ECOLOGICAL ASSESSMENT REPORT

BURSTEAD SOLAR FARM AND BATTERY STORAGE 'FREE GO'

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

NOVEMBER 2023

Burstead Solar Farm 'Free Go'

on behalf of Enso Green Holdings J Limited

Ecological Assessment Report

avian ecology

Report Verification and Declaration of Compliance

This report has been prepared with reference to best practice guidelines for Ecological Impact Assessment in the UK and Ireland, as defined by CIEEM (2018) and is provided in accordance with the provisions of British Standard 42020:2013 Biodiversity: Code of practice for planning and development and BS 8683:2021 Process for Designing and Implementing Biodiversity Net Gain - Specification.

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CONTENTS

Figures

Appendices

1 INTRODUCTION

1.1 Background

1.1.1 Avian Ecology Limited (AEL) was commissioned by Enso Green Holdings J Limited to undertake an Ecological Assessment in relation to the proposed installation of a Solar Farm and battery storage facility with associated infrastructure (the 'Proposed Development'), forming a 'Free Go' application following a previous refusal, on land located to the south and east of Great Burstead, Billericay, Essex (the 'Site'), as illustrated on the Site Location Plan (**Figure 1**).

1.1.2 The Site was previously included in a submitted cross-boundary planning application for a solar farm and battery storage facility, which was refused planning permission by Basildon Borough Council and Rochford District Council (application numbers: 22/00411/FULL (Basildon) and 22/00359/FUL (Rochford)). The revised development area (Proposed Development) is reduced in scale to the previous submission.

1.1.3 This report provides baseline information and an assessment of potential ecological effects of the Proposed Development.

1.1.4 The objectives of this Ecological Assessment are to:

Provide baseline information on the current habitats and ecological features both within the Site and in the immediately 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 as well as providing an outline of proposed habitat enhancements.

1.1.5 The assessment has been informed by desk-based review of relevant ecological information, extended habitat survey, breeding bird survey, combined water vole and otter surveys, and great crested newt eDNA surveys. Reference is made to relevant legislation, planning policy and guidance, as appropriate.

1.1.6 Consideration has been given to the potential presence of rare, protected, or notable habitats and species, and the location of nearby features including designated sites for nature conservation. Mitigation and enhancement measures to achieve Biodiversity Net Gain are also proposed.

1.1.7 Throughout this report, common names for species are favoured over scientific names unless there is potential for confusion and in which case scientific names are also presented.

1.1.8 This Ecological Assessment Report should be read in conjunction with both the *Site Location Plan* (Drawing Number: PL-02; Revision: 05) and *Proposed Site Plan* (Drawing Number: BU2.0; Revision: 08A) produced by Enso Energy; which details the Proposed Development layout on Site, as well as the *Landscape Proposals Plan* (Drawing Number: 01; Revision: E) produced by Briarwood Landscape Architecture.

1.1.9 Reference should also be made to the previously submitted *Burstead Solar Farm Ecological Assessment Report*[1] and *Biodiversity Management Plan*[2] produced by AEL, as well as the previous planning applications[3,4]. A separate updated Biodiversity Management Plan (**Appendix 6**) and Biodiversity Net Gain calculator (**Appendix 7**) accompany the application.

1.2 Site Overview

1.2.1 The Site as illustrated by the red-line application boundary shown on **Figure 1** includes two land parcels of approximately 119ha comprised of agricultural land, and a grid connection route. The two land parcels are approximately 900m apart and are located south and east of Great Burstead which is south-east of Billericay, Essex.

1.2.2 The Site comprises a series of fields in arable cultivation, with the two land parcels located to the west and east of Southend Road (A129). The arable fields are marked by a network of drainage ditches, tree lines, hedgerows and scattered trees. The River Crouch runs adjacent to the southern Site boundaries of both land parcels.

1.2.3 In the wider context, the Site is surrounded by further extensive areas of farmland and residential settlements with the operational Outwood Solar Farm located approximately 100m to the north-east of the eastern parcel. In addition, the recently consented Crays Hall Solar Farm is situated on land directly east of the Site's eastern land parcel.

