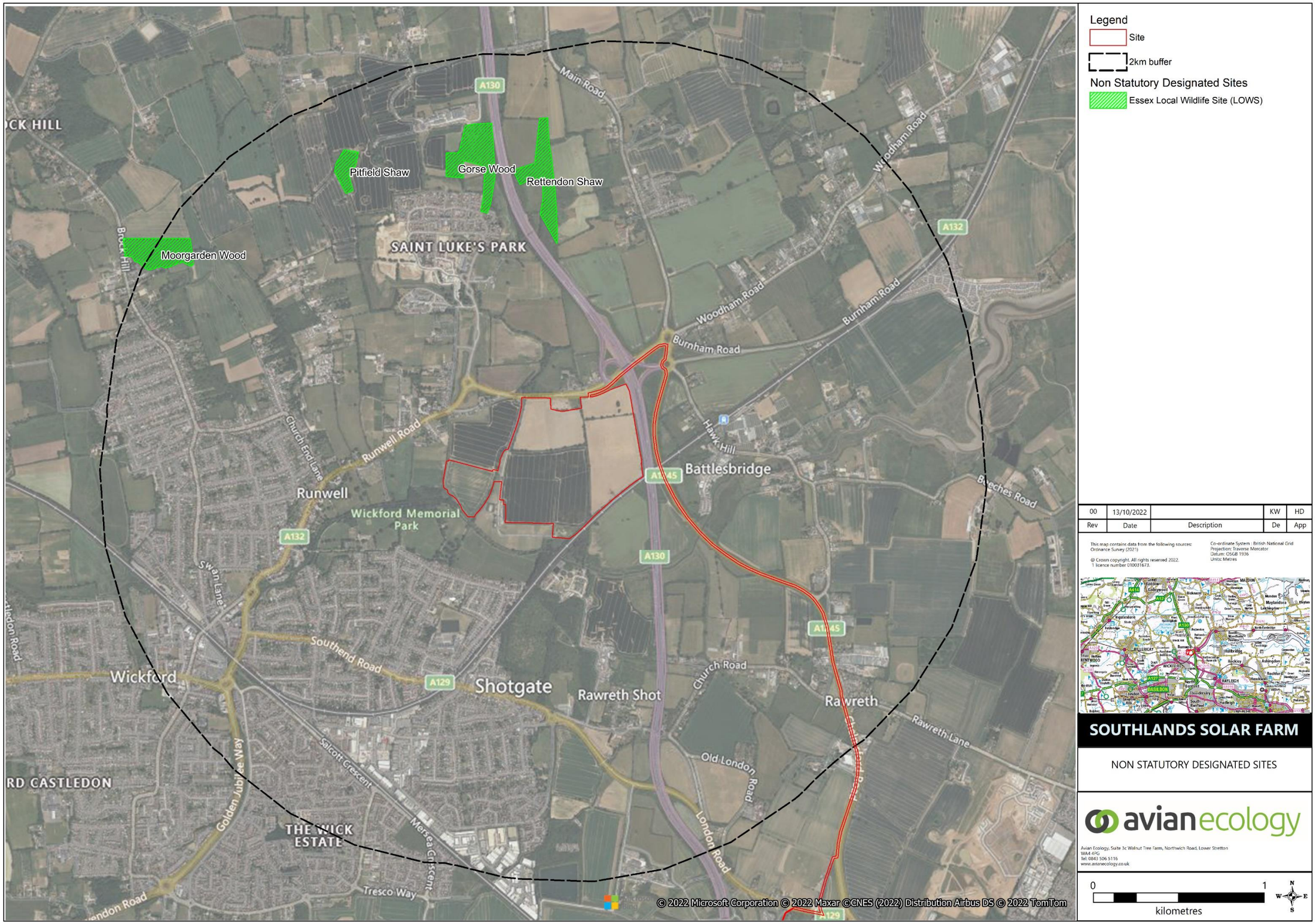


Figure 4: Habitat Plan

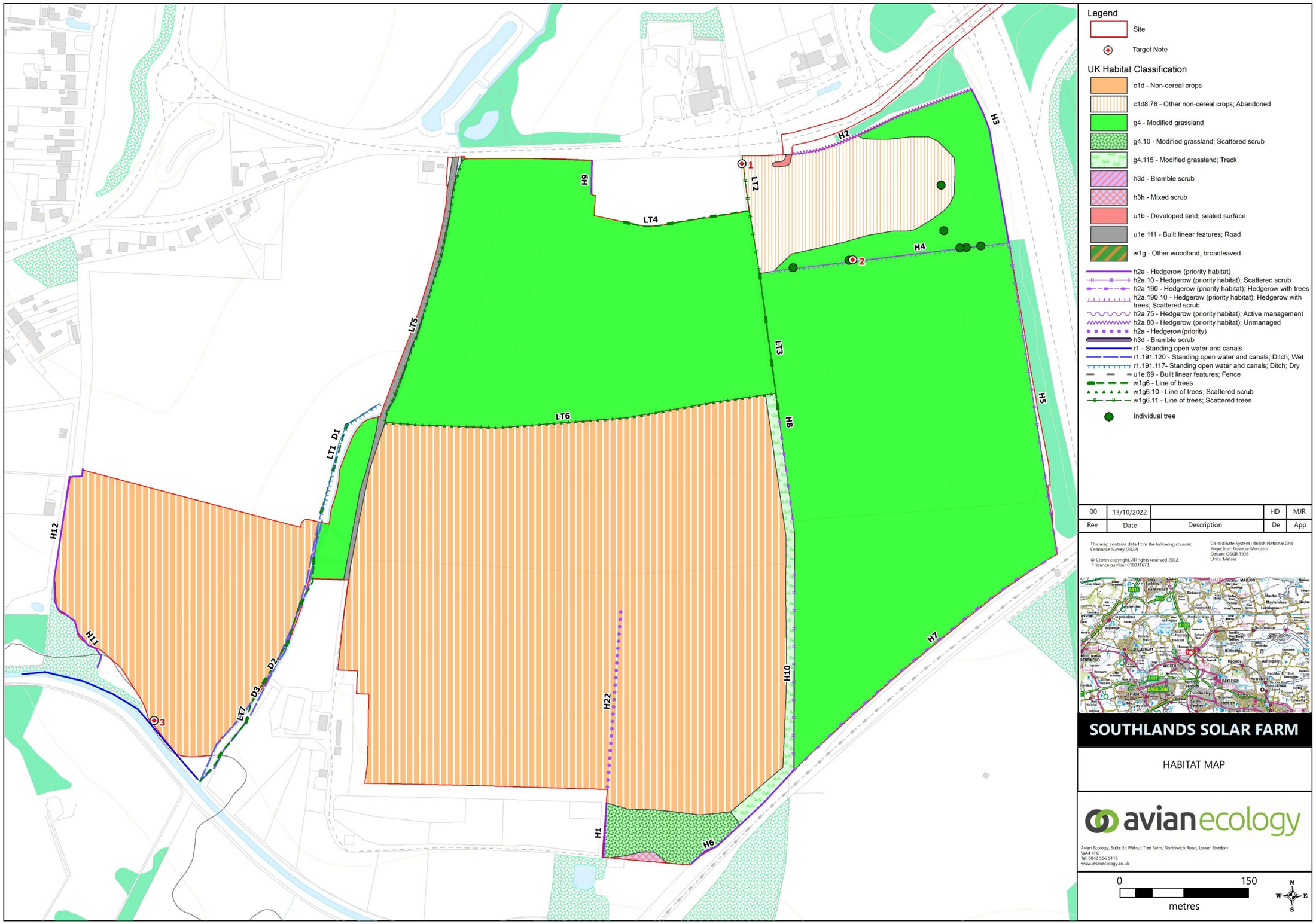
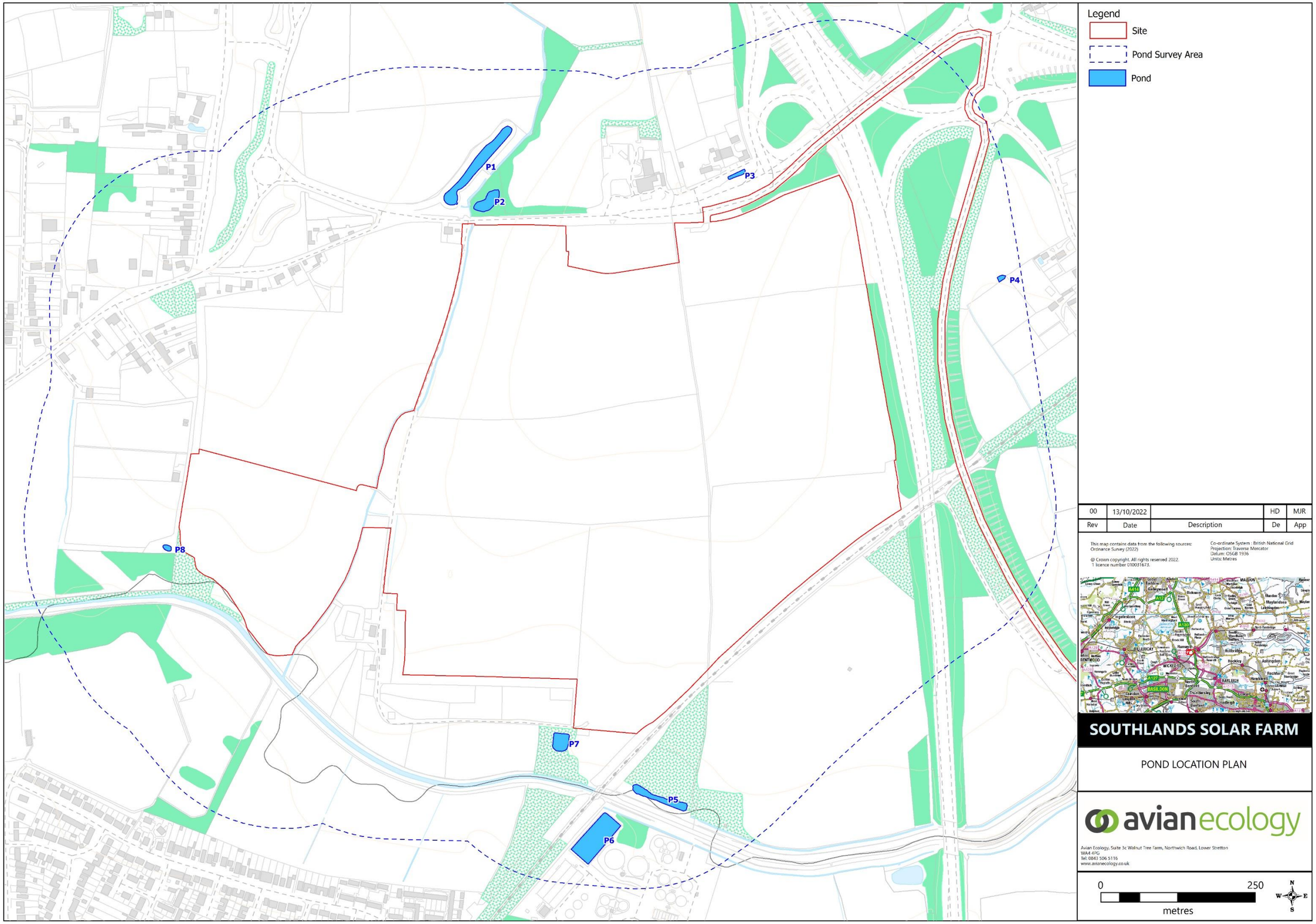


Figure 5 - Pond Location Plan



Appendix 1: Breeding Bird Report

Southlands Solar Farm

on behalf of Enso Green Holdings J Limited

Appendix 1: Breeding Bird Survey Report 2022

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Document Control				
Project Name:		Southlands Solar Farm		
Project Number:		EnsoE-517-3125		
Report Title:		Appendix 1: Breeding Bird Survey Report –2022		
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	13/09/2022	Draft	Z. Hinchcliffe *MRes BSc (Hons.)*	N. Robinson *MSc BSc (Hons.) ACIEEM*
V2	17/10/2022	Updated draft	Z. Hinchcliffe *MRes BSc (Hons.)*	N. Robinson *MSc BSc (Hons.) ACIEEM*
V3	26/10/2022	Final	Z. Hinchcliffe *MRes BSc (Hons.)*	N. Robinson *MSc BSc (Hons.) ACIEEM*

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1 INTRODUCTION

1.1 Project Background

1.1.1 Avian Ecology Ltd. was commissioned by Enso Green Holdings J Limited to undertake a breeding bird survey in relation to the proposed installation of a solar farm and battery storage facility with associated infrastructure (the 'Proposed Development'), located on land south of Runwell Road (A132), Runwell, Wickford (the 'Site').