1.3 Proposed Development

1.3.1 The Proposed Development is for the installation of a solar farm and battery storage facility with associated access, landscaping and infrastructure in the eastern land parcel. The Proposed Development also includes the installation of underground cabling from the proposed solar farm in the eastern land parcel along A129 (London Road/Southend Road, Wickford) to the eastern borough boundary to link to Rayleigh Main Substation, Rawreth. The cable connection route is excluded from this assessment. The western land parcel will be retained with all construction works associated with the Proposed Development planned in the eastern land parcels and associated cable route.

1.4 Legislative Framework, Planning Policy and Guidance

Legislation

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

[1]Avian Ecology Ltd. (2022) *Burstead Solar Farm, Ecological Assessment Report*.
[2]Avian Ecology Ltd. (2022) *Burstead Solar Farm, Biodiversity Management Plan*.
[3] https://planning.basildon.gov.uk/online-applications/simpleSearchResults.do?action=firstPage
[4] https://maps.rochford.gov.uk/DevelopmentControl.aspx?pageno=1&pagerecs=10&maxrecords=100&template=DevelopmentControlResults.tmplt&requestType=parseTemplate&history=90b07a40e3ce408aad0204310ee1cb72&usesearch=true&order=DATEAPRECV%3ADESCENDING&q%3ALIKE=+22%2F00359%2FFUL

Table 1.1: Key legislation.

International
Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (hereafter referred to as the 'the Ramsar Convention)[5];
Convention on the Conservation of European Wildlife and Natural Habitats 1979 (hereafter referred to as the 'the Bern Convention'[6]; and,
UNESCO convention on the protection of the World Cultural and Natural Heritage (1972)[7].
National
The Wildlife and Countryside Act 1981 (as amended).
Countryside and Rights of Way Act 2000;
Hedgerow Regulations 1997;
Infrastructure Act 2015;
Natural Environment and Rural Communities (NERC) Act (2006);
Protection of Badgers Act 1992;
The Conservation of Habitats and Species Regulations 2017 (as amended);
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[8];
The Environment Act 2021[9];
The Invasive Alien Species (Enforcement and Permitting) Order 2019[10]; and,
The Town and Country Planning Act 1990.

1.4.2 The Conservation of Habitats and Species Regulations 2017 (as amended) remains in place following the United Kingdom's withdrawal from the European Union 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 Exit) Regulations 2019 which came into force on 31st December 2020. They are hereafter referred to as the 'Habitats Regulations'.

Policy and Guidance

1.4.3 Reference has been made to the following key pieces of policy and guidance, listed in **Table 1.2**.

[5] https://www.ramsar.org/
[6] https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/104
[7] https://whc.unesco.org/en/convention/
[8] https://www.legislation.gov.uk/uksi/2019/579/contents/made
[9] https://services.parliament.uk/Bills/2019-21/environment.html
[10] https://www.legislation.gov.uk/uksi/2019/527/introduction/made

Table 1.2: Policy.

National
Ancient woodland, ancient trees and veteran trees: advice for making planning decisions (Natural England, 2022)[11]; Biodiversity Net Gain. Good practice principles for development[12]; BS 42020:2013 Biodiversity – Code of Practice for Planning and Development; BS 8683:2021 Process for designing and implementing Biodiversity Net Gain; European protected species policies for mitigation licences (Natural England, 2022)[13]; Natural England European Protected Species Policies[14] The National Planning Policy Framework 2 (NPPF2, 2023)[15]; The United Kingdom Biodiversity Action Plan (UK BAP); and, Wildlife licensing: comment on new policies for European protected species licence (Natural England, 2016)[16].
Local
Essex Biodiversity Action Plan[17]; Basildon Borough Council Adopted Local Plan[18]; Basildon Borough Council Policies Map[19]; Rochford District Council Core Strategy Adopted Version[20]; and, Rochford District Council Policies Map[21]

1.4.4 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.