1.1.2 The objectives of this report are to:

- provide baseline information on breeding ornithological features within the Site; and,
- identify the presence of notable breeding bird species within the Site.

1.1.3 Only common bird species names are referred to within the main text of this report. **Annex 1.1** provides a summary of all bird species recorded during the surveys, including both common names and scientific species names together with a summary of their conservation status as.

1.2 Site Overview

1.2.1 The Site, as shown by the red-line boundary in **Figure 1.1**, is situated on land at Rock Farm, south of Runwell Road (A132) and, approximately 375m north east of Runwell. The Site consists of a mix of arable and pastoral grassland fields bounded by hedgerows. A ditch bisects the Site and the River Crouch is situated adjacent to the southern boundary.

1.2.2 The Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Special Protection Area (SPA) and Ramsar site designated for wintering populations of dark-bellied brent geese and wintering waterbird assemblage are located 1.5km east of the Site. Neither designated site have any cited qualifying breeding bird interests.

2 METHODOLOGY

2.1 Breeding Bird Survey

2.1.1 A breeding bird survey was undertaken between April and July 2022, employing adapted version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) technique, as detailed in Gilbert *et al*. (1998[1]) and comprising a series of three staggered visits undertaken at least seven days apart.

2.1.2 All survey visits were carried out between dawn and 10:45hrs and were carried out in conditions suitable for survey(avoiding heavy rain and strong winds). A summary of survey effort is presented in **Table 2.1** and detailed survey conditions are presented in **Annex 2**.

2.1.3 The survey area comprised a preliminary Site boundary, and adjoining habitats within 100m of this (termed 'the Survey Area'). Only Notable Species were recorded within the extended 100m buffer. The Study Area is shown in **Figure 1.1**.

2.1.4 Breeding bird survey visits were undertaken by J. Hanlon *BSc (Hons.)*, an experienced and competent ornithologist.

2.1.5 During each survey visit all bird registrations were recorded on suitably scaled field maps using standard BTO species codes and behaviour notations (such as singing, carrying food, active nest). The

[1] Gilbert, G., Gibbons, D.W & Evans, J. (1998) *Bird monitoring methods. A manual of techniques for key UK species*. RSPB, Sandy

approximate locations of bird territories within the Site were determined using standard territory mapping techniques to identify and isolate areas within which birds consistently displayed breeding behaviours (following Gilbert *et al.* 1998).

2.1.6 Observations of non-breeding birds just visiting the Site (e.g. gulls feeding in fields) and birds flying over the Site were also made.

Table 2.1: Breeding bird survey effort.

Survey Visit	Date	Start time (24hrs)	End time (24hrs)	Sunrise times (24hrs)
1	22/04/2022	08:15	10:45	05:47
2	30/05/2022	06:30	09:00	04:47
3	01/07/2022	07:55	10:00	04:44

Limitations

2.1.7 No survey limitations were experienced.

3 RESULTS

3.1 Breeding Bird Surveys

3.1.1 For the purposes of the report, although the estimated number of breeding territories for all species is provided (**Table 3.1**) only the breeding territories of Notable Species are mapped, given these are the most relevant species to the design and assessment of the development proposals. Notable Species relevant to the Proposed Development include sist of Birds of Conservation Concern (BoCC Amber and Red List Species (Stanbury *et al.*, 2021) NERC Section 41 species (2006)[2], Schedule 1 species and Essex Biodiversity Action Plan[3] species.

3.1.2 The breeding bird assemblage recorded within the Site is representative of typical farmland habitats, predominantly comprising common and widespread species. A total of 24 species were recorded as showing breeding behaviour within the Survey Area, including 12 Notable Species (**Table 3.1**).

3.1.3 Notable species recorded consisted of six Amber List species (stock dove, song thrush, dunnock, wren, whitethroat, reed bunting), and six Red List species (skylark, house sparrow, yellow wagtail, linnet, greenfinch and yellowhammer). Of these, eight species are listed as rare and most threatened species under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act (2006) (skylark, song thrush, dunnock, house sparrow, yellow wagtail, linnet, reed bunting and yellowhammer). Four species (skylark, song thrush, linnet and reed bunting) are also listed as Essex Biodiversity Action Plan species. The number of breeding territories of these species within the Site were typically low with the only notable species greater than four territories being skylark with four territories and wren with 13 territories.

3.1.4 No species listed under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) were recorded within the survey area.

[2] Natural Environment and Rural Communities (NERC) Act (2006)

3.1.5 Notable Species were typically associated with vegetation along field boundaries onsite, principally hedgerows.

3.1.6 Ground-nesting Notable Species which were recorded to use open fields onsite consisted of yellow wagtail and skylark. Both skylark and yellow wagtail were recorded within the Site in low breeding numbers.

3.1.7 All breeding species recorded along with an estimated number of territories are detailed within **Table 3.1**. Those species in **bold** are considered Notable Species. The indicative locations of the territories of Notable Species are provided in **Figure 1**.

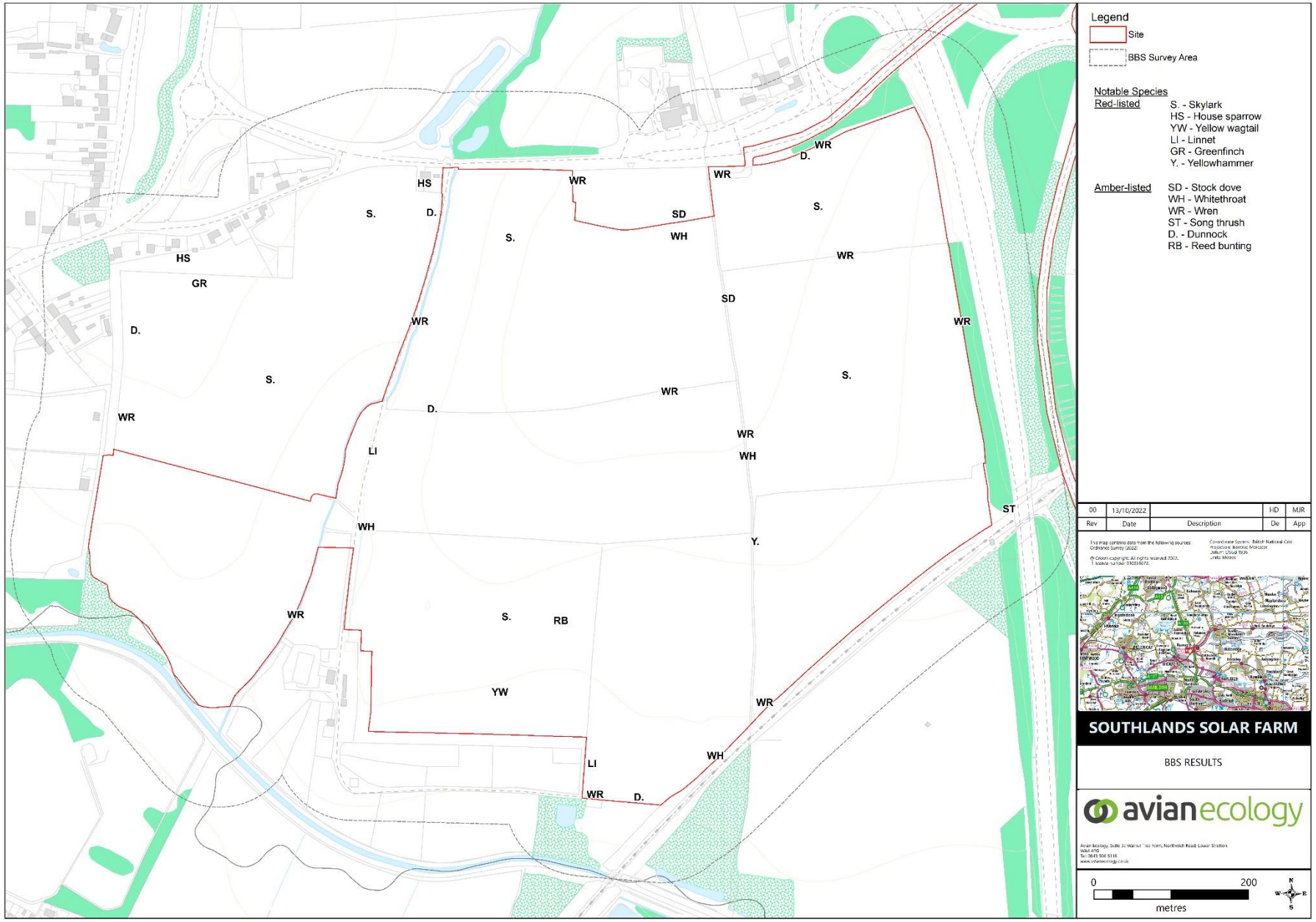
Table 3.1: Breeding bird survey results

Common Name	Estimated Number of Territories within the Site (additional territories within the Survey Area)	Comments
Stock dove	**2**	**Associated with vegetation close to field boundaries.**
Great spotted woodpecker	1	Associated with vegetation close to field boundaries
Blue tit	13	Associated with vegetation along field boundaries.
Great tit	4	Associated with vegetation close to field boundaries
Magpie	3	Associated with vegetation close to field boundaries
Skylark	**4 (2)**	**Within most arable field within the Site.**
Long-tailed tit	1	Associated with vegetation along field boundaries.
Chiffchaff	1	Associated with vegetation close to field boundaries
Blackcap	7	Associated with vegetation close to field boundaries
Lesser whitethroat	1	Associated with vegetation close to field boundaries
Whitethroat	**4**	**Associated with vegetation along field boundaries.**
Wren	**12 (1)**	**Associated with vegetation along field boundaries.**
Blackbird	1	Associated with vegetation along field boundaries.
Song thrush	**1**	**Associated with vegetation along field boundaries.**

Robin	**5**	Associated with vegetation along field boundaries.
Dunnock	**3 (2)**	**Associated with vegetation along field boundaries.**
House sparrow	**0 (2)**	**Associated with buildings along boundary of the Site**
Yellow wagtail	1	**Associated with arable field within the Site.**
Pied wagtail	1	Associated with field margin habitat
Linnet	**2**	**Associated with vegetation along field boundaries.**
Goldfinch	2	Associated with vegetation along field boundaries
Greenfinch	**0 (1)**	**Associated with vegetation along field boundaries.**
Yellowhammer	**1**	**Associated with vegetation along field boundaries.**
Reed bunting	**1**	**Associated with vegetation along field boundaries.**

3.1.8 During survey visits a small number of additional species that were not considered as breeding were recorded within the Survey Area, and which consisted of individual birds flying over the Survey Area, or those visiting the Survey Area to feed. Non-breeding species recorded within the Survey Area included swallow.