[11] https://www.gov.uk/guidance/ancient-woodland-ancient-trees-and-veteran-trees-advice-for-making-planning-decisions
[12] https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development-a-practical-guide/
[13] https://www.gov.uk/guidance/european-protected-species-policies-for-mitigation-licences
[14] https://www.gov.uk/guidance/european-protected-species-policies-for-mitigation-licences
[15] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[16] https://www.gov.uk/government/consultations/wildlife-licensing-comment-on-new-policies-for-european-protected-species-licences
[17] https://www.castlepoint.gov.uk/download.cfm?doc=docm93jijm4n5168.pdf&ver=8595
[18] https://www.basildon.gov.uk/article/701/Adopted-Local-Plan
[19] https://www.basildon.gov.uk/media/9349/Basildon-Council-Revised-Publication-Local-Plan-Policies-Map-Oct-2018/pdf/Basildon_Council_-_Revised_Publication_Local_Plan_Policies_Map_-_Oct_2018.pdf?m=636916137062430000
[20] https://www.cartogold.co.uk/rochford/text/Core-Strategy.pdf
[21] https://www.cartogold.co.uk/rochford/Rochford.htm

1.4.5 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 Desk 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 as follows:

Statutory designated sites for nature conservation, within 5km of the Site, extending to 10km for internationally protected sites with mobile qualifying species;

Non-statutory designated sites for nature conservation within 2km of the Site; and,

Existing records of priority habitats and protected and notable faunal species (dated within the last 10 years), within 2km of the Site.

2.1.2 The following key sources were consulted:

Natural England and Joint Nature Conservation Committee (JNCC) websites[22];

The Multi Agency Geographic Information for the Countryside (MAGIC) website[23];

District Level Licencing Data[24];

The Natural England Open Data Geoportal[25];

The Woodland Trust Ancient Tree Inventory website[26];

National Biodiversity Network (NBN) Atlas[27] (data with licence types CC0, CC-BY and OGL covering commercial use only); and,

The Essex Field Club (EFC)[28] (please refer to **Appendix 8**, for full report provided).

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 and watercourses.

2.2 Field Surveys

2.2.1 Field surveys were primarily conducted in 2021, except for an updated habitat survey in 2023.

[22] http://jncc.defra.gov.uk/
[23] https://magic.defra.gov.uk/MagicMap.aspx
[24] https://naturalengland-defra.opendata.arcgis.com/datasets/great-crested-newts-edna-pond-surveys-for-district-level-licensing-england?geometry=-1.451%2C51.749%2C-1.002%2C51.823
[25] https://naturalengland-defra.opendata.arcgis.com/datasets/Defra::peaty-soils-location-england/explore?location=53.163227%2C-0.801927%2C10.71
[26] https://ati.woodlandtrust.org.uk/
[27] NBN Atlas https://nbnatlas.org/
[28] The Essex Field Club https://www.essexfieldclub.org.uk/

Extended Habitat Survey

2.2.2 The original extended Phase 1 habitat survey of the Site was initially undertaken on 6th May 2021 by T Stones *MSc, MCIEEM, CenV*, a suitably competent and qualified ecologist. The survey followed UK industry standard Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Methodology and with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM), Technical Guidance Series Guidelines for Preliminary Ecological Appraisal.

2.2.3 An updated extended habitat survey was conducted on 25th October 2023, by K. Love *MSc* following the UK industry standard UKHab methodology (UK Habitat Classification Working Group. 2020[29]), with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM_*Guidelines for Preliminary Ecological Appraisal* (CIEEM, 2017)[30]. The extent of the Site and habitats as surveyed is shown on **Figure 4** with accompanying photographs in **Appendix 1**.

2.2.4 All habitats were mapped and described using a series of 'target notes' (TNs) to the highest level of UK habitat classification as possible, with each individual habitat feature being assigned to a primary habitat and then described with secondary codes if applicable. 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.

2.2.5 On-Site trees and buildings were assessed from ground level for their suitability to support roosting bats by way of preliminary roost assessment (PRA). Suitability for roosting bats was classified as follows (from Collins *et al*., 2023, Table 4.1[31]):

> Negligible: No obvious habitat features on site likely to be used by roosting bats, however, a small element of uncertainty remains as bats can small and apparently unsuitable features on occasion.
>
> Low: A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. Structures that do not provide enough space, shelter, protection, appropriate conditions and/or suitability surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity and not a classic cool/stable hibernation site, but could be used by individual hibernating bats).
>
> Moderate: A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
>
> High: A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat. These structures have the potential to support high conservation status roosts, e.g., maternity or classic cool/stable hibernation site.