FIGURE 1: BREEDING BIRD SURVEY RESULTS



ANNEX 1. BIRD SPECIES SUMMARY

Table A1.1 provides a list of bird species recorded during the breeding bird surveys. Both common and species names are presented along with a summary of each species conservation status using the following abbreviations:

- BoCC – Birds of Conservation Concern as listed by leading bird conservation organisations in the UK, including the RSPB and BTO. Red and Amber categories are given (Stanbury *et al*., 2021);
- NERC S.41 - species listed as rare and most threatened on the NERC Act (2006); and,
- LBAP – Essex Local Biodiversity Action Plan Species.

Table A1.1: Summary of bird species.

Common name	Species name	Conservation status
Stock dove	*Columba oenas*	BoCC – Amber.
Great spotted woodpecker	*Dendrocopus major*	-
Blue tit	*Cyanistes caeruleus*	-
Great tit	*Parus major*	-
Magpie	*Pica pica*	-
Skylark	*Alauda arvensis*	BoCC – Red, NERC S41, LBAP.
Swallow	*Hirundo rustica*	-
Long-tailed tit	*Aegithalos caudatus*	-
Chiffchaff	*Phylloscopus collybita*	-
Blackcap	*Sylvia atricapilla*	-
Lesser whitethroat	*Curucca curucca*	-
Whitethroat	*Curucca communis*	BoCC – Amber.
Wren	*Troglodytes troglodytes*	BoCC – Amber.
Blackbird	*Turdus merula*	-
Song thrush	*Turdus philomelos*	BoCC – Amber, NERC S41, LBAP.
Robin	*Erithacus rubecula*	-
Dunnock	*Prunella modularis*	BoCC – Amber, NERC S41.
House sparrow	*Passer domesticus*	BoCC – Red, NERC S41.
Yellow wagtail	*Motacilla flava flavissima*	BoCC – Red, NERC S41.
Pied wagtail	*Motacilla alba yarelli*	-
Linnet	*Linaria cannabina*	BoCC – Red, NERC S41, LBAP.
Goldfinch	*Carduelis carduelis*	-
Greenfinch	*Chloris chloris*	BoCC – Red.
Yellowhammer	*Emberiza citrinella*	BoCC – Red, NERC S41.

Common name	Species name	Conservation status
Reed bunting	*Emberiza schoeniclus*	BoCC – Amber, NERC S41, LBAP.

ANNEX 2: BREEDING BIRD SURVEY EFFORT

Date	Surveyor	Start Time (24 hrs)	End time (24 hrs)	Wind Speed	Wind Direction	Rain	Cloud Height	Cloud Cover	Visibility	Frost	Snow	Temperature (°C)
22/04/2022	JH	08:15	10:45	3	E	0	2	6/8	2	0	0	10
30/05/2022	JH	06:30	09:00	1	SW	0	2	1/8	2	0	0	8
01/07/2022	JH	07:55	10:00	2	SW	0	2	5/8	2	0	0	14

Wind Speed		W-Direction	Rain		Cloud Cover		Cloud Height	
Calm	0	Use 16 point Compass	None	0	In eighths e.g.	3/8	<150m	0
Light air	1		Drizzle/Mist	1			150-500m	1
Light breeze	2	N	Light showers	2			>500m	2
Mod. breeze	3	NE	Heavy showers	3				
Fresh breeze	4	ENE	Heavy Rain	4				
Strong breeze	5	E						
Mod. gale	6	Etc	**Visibility**		**Snow**		**Frost**	
Fresh gale	7		Poor	0	None	0	None	0
Strong gale	8		< 1km	1	On site	1	Ground	1
Whole gale	9		>1km	2	High ground	2	All day	2
Storm	10							

Appendix 2: Great Crested Newt Presence or Absence (eDNA) Survey Report

Southlands Solar Farm

on behalf of Enso Green Holdings J Limited

Appendix 2 - Great Crested Newt Presence or Absence (eDNA) Survey Report

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Document Control				
Project Name:		Southlands Solar Farm		
Project Number:		EnsoE-517-3125		
Report Title		Appendix 2: Great Crested Newt Presence or Absence (eDNA) Survey Report		
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	07/10/2022	Draft	A. Stanley *BSc (Hons) PG Dip ACIEEM*	B. Walker *MSC MCIEEM*
V2	17/10/2022	Updated Draft	A. Stanley *BSc (Hons) PG Dip ACIEEM*	B. Walker *MSC MCIEEM*
V3	26/10/2022	Final	A. Stanley *BSc (Hons) PG Dip ACIEEM*	B. Walker *MSC MCIEEM*

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FIGURES

ANNEXES

1 INTRODUCTION

1.1 Background

1.1.1 Avian Ecology Ltd. was commissioned by Enso Green Holdings J Limited to undertake a presence/absence survey for great crested newt (GCN) *Triturus cristatus* using environmental DNA (eDNA) sampling. The survey was undertaken in relation to the proposed development for a Solar Farm and battery storage facility on land south of Runwell Road (A132), Runwell, Wickford ('the Site'), as illustrated in **Figure 2.1**.

1.1.2 The purpose of this report is to outline in detail the survey methodology applied, in addition to presenting the subsequent results of eDNA testing carried out on-site.

1.2 Survey Area

1.2.1 Ponds were identified from aerial images and Ordnance Survey (OS) maps on or within 250m of the preliminary Site boundary and which encompasses the updated Site boundary and areas within 250m. Due to the low impact of solar energy developments on GCN habitats, and reflecting guidance published by Natural England, the survey of ponds beyond 250m, from the Site are not typically considered necessary to inform an Assessment.

1.2.2 Ponds subject to assessment, are identified on **Figure 2.1**.

2 METHODOLOGY

2.1.1 A total of eight ponds (P1-P8) were identified within 250m of the preliminary Site boundary, although none were found to be present directly on-Site.

2.1.2 Five of these ponds (P1-P4 and P6) were confirmed to be separated from the Site by natural or artificial barriers, such as the River Crouch, and kerbed A roads. Consequently, these were discounted from further assessment. Of the three remaining ponds (P5, P7 & P8), access and assessment was possible for only Pond P7. Access to ponds P5 and P8 was not possible at the time of survey.

2.1.3 A field survey in relation to P7 was undertaken on the 14th June 2022. Pond P7 was confirmed to be accessible, and subsequently assessed for its potential to support GCN using the Habitat Suitability Index (HSI) Assessment methodology, as developed by Oldham *et al.* (2000)[1] and detailed within ARG UK guidance (ARG UK, 2010). Additionally, P7 was also subject to eDNA sampling in order to determine the presence or likely absence of GCN.

2.2 HSI

2.2.1 The HSI assessment incorporates measurements for ten indices relating to different environmental variables, which when combined, have been found to provide a good indication for the general suitability of individual ponds, in relation to GCN. Each of these indices is scored (between 0.01-1) using a series of graphs and figures contained within the ARG's guidance notes (ARG UK, 2010[2]). Cumulative scores are then used to calculate an overall Habitat Suitability Score for a given pond.

2.2.2 Final scores relate to pond suitability for great crested newt and range from 'poor' to 'excellent'.

2.3 eDNA

2.3.1 Environmental DNA (eDNA) is nuclear or mitochondrial DNA that is released from an organism into the environment. Sources of eDNA include secreted faeces, mucous, gametes, shed skin and carcasses. In aquatic environments, eDNA is diluted and distributed in the water where it persists for 7–21 days, depending on the conditions (Biggs *et a*l., 2014[3]). The technique for determining presence/absence of GCN uses Polymerase Chain Reaction (PCR) laboratory techniques to detect the species eDNA within water samples.

2.3.2 Research by the Department for Environment Food and Rural Affairs (Defra) Project WC1067, concludes that the sampling of waterbodies collecting eDNA appears to be a highly effective method for determining whether great crested newts are present or absent during the breeding season, even where eDNA is present in very low concentrations (Biggs *et al.,* 2014).

2.3.3 Natural England accepts the use of environmental DNA surveys as evidence of presence or absence of GCN, provided samples are taken when newts are likely to be present (this depends on location and conditions like the weather). Natural England will only accept eDNA survey results undertaken between mid-April and the 30th of June, in strict accordance with the published technical advice note, by suitably experienced and licensed GCN surveyors.

[1]Oldham R.S., Keeble J., Swan M.J.S. and Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal, 10(4), pp. 143-155.

[2]ARG UK (2010) ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.

[3]Biggs J., Ewald N., Valentini A., Gaboriaud C, Griffiths R.A., Foster J., Wilkinson J., Arnett A., Williams P and Dunn F (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

Field Sampling Technique

2.3.4 Pond P7 was sampled on the 14th June 2022 by a suitability experienced and accredited agent, Mrs K. Ward *MSc*. (accredited under Mr D. Foy's licence; 2015–19225-CLS-CLS) and Mr. L. Quarton *MSc*. Sampling took place within an acceptable surveying period, as determined by Natural England.

2.3.5 The protocol for sampling followed that outlined within the technical advice note for field and laboratory sampling of great crested newts (Biggs *et al*., 2014), which required the collection of 20 x 30ml subsamples from each pond, spaced as evenly as possible around the pond margin.

2.3.6 Each sample was then placed within a Whirl-Pak bag and shaken for 10 seconds, before a 15ml sample was pipetted from the bag and placed in a specimen tube for laboratory analysis. Following collection, samples were refrigerated prior to laboratory dispatch.

Laboratory Analysis

2.3.7 Laboratory analysis was undertaken by SureScreen Scientifics, an approved laboratory for Edna testing:

SureScreen Scientifics Division Ltd,
Morley Retreat,
Church Lane,
Morley,
Derbyshire,
DE7 6DE
Tel: +44 (0)1332 292003
Email: scientifics@surescreen.com

2.3.8 The laboratory follows the analysis methodology outlined within the Defra Project WC1067 (Biggs *et al.,* 2014) using the q-PCR test conducted in two phases.

2.3.9 The sample first goes through an extraction process to acquire as much eDNA as possible to produce a pooled sample. The pooled sample is then tested via 1-PCR.

2.3.10 Each pooled sample is replicated 12 times to ensure results are accurate. If one of the twelve replicates tests positive the sample is declared positive. The sample is only declared negative if no replicates show amplification. Inhibition and degradation checks are also carried out on each sample using a known DNA marker. Results of these quality control tests are recorded with each sample.

2.3.11 Samples are tested in a clean room and the different phases of testing are kept separate to reduce any risk of cross contamination.

3 RESULTS

3.1.1 A photograph of P7 is depicted in **Figure 3.1**, and a brief description is provided in **Table 3.1** below. Pond locations are further shown in **Figure 1.1**.

Figure 3.1: *A photograph of P7 taken in-field from an access point located on the west bank.*

Table 3.1: *Summary information pertaining to Pond 7 (i.e. P7).*

Pond Reference	Location	Description
P7	Adjacent to Site (~25m SW)	Pond P7 was located directly adjacent to the Site's southern border and is found just north of the River Crouch. Immediate surrounding habitat is comprised of a small woodland copse, connected to a hedgerow complex running east/west and north-east. Habitats to the north (including the Site) are comprised of arable/pastoral fields, with urban infrastructure (the A130 and local railway lines *etc.*) found within the wider landscape. Moreover, the woodland copse containing P7 appears to have been included within the boundary of a previous LWS. Pond P7 is a relatively deep circular pond considered to dry rarely, and is roughly 640m^2 in size. However, access was restricted to the west bank due to dense scrub growth (*e.g.,* hawthorn *Crataegus monogyna*) encircling the pond's outer margins. Hedgerows extending from the Site also interconnect with marginal scrub. Associated scrub/trees provide shade to approximately 40% of the pond surface area, and good terrestrial habitat. The pond further features steep banks (~75 degrees), with bankside/marginal vegetation including garlic mustard *Alliaria petiolata*, and water-mint *Mentha aquatica*. Emergent reed is prominent within the pond (~35%), with a relative abundance of invertebrates (*e.g.,* banded damselfly *Calopteryx splendens*) present, in addition to bird activity.

3.2 HSI

3.2.1 P7 received a HSI score of 0.84, indicating an inferred 'excellent' habitat suitability for GCN, as shown in **Table 3.2** below.

Table 3.2: *A summary of HSI survey results relating to Pond P7.*

Suitability Indices	P7
SI1 – Location	1
SI2 – Pond area	1
SI3 – Pond drying	1
SI4 – Water quality	1
SI5 –Shade	1
SI6 – Fowl	0.67
SI7 – Fish	1
SI8 – Ponds	0.4
SI9 – Terrestrial habitat	1
SI10 – Macrophytes	0.65
HSI	**0.84**
Suitability	**Excellent**

3.3 eDNA

3.3.1 Pond P7 returned a negative result for the presence of GCN based on eDNA sampling, as summarised in **Table 3.3** below.

3.3.2 A laboratory report produced by SureScreen Scientifics Division Ltd., presenting a detailed evaluation of eDNA sampling, is also reproduced in **Annex 2.1**.

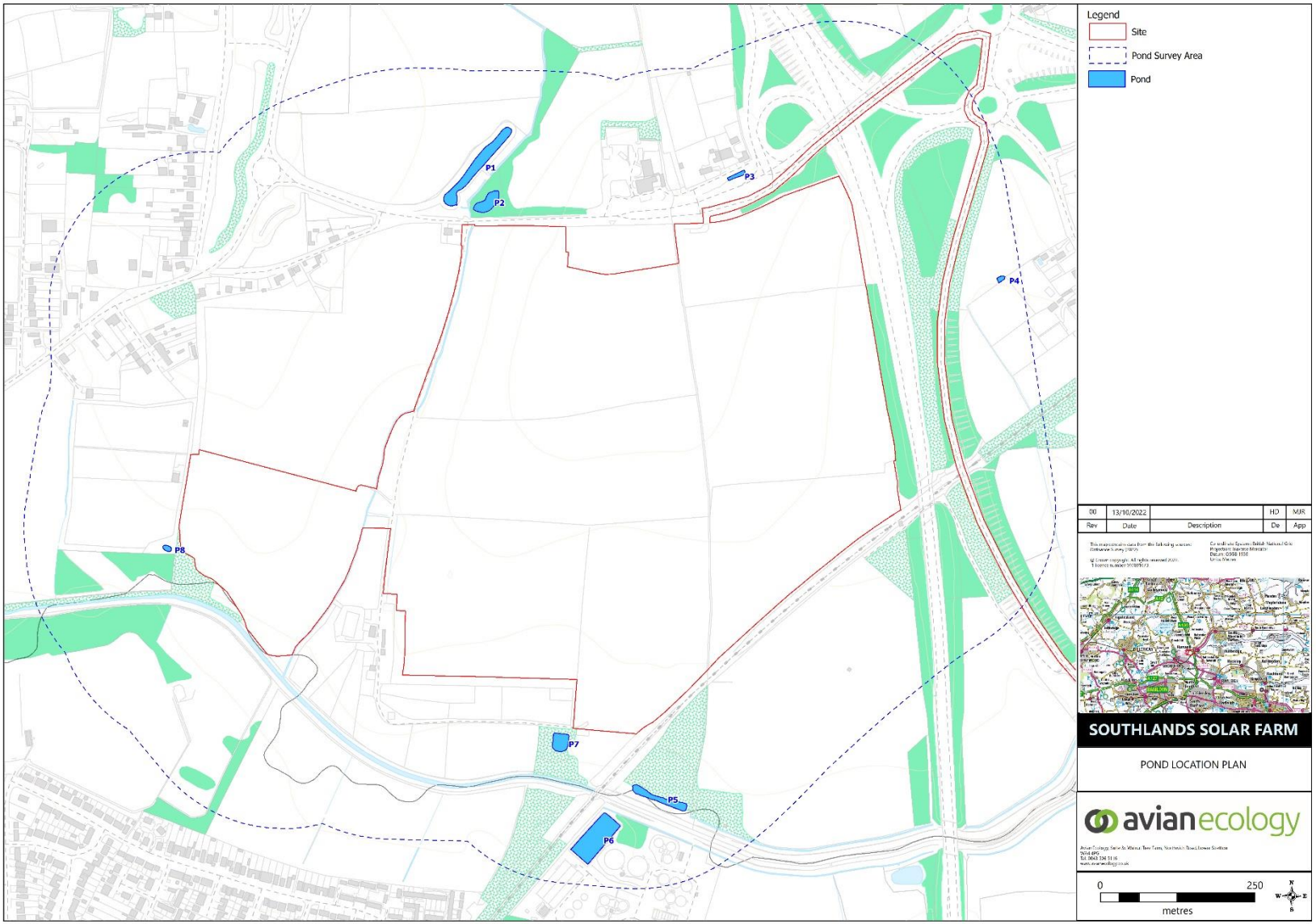
Table 3.3: *A summary of eDNA survey results for Pond 7 (i.e., P7).*

Pond	Sample Ref.	Inhibition Check	Degradation Check	Sample Integrity Score	Result
P7	4716	Pass	Pass	Pass	Negative

4 CONCLUSIONS

4.1.1 The eDNA sampling and analysis returned a negative result for the one pond surveyed, P7 indicating that GCN are likely to be absent from the water body surveyed.

FIGURE 2.1: POND SURVEY PLAN



Annex 2.2 –eDNA Laboratory Results

SureScreen Scientifics

Folio No: E14353
Report No: 1
Purchase Order: AE-22-113
Client: AVIAN ECOLOGY LTD
Contact: Amy Stanley

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 22/06/2022
Date Reported: 04/07/2022
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
4716	P7 Rayleigh3		Pass	Pass	Pass	Negative	0

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Esther Strafford **Approved by:** Chelsea Warner

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Company Registration No. 08950940

Annex 2.2 –eDNA Laboratory Results

SureScreen Scientifics

METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result: **Presence of GCN eDNA** [Positive/Negative/Inconclusive]
Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.
Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.
Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.

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Appendix 3: Biodiversity Management Plan

Southlands Solar Farm

on behalf of Enso Green Holdings J Limited.

Appendix 3 - Biodiversity Management Plan

avian ecology

Document Control				
Project Name:		Southlands Solar Farm		
Project Number:		EnsoE-517-3125		
Report Title		Appendix 3: Biodiversity Management Plan		
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	07/10/2022	Draft	A Stanley BSc (Hons) PG Dip ACIEEM	B.Walker MSc MCIEEM
V2	26/10/2022	Final	A Stanley BSc (Hons) PG Dip ACIEEM	B.Walker MSc MCIEEM

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Annexes

Annex 3.1: Bat and Bird Box Specifications

Annex 3.2: Outline Reasonable Avoidance Measures (RAMS) Method Statement

1 INTRODUCTION

1.1.1 This Biodiversity Management Plan (BMP) sets out habitat protection and enhancement measures in relation to the proposed installation of a Solar Farm and battery storage facility (the 'Proposed Development') on land south of Runwell Road (A132), Runwell, Wickford. The 'Preliminary Site Boundary' has since been updated and is reflected within this report; henceforth referred to as 'the Site'. This document also details ecological management practices to be adopted with the aim of developing and maintaining wildlife habitats to provide a net gain for local biodiversity.

1.1.2 Habitat enhancement measures and ongoing management practices are proposed in line with guidance produced by BRE guidance Biodiversity Guidance for Solar Developments (BRE, 2014) that will enhance and safeguard key habitats for the benefit of wildlife, and enhance the ecological value of land currently under agricultural use.

1.1.3 BRE guidance Biodiversity Guidance for Solar Developments (BRE, 2014)[1] states that; '*with appropriate land management, solar farms have the potential to support wildlife and contribute to national biodiversity targets. Indeed, solar farms may have several additional advantages in that they are secure sites with little disturbance from humans and machinery once construction is complete. Recent research suggests biodiversity gains on solar farms can be significant*'.

1.1.4 Therefore, the site-specific approach provided within this report provides recommendations for long-term management of the land throughout the lifetime of the solar farm to conserve and improve landscape habitat connectivity with the wider landscape for wildlife through protecting and enhancing potentially important wildlife corridors and habitats. This will contribute to the establishment of coherent ecological networks, supporting the targets of the National Planning Policy Framework (NPPF, 2021).

2 ECOLOGICAL BASELINE- PRE-DEVELOPMENT

2.1.1 This BMP should be read in conjunction with the *Landscape Proposals Plan*. Detailed descriptions of habitats and species can be found in the Southlands Solar Farm Ecological Assessment Report[2].

2.1.2 The Site consists of a mix of arable and pastoral grassland fields bounded by hedgerows. A wet ditch bisects the Site and the River Crouch is located to the south of the Site.

2.1.3 The Site is not located within or adjacent to any statutory designated sites for nature conservation. Six international statutory designated sites are located within 10km of the Site and four nationally designated sites are located within 5km. The Essex Estuaries SAC, Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar and SPA and the Crouch and Roach Estuaries SSSI are located approximately 1.51km north west of the Site. Four non-statutory designated sites occur within 2km of the Site, the closest of which, Rettendon Shaw (LoWS) is situated 890m north.

[1] BRE (2014). Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene.
[2] Avian Ecology Ltd (2022) Southlands Solar Farm: Ecological Assessment Report.

3 ECOLOGICAL MITIGATION MEASURES

3.1 Designated Sites and Habitats

3.1.1 The Site does not form part of any statutory designated site for nature conservation. However, the closest statutory designated sites are located approximately 1.51km north west of the Site and include; Essex Estuaries SAC, Crouch and Roach Estuaries (Mid Essex Coast Phase 3) SPA and Ramsar and Crouch and Roach Estuaries SSSI. Qualifying species include over wintering waterbirds as well as over wintering Brent geese *Branta bernicla*. Wintering bird surveys are ongoing and results of these will be used to inform a Habitats Regulations Assessment (HRA), if required.

3.1.2 No other impacts on statutory or non-statutory designated sites are anticipated, with the following measures being implemented. Further detail on designated sites is provided within the Ecological Assessment Report.