[29] https://ukhab.org/ukhab-documentation/
[30] CIEEM. (2017). *Guidelines for Preliminary Ecological Appraisal, 2nd edition*. Chartered Institute of Ecology and Environmental Management, Winchester.
[31] Collins et al. (ed) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 4th edition, BCT: London

Breeding Bird Surveys

2.2.6 A breeding bird survey was undertaken by J. Hanlon *BSc,* a suitably experienced ornithologist. The survey was undertaken between April and June 2021, with one visit conducted monthly (total of three survey visits).

2.2.7 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*. (1998)[32]. 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).

2.2.8 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 (Eaton *et al*. 2015[33]), Annex 1[34]/Schedule 1[35] raptors and owls, priority species listed under Section 41 of the NERC Act 2006[36] and Essex Local Biodiversity Action Plan (LBAP)[37] species. 'Amber' and 'Red' List Species were based on BoCC4 (Eaton et al. 2015) classifications, which was the current guidance at the time. This has since been updated to BoCC5 (Stanbury et al. 2021[38]).

2.2.9 Detailed survey methodologies and full results are presented as **Appendix 2**: *Breeding bird Survey Report.*

Water Vole and Otter Survey

2.2.10 Combined otter and water vole surveys were undertaken on the 3rd and 4th July 2021 and 11th September 2021, which focussed on ditches within and adjacent to the Site. The surveys included a habitat suitability assessment and a search for water vole and otter field signs.

2.2.11 Detailed survey methodologies and full results are presented as **Appendix 4:** *Water Vole and Otter Survey Report*.

Great Crested Newt Presence/Absence Survey (eDNA)

2.2.1 Potential ponds which could be used by great crested newt (GCN) for breeding, if present and suitable, were identified within a 250m radius of the Site using OS and aerial mapping. Ponds within 50m of the cable route were also identified. However, where cable route works are restricted to main roads ponds were discounted due to the absence of suitable habitat and the low impact and temporary nature of works.

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[32] Gilbert, G., Gibbons, D.W & Evans, J. (1998) *Bird monitoring methods. A manual of techniques for key UK species*. RSPB, Sandy.
[33] 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.
[34] https://ec.europa.eu/environment/nature/conservation/wildbirds/threatened/index_en.htm
[35] https://www.rspb.org.uk/birds-and-wildlife/advice/wildlife-and-the-law/wildlife-and-countryside-act/schedules/
[36] https://www.gov.uk/government/publications/habitats-and-species-of-principal-importance-in-england
[37] http://www.essexfieldclub.org.uk/portal/p/Essex+BAP+species
[38] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., & 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 114:723-747.

2.2.2 No ponds were identified within the Site; however, fifteen ponds were identified within 250m of the Site boundary and one within 50m of the cable route (see **Figure 1** in **Appendix 5**). Of these, three ponds (P1, P10 and P14) were accessed and assessed for their suitability to support GCN using the Habitat Suitability Index (HSI) Assessment methodology as developed by Oldham *et al.* (2000[39]) and as detailed within ARG UK guidance (ARG UK, 2010[40]). These ponds were also subject to eDNA survey sampling to determine the presence or likely absence of GCN.

2.2.3 Detailed survey methodologies and full results are presented as **Appendix 5:** *GCN Presence or Absence (eDNA) Survey Results.*

2.3 Biodiversity Net Gain

2.3.1 In order to assess the measurable biodiversity impacts associated with the Proposed Development, the Natural England Biodiversity Metric 4.0 Calculator[41] (the 'Metric) was utilised in order to provide evidence of the required biodiversity net-gain. The Metric is a biodiversity accounting tool used to quantify biodiversity losses and gains using habitats as a proxy for overall biodiversity. It is recognised as an industry standard and has been developed through full and widespread consultation with stakeholders across all relevant sectors.

2.3.2 The BNG assessment was undertaken by C. Scott *MRes ACIEEM*, a suitably qualified and experienced ecologist with experience utilising biodiversity metrics. Data gathering and Metric calculations were undertaken according to the methodology detailed with the Metric 4.0 user guide, unless otherwise stated.