3.1.3 The layout of the proposed development has been designed to retain hedgerows, trees and ditches as far as practically possible, with buffers of at least 5m wide maintained along field boundaries. Perimeter fencing will be erected first before construction starts to prevent the encroachment of works beyond the Site boundary. The proposed access tracks will exploit gaps in hedgerows. An existing crossing point will be used over the ditch on Site, ensuring the minimum 5m buffer is maintained.

3.1.4 Hedgerows will be retained on Site and along with mature trees around the construction areas, will be protected in-line with BS 5837:2012 *Trees in relation to design, demolition and construction*.

3.1.5 Standard measures to ensure surface water runoff control and pollution prevention will be implemented; these measures will safeguard boundary habitats as well as off-site ditches and watercourses and associated habitats and species.

3.1.6 There will be clear delineation of working areas and access routes for vehicles entering the Site and instructions on these will be given to all site construction staff, delivery drivers and subcontractors.

3.1.7 During the operation of the solar farm over time, dirt and dust can accumulate on the glass surface of the module, reducing its power output. Periodic cleaning of PV modules where required will be a very low disturbance activity undertaken with a soft brush and using clean water. No chemicals are required.

3.2 Birds

3.2.1 Site clearance works should be undertaken outside of the breeding bird season in so far as reasonably practical. The breeding bird season is generally considered to be 01st March to 31st August inclusive. Where this cannot be avoided, a suitably experienced ecologist will be appointed to undertake a pre-site clearance survey to identify the presence of any wild bird nests being built or in use (including those of ground nesting birds such as skylark *Alauda arvensis)*. Only once the appointed ecologist is satisfied that an offence under Part 1 of the Wildlife and Countryside Act 1981 (as amended) will not occur, may works proceed.

3.2.2 If a nesting species is identified, a suitable work exclusion zone will be established around the nest site and a Breeding Bird Protection Plan will be required, in line with best practice guidance and in consultation with the advising ecologist.

3.2.3 There is the potential for effects on the Crouch & Roach Estuary SPA & Ramsar through habitat loss and displacement of qualifying species such as wintering birds including the Brent goose. Wintering birds are ongoing and results from this will be used to support a HRA if required.

3.2.4 During operation, disturbance will be minimal and limited to intermittent maintenance activities. However, it is recommended that the cleaning of panels is undertaken outside of the breeding bird season in so far as reasonably practical to minimise disturbance to nesting birds.

3.3 Bats

3.3.1 Protection of mature trees, hedgerows and other field boundary features around the Site and adjacent land will safeguard potential roost sites and maintain foraging and commuting opportunities.

3.3.2 Construction will be undertaken during daylight hours as far as possible; in order to protect foraging and/ or commuting bats, if any lighting is required during construction, this will be used in a sensitive manner and directed away from field boundary habitats and habitats bordering the Site.

3.3.3 During operation, the solar farm will not be routinely lit. Any lighting associated with the substation will be very localised and will only be used on occasion, for example if an engineer needs to carry out emergency visits to the Site at times when natural light levels are low.

3.3.4 Any lighting required will be restricted and directed away from retained boundary habitats to maintain dark corridors for foraging and commuting. Light spill can be avoided in a number of ways, including the use of low-level lighting and use of hoods and careful selection of lighting; further information is available in *Bats and Lighting in the UK, Bats and the Built Environment Series, Bat Conservation Trust and Institute for Lighting Engineers*[3]. As long as lighting is designed and implemented in a sensitive manner, no discernible effects are anticipated on foraging/commuting bats.

3.3.5 As trees with roost potential will be retained along with other field boundary features, and the Site will adopt sensitive lighting measures, maintaining foraging and commuting 'dark' corridors along hedgerows and trees lines, the proposed development is not anticipated to have any adverse impacts on local bat populations.

3.3.6 If any tree is subsequently required to be removed, checks for roosting bats will be undertaken in advance of any removal. If bats are confirmed to be roosting within any tree to be impacted by proposed works, the data gathered would be used to inform potential design amendments avoid or reduce impacts or, failing that support a licence application to Natural England to destroy/disturb the bat roost.

3.4 Badger

3.4.1 No evidence of badger *Meles meles* presence has been observed within the Site. However, suitable habitat is located within and adjacent to the Site including grassland field boundaries and hedgerows, with the neighbouring adjacent woodland to the south offering further foraging, commuting and sett establishment opportunities.

3.4.2 Due to the highly mobile nature of badgers, a pre-construction badger check will be undertaken to confirm the continued absence of badger setts within the proposed development area before commencement of works. If a sett is found, advice will be provided by the project ecologist to ensure necessary protection, avoidance or mitigation measures are in place before works proceed.

[3] Institution of Lighting Professionals & the Bat Conservation Trust. (2018). *Guidance Note 08/18: Bats and artificial lighting in the UK Bats and the Built Environment series*

3.4.3 Once constructed, the proposed development (with panels raised off the ground) will not sever potential commuting routes used by badgers, with linear features such as hedgerows and ditches to be largely retained and protected as part of the proposed development. Gaps or mammal gates will be installed at suitable intervals and locations along the perimeter fence line to allow badgers and other small mammals free movement into and out of the Site, providing enhanced opportunities for foraging and refuge within what will be a relatively protected and undisturbed area.

3.5 Otters and Water Vole

3.5.1 A ditch is present within the Site and the River Crouch runs adjacent to the south of the Site. The on-Site ditch was considered to provide sub-optimal habitat for otter and water vole.

3.5.2 The proposed development will maintain a buffer of at least 5m from watercourses. However, if any works are required in or within 5m of a watercourse, a pre-construction otter and water vole survey will be undertaken by a suitably experienced ecologist prior to any works commencing to the watercourse to check for signs of activity.

3.5.3 If the survey finds water vole / otter to be present and significant disturbance is considered likely during the proposed works, one or both of the following options will be incorporated:

- The development design will be amended to avoid works which may impact upon water vole / otter and their habitat (e.g. alteration of the configuration of access tracks and/or crossings); and/or,

- Works will be undertaken under a licence if disturbance cannot be avoided. Licenced works are restricted to certain times of the year e.g., works under a water vole class licence must be undertaken between 15th February and 15th April and for a site (which must be obtained from Natural England) including trapping, between 1st March and 15th April.

3.5.4 Standard measures to ensure run off control and pollution prevention will be implemented in line with a Construction Environmental Management Plan (CEMP) to protect riparian habitats both on-Site and the wider area to ensure no indirect effects occur.

3.6 Hazel Dormouse

3.6.1 The dominant habitats within the Site (arable and modified grassland) is considered to be of negligible suitability for hazel dormice *Muscardinus avellanarius* but the hedgerows and woodland within and adjacent to the Site have greater value for the species.

3.6.2 Any works within suitable habitat such as hedgerows, will follow Reasonable Avoidance Measures (RAMs) under the supervision of a licensed ecologist to avoid any risk of adverse effects on hazel dormice species if present. Outline RAMs are provided at **Annex 3.2.**

3.6.3 Hedgerow and woodland buffer creation as well as tree planting will provide the species with additional suitable habitat. Overall, the proposed habitat retention and enhancements will provide a habitat net-gain for hazel dormice (if present) by providing enhanced terrestrial habitat for foraging/hibernation purposes.

3.7 Amphibians and Reptiles

3.7.1 Land within the Site is dominated by arable fields and modified grassland, which are intensively managed and considered to be unsuitable habitat to support and maintain viable amphibian populations. However, habitats such as field boundaries and hedgerows, which will be retained and protected, may provide suitable terrestrial habitat for amphibian species.

3.7.2 A total of eight ponds (P1-P8) were identified within a 250m search buffer of the Site, although none were found to be present directly on-site. Five of these ponds were confirmed to be isolated from the Site by natural or artificial barriers such as the River Crouch and kerbed roads. Consequently, these were discounted from further assessment in conjunction with Natural England's published guidance.

3.7.3 One pond was accessible for surveys and a eDNA survey on pond P7 returned a negative result, indicating that great crested newts *Triturus cristatus* (GCN) are absent from this pond. All other ponds were not able to be surveyed due to access constraints.

3.7.4 All ponds in the wider area will be retained and protected. Where possible, stand off buffers will be established, to protect ponds and suitable surrounding terrestrial habitats (e.g., hedgerows and scrub etc) that may be used by amphibians and reptiles.

3.7.5 Works are primarily focussed within low value habitats including arable and managed short grassland where amphibians and reptiles are unlikely to be present. However, a precautionary approach is proposed to safeguard individual GCN and common reptiles potentially present for the removal of suitable habitat within the Site such as hedgerows and tall grassland. Construction works will follow RAMs under the supervision of a licensed ecologist, as required. Outline RAMs are provided at **Annex 5.3**.

3.7.1 Standard measures to ensure run off control and pollution prevention will be to protect aquatic and associated terrestrial habitats and ensure no indirect effects on amphibians and reptiles.

3.7.2 Total land take for solar farm developments is typically low (less than 5% footprint on the ground) and construction works are low impact; requiring limited disturbance for a temporary period of time. Overall, the proposed habitat retention and enhancements such as species and structurally diverse grassland, hedgerow creation, woodland buffer planting, log piles and insect hotels will provide a net benefit for reptiles and amphibians including the local populations of GCN by providing extensive areas of undisturbed and enhanced terrestrial habitat for foraging, refuge, hibernation and dispersal.

3.8 Other Species

3.8.1 Brown hares *Lepus europaeus* and hedgehog *Erinaceus europaeus* may potentially use the Site. The habitats on Site are typical of habitats in the wider environment, and with low levels of land take associated with solar farm, the proposed development is not considered to negatively impact local populations of these species.

3.8.2 Security fencing located around the Site perimeter will have mammal gates or gaps positioned at several locations along the base of fences in order to allow mammal species such as brown hare and hedgehog (amongst others) to continue to use the habitats on Site during the operational period, thereby maintaining dispersal routes and opportunities to access relatively undisturbed habitat within the secured Site and connectivity in the wider landscape.

3.8.3 The retention, creation and infilling of hedgerows as well as installation of hedgehog boxes and insect hotels will also increase habitat provision within the Site for invertebrates, brown hare, hedgehog and other species.

4 ECOLOGICAL ENHANCEMENT MEASURES

4.1 Habitat Enhancement

4.1.1 Management practices are proposed that will enhance the Site for the benefit of local wildlife. The design and long-term management of the land seeks to maintain and improve functionality through

protecting and enhancing potentially important wildlife corridors i.e. through new hedgerow creation and infill planting to strengthen existing hedgerows within and around the Site as well as planting trees. The creation of extensive grassland habitat on fields which were formerly arable provides increased habitat for invertebrates and foraging, shelter and breeding opportunities for other wildlife.

4.1.5 The *Landscape Proposals Plan* sets out the landscape planting and maintenance specifications.

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

4.1.7 All bare-root planting stock will be kept covered until actually planted in order to minimise water-loss and prevent the roots from drying out. Bare root stock shall be planted while dormant (during winter months). Containerised and rootballed stock will be used where necessary, as advised by the supplier.

4.1.8 Any imported topsoil will accord with BS 3882 *Specification for Topsoil*. All supplying nurseries will be registered under the Horticultural Trade Association Nursery Certification Scheme and plant material should be of certified British provenance. All plants will be packed and transported in accordance with the Code and Practice for Plant Handling as produced by The Committee for Plant Supply and Establishment.

4.1.9 All plant material will conform with BS:3936 *Specification for nursery stock Bulbs, corms and tubers* and BS:4428 *Code of practice for general landscape operations (excluding hard surfaces)*, or the most up to date and current British Standards and in accordance with seed supplier's technical advice.

4.1.10 It is advised that herbicides are not used on Site; however, if herbicides are required, the herbicide handbook (English Nature, 2003[4]) provides guidance on appropriate herbicide use in relation to nature conservation works.

Ground Preparation

4.1.11 Where necessary existing weeds will be manually removed or treated with a suitable herbicide as specified within the herbicide handbook (English Nature, 2003) or hand-weeding.

4.1.12 Any extraneous matter such as plastic, large pieces of wood and metal will be removed from Site to a registered waste disposal facility.

Native Hedgerow Planting

4.1.13 Hedgerow trenches shall be dug to 450mm x 450mm x 450mm depth, the base of which shall be broken up before returning the approved topsoil backfill mixture to the trench, at the ratio of one part compost to two parts topsoil. All stock shall be planted to the root collar and well firmed in place.

4.1.14 After planting, a 50mm layer of approved compost fine bark (nominal size 1-10mm) shall be spread over the whole hedge area (450mm wide).

4.1.15 On completion, all hedge plants shall be thoroughly watered in and will be protected from damage by rabbit proof fencing or individual spirals/shrub guards, as appropriate.

[4] English Nature (2003) *The Herbicide Handbook: Guidance on the use of herbicides on nature conservation sites*. Natural England, Peterborough.

Tree Planting

4.1.16 All standard trees will be planted in separate pits (1m x 1m x 900mm), which shall be backfilled with a mixture of approved topsoil and tree and shrub planting compost at a rate of one part compost to two parts topsoil. Root barriers will be employed near services.

4.1.17 The bottom of each pit will be broken up to a depth of 150mm and the sides will be scarified. Each tree shall be planted centrally within the pit to the original root collar and secured by two untreated stakes (1.4m minimum length), with approved ties.

4.1.18 After planting, all trees will be watered-in and a mulch layer of 1m diameter approved forest bark will be spread over the tree pit to a depth of 50mm. A spiral guard will be fixed to the base of each tree to protect it from rabbit damage and potential strimmer damage.

Native Woodland Buffer

4.1.19 Individual pits shall be dug to a minimum of 450mm x 450mm x 300mm depth, the base of which shall be broken up before returning the approved topsoil backfill mixture to the trench, at the ratio of one part compost to two parts topsoil. All stock shall be planted to the root collar and well firmed in place.

4.1.20 After planting, a 50mm layer of approved compost fine bark (nominal size 1-10mm) shall be spread over each pit (1m wide).

4.1.21 On completion, all plants shall be thoroughly watered-in and will be protected from damage by rabbit proof fencing or individual spirals/shrub guards, as appropriate.

Grassland Creation

4.1.22 The BRE guidance states that, as panels are raised above the ground on posts, over 95% of a site used for solar farm development is still accessible for plant growth and complementary agricultural activities, such as conservation grazing (BRE, 2014). The RSPB briefing note on Solar Energy also states that biodiversity gains are possible where intensively cultivated arable or grassland is converted to extensive grassland and/or wildflower meadows between and/or beneath solar panels and in field margins (RSPB, 2014[5]). A significant benefit to wildlife will be therefore achieved through creation of more species and structurally diverse grassland within the Site, favourable to invertebrates, birds, mammals, amphibians, and reptiles.

4.1.23 Land beneath and around the solar panels will be converted to grassland through seeding with appropriate seed mix *Emorsgate EG27 – Special Old Fashioned Grazing Mixture* or similar. The perimeter areas will be sown with *Emorsgate EM1- Basic General Purpose Meadow Mixture* or similar, as shown on the *Detailed Landscape Plan*.

4.1.24 A longer-term approach to the establishment of this grassland meadow habitat has been adopted, through suitable management practices and the avoidance of fertilizers and herbicides to establish an increasingly species and structurally varied grassland across the Site.

<u>Seeding</u>

4.1.25 Prior to seeding (after construction of the solar panels, access tracks and other associated infrastructure), unwanted vegetation growth within the fields will be removed by scraping the surface to a depth of 150mm. The ground shall then be thoroughly broken up and cultivated and fine graded

[5] RSPB (2014) *Solar Energy: RSPB Policy Briefing, December 2014*. RSPB: Sandy.

to even running falls, before raking and cross raking. The grass seed mixes shall be sown in accordance with good practice and in line with the supplier's guidance.

4.1.26 Seeding will take place in September, to allow establishment prior to winter and reduce seed loss to birds. If the soils and seed bed have been prepared before September, any weed growth that has established in the meantime will be sprayed with glyphosate and the seedbed will be re-prepared.

4.1.27 Seeds shall be broadcast by approved lightweight machinery and following seeding, the area will be subject to rolling to incorporate the seed with the growing substrate.

4.2 Wildlife Enhancement

Bird Nest Boxes

4.2.1 Additional bird nesting provision will be made through the inclusion of 10 bird boxes erected on semi-mature/mature trees located along the field boundaries within and bordering the Site. Precise locations will be subject to confirmation during the installation depending on tree condition at that time.

4.2.2 Bird boxes should ideally be installed in the autumn (September to November) following the cessation of construction works, by the appointed contractor under advice of the suitably competent ecologist.

4.2.3 Boxes should be erected at an appropriate height of between 1 to 5 metres. Boxes should be angled so that they face away from the prevailing wind or in a semi sheltered environment. Positioning within or close to hedgerows will increase chances of occupation. Bird boxes will be suitable for a variety of farmland bird species.

4.2.4 Suitable specifications for bird boxes are provided in **Annex 3.1**.

Bat Roost Boxes

4.2.5 Additional bat roost provision will be made through the inclusion of a minimum of 10 bat roost boxes on suitable trees along the field boundaries with and bordering the Site. Boxes will be erected at an appropriate height (ideally above 4m in height) and with clear flight paths to utilise the Site boundary features. Precise locations will be agreed with the project ecologist and will be subject to confirmation during the installation depending on tree condition at that time.

4.2.6 Suitable specifications for roosting boxes are provided in **Annex 3.1**.

Hedgehog

4.2.7 Additional hedgehog habitat provision will be made through the inclusion of 5 hedgehog boxes within the Site. Precise locations will be subject to confirmation during the installation but will be focussed within sheltered and undisturbed locations along boundary features such as hedgerows and scrub. The entrance should be placed out of the weather, ideally facing east to south.

4.2.8 Boxes can be installed any time of year but should ideally be installed in the spring or summer following the cessation of construction works, by the appointed contractor under advice of the suitably competent ecologist.

4.2.9 Suitable specifications for hedgehog boxes are provided in **Annex 3.1**.

Other Species

4.2.10 Additional habitat provision for invertebrates will be made through the inclusion of 5 insect hotels/boxes erected within the Site. Precise locations will be subject to confirmation during the installation depending on the box/hotel and condition of trees (if required).

4.2.11 Insect hotels can be installed any time of year and should follow the cessation of construction works, by the appointed contractor under advice of the suitably competent ecologist.

4.2.12 Boxes should be erected at sheltered undisturbed locations and be angled so that they face away from the prevailing wind. A selection of boxes/hotels will be suitable for a variety of insect species.

4.2.13 Suitable specifications for insect boxes/hotels are provided in **Annex 3.1**.

4.2.14 Three habitat or log piles will be located along field margins within the Site to provide refuge and cover for a variety of species including invertebrates, amphibians, reptiles and small mammals. These can be added to using cut material obtained during site management (e.g., cutting back hedgerows).

5 HABITAT MANAGEMENT

5.1.1 Habitat management will be reviewed and undertaken periodically throughout the lifetime of the proposed development (see Section 7). Management will be the responsibility of the current or any subsequent owner of the solar farm. All works associated with the implementation of the BMP will be undertaken by experienced contractors. The costs of any such works will be borne by the owner or any subsequent owner of the solar farm. Monitoring and reporting will be undertaken by a suitably qualified ecologist and the costs associated with monitoring reporting and any rectification works will be borne by the owner or any subsequent owner. The Applicant would welcome a condition in this regard on any granting of planning permission.

5.1 Hedgerow, Tree Planting and Woodland Buffer

5.1.1 During the establishment period (the first five years), all dead, dying or diseased stock will be replaced with stock of similar size and species by the appointed contractor at their own cost. If the failure of the plant is due to disease and the disease is considered likely to re-occur, then an alternative native species of local provenance may be used as a replacement. The exact timing of the planting of replacement hedgerow/scrub/tree is dependent on the ground conditions; however, planting should ideally take place between the months of November and March inclusive, this will allow the plants more time to establish a network of feeder roots before the onset of spring.

5.1.2 The planting areas will be kept mulched and weed-free during the establishment period, using approved hand-weeding or if necessary, herbicide treatment (applications in April, June and August). The herbicide handbook (English Nature, 2003) provides guidance on appropriate herbicide use in relation to nature conservation works. Where used, herbicides will be sprayed in appropriate weather conditions, to avoid affecting adjacent grassland areas.

5.1.3 During the establishment period, tree/hedgerow plants should be inspected during periods of warm weather and drought. If it is considered that the ground conditions are too dry, the planted areas will be watered on a regular basis until weather conditions are considered suitable for watering to cease.

5.1.4 At the end of each growing season, all trees shall receive an application of slow-release fertiliser. The planted woodland areas and hedge lines shall receive an application of fertiliser at the end of the maintenance period.

5.1.5 During establishment, hedgerows will be trimmed outside each growing season; hedgerows will be cut back by half the growth of that year with pruning aiming to encourage the development of healthy well-shaped specimens. New hedgerows will be trimmed using powered hand-held machinery (not flail cutters) for the first 3 years until established.

5.1.6 All canes, stakes, guards, spirals or ties will be regularly checked and replaced as required and removed once plants have established. Once established planting guards (where used) will be removed and disposed of off-site.

5.1.7 Once established, all hedgerows will be allowed to grow up to a height of 3m and managed at 3m or 3m+ (as specified within the *Landscape Proposals Plan),* as appropriate for the operation of the Site to avoid shading of the panels and protect the perimeter fencing from encroachment. Hedgerows should be managed on a 2–3-year flexible rotation so that not all hedgerows are be cut in the same year for the benefit of wildlife and to allow plants to flower and set seed/fruit. Established hedgerows will be cut between late September and February using a tractor mounted flail or other method as appropriate.

5.1.8 No cutting or trimming is to be undertaken during the breeding bird season (1st March to 31st August inclusive).

5.1.9 Existing and newly planted trees will be left to grow naturally and not cut apart from pruning if necessary to maintain the health of the tree, safety or to protect panels from damage. These will be clearly marked to ensure that they are not cut back during hedgerow trimming/maintenance works.

5.2 Grassland Management

5.2.1 The grassland vegetation within the Site will be managed to provide a varied habitat structure providing nesting opportunities for birds and nectar, pollen and shelter for invertebrates, amphibians, reptiles and small mammals. Taller grassland vegetation will be encouraged to develop at the base of hedgerows and at field margins to provide foraging and shelter opportunities for wildlife.

Initial Management

5.2.2 Grassland management will be carried out in accordance with the seed supplier's technical advice during the establishment phase.

<u>Special Old Fashioned Grazing Mixture - Main Body of the Site</u>

5.2.3 During the first year of management, in good growing conditions (warm soils and adequate rainfall) the grass will establish and need its first management around 6-10 weeks from sowing, by which time grass will have reached around 10cm height.

5.2.4 Light grazing with livestock can be introduced at this stage. Sheep are to be preferred as they have lighter feet and nibble grass back neatly and so encourage the grass to thicken up by tillering at the base. Grazing for short periods initially will avoid over grazing and allow time for the grass to recover. Grazing should be avoided if the soil is saturated with water.

5.2.5 Alternatively, top initial growth (sown species and weeds) to encourage the sward to thicken up and restrict any weed growth. Cuttings will be removed/relocated so as not to leave mulched patches which will kill young grass.

5.2.6 Any cut material will be either removed from the Site or heaped in small piles in designated areas within the Site in order to prevent nutrient build-up within the soil. Heaped material will provide suitable habitat for reptiles and invertebrates.

Basic General Purpose Meadow Mixture - Site perimeter and meadow areas

5.2.7 There will often be a vigorous initial growth and a flush of annual weeds during the first season. This should be managed by topping and mowing throughout the first year at regular intervals. Regular cutting to establish the grassland will take place during Year 1 after seeding and possibly also in Year 2, if growth is particularly vigorous on the ex-arable land. In the unlikely event that the grassland / meadow planting fails and the area of bare ground is greater than 20%, these areas will be re-seeded.

5.2.8 Problem perennial weeds will be controlled by hand pulling or if necessary careful targeted application of a non-residual herbicide by way of spot spraying with a knapsack (low pressure to avoid spray drift), or weed wiping (no herbicide application within the vicinity of ditches or watercourses) herbicide application may be used in April, June and August. Alternatively, annual weeds can be managed by topping and mowing prior to setting seed which will encourage lateral development of the grasses. Any topping undertaken between April and July should be no lower than 200mm to retain habitat for ground nesting birds.

5.2.9 Any cut material will be either removed from the Site or heaped in small piles in designated areas within the Site in order to prevent nutrient build-up within the soil.

5.2.10 Specific attention should be paid to the potential presence of the following injurious (harmful) weeds: common ragwort *Senecio jacobaea*, spear thistle *Cirsium vulgare*, creeping thistle *Cirsium arvense* curled dock *Rumex crispus* and broad-leaved dock *Rumex obtusifolius*; which are all listed within the Weeds Act 1959. These species should be removed from the grassland areas prior to enhancement works commencing[6 & 7].

Long-term Management

5.2.11 Following establishment of a suitable sward, the grassland habitats will be managed through either grazing and/or mechanical cuts to develop nectar and pollen rich meadow grassland with a varied structure. Both management approaches are detailed below for ease of reference. Management by sheep grazing (option B) is preferred.

Option A: Cutting Regime

5.2.12 Following establishment, one or possibly two cuts will be taken per year comprising an early cut in February (if necessary) to manage regrowth around panels, and a second later in the season between August and September (each cut reducing sward height to approximately 150mm). No cutting will take place throughout the summer to allow the seeds of the later flowering species to fall prior to the cut. There may be circumstances when an additional summer cut is required to prevent vegetation obscuring panels, in such cases cuts should reduce sward height to no lower than 200mm to retain habitat for nesting birds.

5.2.13 Cutting should adopt a systematic method (i.e. working outwards towards the boundary features); this will allow fauna such as invertebrates, amphibians, birds and small mammals to temporarily and safely vacate the area.

[6] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525269/pb9840-cop-ragwort-rev.pdf

[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69296/pb7190-harmful-weed-control.pdf

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

5.2.15 Cuttings will remain on-Site for three to five days following the cut to allow seeds to disperse, and then be removed or heaped in designated areas within the Site in order to remove nutrients and promote the development of a species-rich sward.

5.2.16 The meadow grassland along the field margins and open meadow areas, can be cut less frequently once established, with a single main cut (reducing sward height to approximately 150mm) late in the season, between August and September, subject to weather conditions. The late cut will allow the seeds of the later flowering species to fall prior to the cut. An optional earlier cut can be made in March, if necessary, to manage re-growth.

Option B: Grazing Regime

5.2.17 Once established, the grassland within the perimeter fence can be managed by sheep grazing as an alternative to mechanical cutting. Grazing should follow a low-intensity grazing regime to maintain grass cover. Moderate trampling will expose ground for colonisation by annuals the next spring; however, heavy trampling can lead to ground poaching and infestations by weed species that will be detrimental to the Site. During the spring and summer (March to August), stock will ideally be removed or stocking density reduced to allow summer flowering plants to set seed, and grazing will be removed in the winter period in order to prevent the compaction of wet earth. The shepherd will be responsible for the management of livestock and the stocking density.

5.2.18 Ideally, it is best to aim for a stocking rate sufficient to maintain a varied structure, rather than the maximum that the grassland can support. Grazing density (**Table 5.1**) is based on medium sized sheep (i.e., 60kg). It is important to regularly monitor the Site to ensure the grassland is not under or over grazed and stock density and duration altered accordingly. The stocking density should be reduced in wet periods or in conditions when poaching would lead to a break-up of the sward and colonisation by aggressive weed species.

Table 5.1: A guide to stocking levels for lowland grassland (number of sheep per hectare). Adapted from the Lowland Grassland Management Handbook produced by Natural England.

Number of grazing weeks per year	Neutral Grassland (sheep per ha)
16	12.5
20	10
24	8
36	5.5
52	4

5.2.19 The following indicators will be used to review and amend stocking densities:

- An increase in the amount of uneaten grass, the accumulation of litter, an increase in vigorous rank and unpalatable grasses, and a reduction in low growing herbs indicates stocking density is too low (increase density).

- A reduction in density of plants, excessive poaching, weed invasion and the development of bare patches indicates stocking density is too high (reduce density).

6 ECOLOGICAL MONITORING

6.1.1 The development of the biodiversity interest of the Site will be monitored over time by a suitably experienced ecologist. A walkover survey will be undertaken on years 1, 3 and 5 and 10. This will involve an inspection of the hedgerows, woodland buffer planting, grassland and any other ecological features to ensure that they are being managed in a manner suitable for the enhancement of wildlife interest. Bird, bat, insect and hedgehog boxes will also be checked to ensure they are in place and in working order. The results of these monitoring surveys will be used to inform future changes in management and the need or otherwise to replace missing boxes. The management plan will be amended, if necessary, based on the monitoring recommendations (including amending the cutting/grazing regime if necessary).

6.1.2 Following the outcomes of each monitoring survey it will be the duty of "the Owner" of the Site to amend the BMP to inform future changes in management including amending the grazing and cutting regime, if needed.

6.1.3 Monitoring procedures are outlined in **Table 6.1** (adapted from BRE guidance):

Table 6.1: Monitoring procedures and key indicators.

Biodiversity feature	Monitoring procedure	Key indicators
Hedgerows / woodland buffer planting	Walk full length of planted/infilled hedgerows	Browse damage, dead whips, weeds, gaps, dead or damaged hedgerow plants.
Grassland Areas	Walkover of grassland areas- main body of Site and perimeter	<u>If option A (cutting) is chosen:</u> Excessive weed invasion or unwanted perennial weeds (docks, thistles) may need control by occasional spot treatment with an herbicide or other specific remediation. <u>If option B (Grazing) is chosen:</u> Increase in the amount of uneaten grass/accumulation of litter/vigorous rank and unpalatable grasses – indicates need to increase stock densities. Reduction in density of plants or plant species present (count and check against original seed mix species list) - Indicates need to reduce stock densities or amend cutting regime. Excessive poaching, weed invasion or unwanted perennial weeds (docks, thistles) may need control by occasional spot treatment with an herbicide or other specific remediation. Occasional bare patches at the edges of the grassland (<20%) are acceptable as they provide diversity within the grassland habitat for invertebrates and birds.
Bird, bat, insect and hedgehog boxes	Inspect each box	Ensure boxes are present and they are intact (external inspection) and secured. Note if need to replace.
Hibernacula/log piles	Inspect each hibernacula/ log pile	Check for obvious damage. Note need for repairs or for hibernacula/ log pile to be built-up. Also note any barrier that may hider wildlife entering the structure.

7 INDICATIVE MANAGEMENT SCHEDULE

7.1.1 The following management programme shows possible months in which activities will commence within the first planting period after construction:

Implementation and Habitat Enhancement Year 1

Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Grassland creation (*preferred month)			✓	✓	✓	✓	✓	✓	✓*			
Hedgerow and tree planting	✓	✓									✓	✓
Installation of bird, bat, insect, hedgehog boxes and hibernacula/log piles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Habitat Management Year 2

Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Initial management of grassland (targeted herbicide treatment of perennial weeds or cutting/topping where necessary)				✓		✓		✓				
Herbicide treatment or hand-weeding of hedgerow / tree planting bed				✓		✓		✓				
Trimming of new hedgerows to encourage bushy side growth	✓	✓							✓	✓	✓	✓
Inspect bird, bat, insect and hedgehog boxes as well as hibernacula/log pile. Repair and replace, as required	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Ongoing Annual Management, Year 3 onwards

Management Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Grassland cutting		✓						✓	✓			
Sheep gazing	✓	✓							✓	✓	✓	✓
Herbicide treatment or hand-weeding of hedgerow / tree planting bed (establishment period up to first five years)				✓		✓		✓				
Periodic trimming of hedgerows as required	✓	✓							✓	✓	✓	✓
Inspect bird, bat, insect and hedgehog boxes as well as hibernacula/log pile. Repair and replace, as required	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

ANNEX 3.1: WILDLIFE BOX SPECIFICATIONS

Suitable Bat Roost Boxes		
Large Twin Crevice		Primarily for use by roosting bats but may also be used by small birds as a safe roost site. Two curved internal voids narrowing down to tight crevices at the top. Suitable for a range of bat species, mating roosts and spring and autumn roosts where the thermal mass is a benefit. Top loop for more comfortable carrying and quick initial attachment to the tree and two *through the box* nail holes for secure attachment of this heavy box.
Kent Type Twin Crevice		Two parallel crevices for roosting bats with internal connection to move between the two. Light internal finish for helping to spot bats, droppings and rub marks. Top loop for quick and easy initial attachment to the tree, plus two *through the box* nail points for maximum security.
Bat chamber		Primarily for use by roosting bats including as an autumn mating roost, particularly for pipistrelles. Also likely be used by small birds as a safe roost site. 16mm hole for endoscope inspection in the base facilitating inspection, potentially avoiding working at height with the right equipment. Light internal finish facilitates detection of droppings or rub marks. Top loop makes initial attachment to the tree easier – with two further attachment points for 6" nails for security.
Siting	The bat boxes can be sited in trees and are best positioned at a height above 4 metres. Bat boxes should ideally be sited in open sunny positions facing different directions to provide a variety of micro-habitats.	
Timing	Bat boxes can be installed at any time of year following the cessation of construction works.	

Other Notes	Note that once bats have inhabited a roost site, they may only be disturbed by licensed bat workers.
References	https://www.barkboxes.co.uk/product/large-twin-crevice/ https://www.barkboxes.co.uk/product/kent-type-twin-crevice/ https://www.barkboxes.co.uk/product/bat-chamber/

Suitable Bird Boxes		
Great tit / tree sparrow nest box		Nest box and roost site with 28mm entrance suitable for great tit or tree sparrow. Likely to be used by roosting birds, one of these was adopted by a blue tit whilst still in production, and with potential for use by roosting bats.
Starling box		A large box for nesting starling. This meets BTO recommendations, but we are researching whether smaller curved boxes will be used by the species. *Branch stub* entrance provides shelter and protection from predators. Top loop provides more comfortable carrying and a quick initial attachment point to the tree; whilst *through the box* nail points provide security for this large box.
Branch stub		Replicating a rotting branch stub with void. More likely to be used by nesting and roosting birds than roosting bats.

Suitable Bird Boxes		
Open fronted nest box		For birds such as robin and pied wagtail. Open fronted but with a generous canopy to screen from aerial predators. Place in good cover not in the open.
Siting	The nest boxes should be sited in trees and are best positioned at a height of between 1 to 5 metres. Boxes should be angled so that they face away from the prevailing wind or in a semi sheltered environment. Positioning within or close to hedgerows will increase chances of occupation.	
Timing	Bird boxes will be erected outside of the breeding bird season, to eliminate the possibility of disturbing birds currently utilising the trees for nesting.	
Other Notes	Note that bird boxes should not be opened between the months of March to September to avoid disturbing nesting birds.	
References	https://www.barkboxes.co.uk/product/great-tit-tree-sparrow/ https://www.barkboxes.co.uk/product/starling-box/ https://www.barkboxes.co.uk/product/branch-stub/ https://www.barkboxes.co.uk/product/open-fronted-nest-box/	

Examples of a Suitable Hedgehog Box		
Wooden hedgehog Nest Box		Hedgehog box that is made out of FSC certified exterior grade plywood. It has chambers and a tunnel, to help prevent predator interference. It is designed with in built ventilation to provide ambient temperature and humidity without draughts.
Siting	Sheltered and undisturbed locations, primarily along field boundaries.	
Timing	Boxes can be installed at any time of year following the cessation of construction works but ideally in spring or summer.	
Other notes	Note that boxes should not be opened between the months of November to February (temperature dependent) to avoid hibernating hedgehogs.	
References	https://www.wildcare.co.uk/10512-hedgehog-nest-box-nbc.html	

Examples of Suitable Insect Hotels		
Insect Tower for a variety of insects		It has been designed to provide habitat for a range of insects. The nesting tubes are for solitary bees, vertical slots are for butterflies, refuge holes are good for ladybirds and lacewings and pine cones for a variety of species.

Examples of Suitable Insect Hotels		
Hymenoptera nesting box		Hardwood nesting aid for Hymenoptera such as wild bees, sand wasps and common wasps. They live and occupy existing holes. Natural numbers of these features are decreasing with arable cultivation.
Clay and reed box for a variety of insects		Reeds either side and clay with holes in the centre provides a range of habitats for a variety of insect species.
Siting	The nest boxes should be sited in trees and should be angled so that they face away from the prevailing wind or in a semi sheltered environment within a sunny area.	
Timing	Boxes can be installed at any time of year following the cessation of construction works	
References	https://www.nhbs.com/schwegler-clay-and-reed-insect-nest https://www.nhbs.com/schwegler-insect-nesting-aid-hardwood https://www.nhbs.com/insect-tower	

ANNEX 3.2: OUTLINE REASONABLE AVOIDANCE MEASURES (RAMS) METHOD STATEMENT

The following Method Statement outlines suitable measures to be implemented during construction works associated with the proposed solar development to avoid the disturbance, injury or killing of individual hazel dormice *Muscardinus avellanarius*, hedgehog *Erinaceus europaeus*, amphibians including great crested newt *Triturus cristatus* and common reptile species.

Measures to ensure the favourable conservation status of the species during the proposed development must reflect legislation and guidance application at the time and the construction phase will be undertaken following RAMS under the supervision of an Ecological Clerk of Works (ECoW) as required to provide advice.

These RAMs relate to small scale removal of optimal habitat including hedgerows and tall grassland and should not be employed for larger scale or extensive habitat removal. Minor or short term destructive or disturbance works (e.g. grid connection, cable laying, ground mountings, construction of substations) will also follow this Method Statement to ensure legal compliance and to ensure the objectives are achieved.

Hazel Dormouse

Summary of Method Statement

Hazel dormouse is not considered likely to be present; however, hedgerows and adjacent woodlands may offer suitable habitat for the species.

Any clearance of habitats potentially suitable for hazel dormouse (woodland) will be carried out by hand or light machinery using the 'persuasion' approach (Bright *et. al.*, 2006[15]) and under the direct supervision of a suitably licensed ecologist and/or accredited agent.

Search and Habitat Clearance

Prior to habitat clearance commencing in suitable hazel dormouse habitats, a detailed inspection of all such vegetation to be removed/impacted will be undertaken by the supervising ecologist in order to ensure no hazel dormice are present. Clearance of 0.08ha of woodland for example are not likely to affect dormice in any way but should be first checked by the ecologist. For areas greater than that may require more detailed survey and advice should be sought from the ecologist before removal.

Potential impacts of killing and injury during site clearance will be mitigated using the 'persuasion' approach (Bright *et al*, 2006[8]). This approach is normally adopted where:

- Less than 100m of hedgerow will be removed – as long as the remaining habitat is linked to a larger potential dormouse habitat.
- Less than a 50m wide strip of woodland will be removed – as long as the remaining habitat is linked to a larger dormouse habitat.

If works are proposed during the dormouse hibernation period between November – March, vegetation will be 'soft' felled in order to avoid impacts on potential dormouse hibernation habitat such as tree/hedge 'stools' and exposed roots (no ground clearance should take place in these habitats during this period). Felled tree

[8] Bright, P.W, Morris, P.A. & Mitchell-Jones, A. (2006) *Dormouse Conservation Handbook: Second Edition*. English Nature, Peterborough.

sections may be logged into approximately 2m lengths and piled away from proposed works areas to provide wildlife habitat (including summer and winter nest/hibernation sites for dormice). As a precautionary measure, remaining stumps that may provide places of shelter should be removed the following April/May.

All clearance will be undertaken by an appointed contractor under the supervision of a suitably qualified/licenced ecologist using hand tools or light machinery, and will be sensitive to the likelihood of disturbing dormice. Vegetation will be gradually reduced to stump level, with all cut brash stacked in habitat piles or chipped into piles at suitable locations around the site (outside of the proposed development works areas in retained woodland habitats), as directed by the ECoW to provide habitat for invertebrates, small mammals (including dormice), amphibians and reptiles.

Site operatives will be informed by a 'tool box', which will detail the potential for protected species to occur on-site, what to look out for and what to do in the event that animal is found.

If a hazel dormouse is found during site clearance or construction periods, works must stop immediately and contact should be made with a suitably qualified/licenced ecologist for advice. Further works potentially affecting dormice would require a European Protected Species Mitigation Licence to legally proceed.

Amphibians

Summary of Method Statement

Great crested newts were found during the eDNA survey to be absent in P7, however some ponds were inaccessible during survey. The majority of the site is arable land and intensively managed modified grassland, of negligible suitability for amphibians. The hedgerow bases, field margins and woodland offer suitable habitat.

The following Method Statement outlines suitable measures to be implemented during construction works to avoid the potential for disturbance, injury or killing of individual great crested newt.

Should RAMs be considered insufficient, certain works may require to be undertaken under a Low Impact Class Licence (LICL) or full European Protected Species Mitigation (EPSM) licence from Natural England, either of which would be supported by a detailed Method Statement.

Where possible, buffers will be implemented around ponds. These RAMs relates small scale removal of suitable habitat. They should not be employed for larger scale or extensive scrub, woodland or hedgerow habitat removal. Minor or short term destructive or disturbance works (e.g. grid connection, cable laying, ground mountings, construction of substations) will also follow this Method Statement to ensure legal compliance and to ensure the objectives are achieved.

Vegetation clearance works including within woodland areas as well as grasslands greater than 15cm in height will be supervised by a suitably licensed ecologist and/or accredited agent.

Method Statement

This Method Statement should be followed for the construction works and associated minor short term destructive habitat clearance works within the Application site, as listed above in order to ensure legal compliance and to ensure the objectives are achieved.

The following measures will be adopted throughout the construction period of the proposed development:

- Site operatives will be informed by 'tool box' talk of the potential for protected species to occur on-site, what to look out for and what to do in the event that animal is found.

- Vegetation clearance works in close vicinity to ponds, should only commence after a careful visual inspection by a ECoW has determined that no animals are present. Vegetation should be reduced (by hand strimmer) to a height of c.150mm prior to ground works commencing to aid visual searches and encourage individuals to temporarily move away from the working areas.

- Trenches and excavations should include an escape route for animals that might enter the trench, especially if left open overnight. Ramps should be no greater than 45 degrees in angle and can include wooden planks or ramped earth. Ideally, any excavations open for a prolonged period should be covered.

- All excavations left open overnight or longer should be checked for animals prior to the continuation of works or infilling.

- Any excavated material stored overnight should be searched prior to being used as infill.

Should a great crested newt be found at any point during construction, works within suitable habitat and/or potentially disturbing works in close proximity to the great crested newt must cease immediately and the ECoW will advise on the appropriate actions, including applying for a licence, if required. Other amphibians found during the visual inspection will be placed within a designated receptor area comprising of terrestrial habitats which will not be impacted by the proposed works and has excellent connectivity with surrounding terrestrial habitats.

Reptiles & Hedgehog

Summary of Method Statement

Vegetation clearance works may include removal of small areas of hedgerow as well as grasslands greater than 15cm in height will be supervised by a suitably licensed ecologist and/or accredited agent.

Method Statement

This Method Statement should be followed for the construction works and associated minor short term destructive habitat clearance works within the Site in order to ensure legal compliance and to ensure the objectives are achieved.

The following measures will be adopted throughout the construction period of the proposed development:

- Site operatives will be informed by 'tool box' talk of the potential for protected species to occur on-site, what to look out for and what to do in the event that animal is found.

- Vegetation clearance works should only commence after a careful visual inspection by an ECoW has determined that no animals are present. Vegetation should be reduced (by hand strimmer) to a height of c.150mm prior to ground works commencing to aid visual searches and encourage individuals to temporarily move away from the working areas.

- The proposed timing of the works should avoid the hibernation period (November to February inclusive) in order to prevent disturbance to hibernating animals including reptiles and hedgehogs.

- Trenches and excavations should include an escape route for animals that might enter the trench, especially if left open overnight. Ramps should be no greater than 45 degrees in angle and can include wooden planks or ramped earth. Ideally, any excavations open for a prolonged period should be covered.

- All excavations left open overnight or longer should be checked for animals prior to the continuation of works or infilling.

- Any excavated material stored overnight should be searched prior to being used as infill.

- Any brash cut down from the Site should be placed in piles within the set aside habitat area, to create additional hibernacula for both amphibian and reptile species.

- Site specific management practices will be set out within a CEMP and must be adhered to during construction to ensure the protection of habitats and species within the Site.

Should a reptile, hedgehog or other notable species (or signs of) be found at any point during construction, works within suitable habitat and/or potentially disturbing works in close proximity to the animal must cease immediately and the ECoW will advise on the appropriate actions.

Appendix 4: Biodiversity Net Gain Metric v3.1

(See separate Excel Spreadsheet)

Appendix 5: Photographs

Photographs	
	
Photo 1: Example of the hedgerows within the Site	**Photo 2: Example of grassland within the Sites**
	
Photo 3: Example of disused arable land at north of Site.	**Photo 4: Grassland to the south of the Site.**

	
Phot 5: Dense scrub within the Site.	**Photo 6: Ditch within the Site.**