2.3.3 The metric calculates the value of a habitat (measured as 'biodiversity units') by multiplying the area (hectares), distinctiveness (intrinsic value and rarity), condition (quality) and strategic significance (ecological value of the location) of each habitat parcel. The distinctiveness of a habitat is pre-set within the Metric and cannot be changed.

2.3.4 Information on habitat condition was gathered during the updated extended habitat survey, assessing habitats against the relevant criteria for each habitat type as set out in the Metric 4.0 Technical Supplement.

2.3.5 For created habitats, additional risk multipliers are assigned to account for the difficulty of creating a particular habitat type, time required to achieve the target condition, and where habitat creation is off site, spatial risk.

2.3.6 Where the value of habitats following works is greater than those at the baseline, a net gain will be predicted, or a net loss predicted where the post-works habitat value is lower than the baseline. In addition, the Metric promotes a 'no down-trading' policy within the Metric, whereby habitat loss must be compensated by habitat of the same value or higher; loss of high distinctiveness habitats such as lowland meadow and broad-leaved woodland must be compensated for on a like-for-like basis.

[39] 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.
[40] ARG UK (2010) ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.
[41] http://publications.naturalengland.org.uk/publication/6049804846366720

2.4 Limitations

Desk Study

2.4.1 A desk study does not identify a comprehensive account of all species and features of ecological importance within the study area, however it improves the understanding of the Site's ecological value and the likely species and habitats within the area.

Extended Habitat Survey

2.4.2 The updated extended habitat survey visit was undertaken in October 2023, and therefore marginally outside the optimal period for botanical surveys (approximately April to September). However, with supplement data gathered in the optimal botanical survey period during the initial extended Phase 1 habitat survey visit in May 2021, it is considered that the timing of the survey is not a limitation to the assessment.

2.4.3 An extended habitat survey does not constitute a detailed botanical survey or faunal species list or provide a full protected species survey but, enables competent ecologists to ascertain an understanding of the ecology of the Site in order to:

Broadly identify the nature conservation value of a site 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 identify the true nature conservation value of a site (if any).

2.4.4 The majority of the proposed cable route that follows an existing road network was not subject to extended habitat survey due to health and safety purposes. Following review of aerial imagery, with unsurveyed areas of the proposed route solely proposed along existing hardstanding roads, it is considered that its exclusion from the survey is not a limitation to the assessment.

Biodiversity Metric Calculation

2.4.5 The proposed cable route not subject to habitat surveys was assumed to be hardstanding of existing roads following review of aerial imagery. Such habitat is not subject to habitat condition assessments as used under the biodiversity metric calculations, and consequently it is considered that there is no limitation to the assessment.

2.4.6 The River Crouch borders the Site at two locations; along the south-eastern boundary of the eastern parcel and the southern boundary of the western parcel. Although the Site boundary borders the river at both locations, construction and operational activities will not be undertaken within 10m of the riverbank. A Modular River Physical Survey (MoRPh) survey was not undertaken on the River Crouch, and subsequently not included within the BNG Assessment. However, as construction or operational activities will not be undertaken within 10m of the river, this is not considered a significant constraint. The BNG Assessment included all other watercourses (e.g., ditches and culverts) located within the Site.

Protected Species Survey Data Validity

2.4.7 Protected species surveys were undertaken between spring and autumn 2021. However, an updated habitat survey in 2023 has confirmed that habitats within the Site have not materially changed since 2021 and therefore it is reasonably assumed that 2021 surveys are representative of current species status. Subsequently the age of survey data is not considered a limitation to the assessment.

Breeding Bird Surveys

2.4.8 The survey was undertaken in 2021 and Notable species were recorded in line with current guidance at the time including BoCC4, Eaton *et al*. (2015). This has since been updated to BoCC5, Stanbury *et al.* (2021). In line with the survey results, the assessment has been undertaken following BoCC4, but this is not considered to be a constraint to the assessment; the survey results include no additional ground-nesting species since added to the BoCC5 list that could be considered potentially vulnerable to negative impacts from the Proposed Development.

Water Vole and Otter Survey

2.4.9 The first survey visit was undertaken at the beginning of July 2021, just outside of the first half of the survey season which is at the end of June. However, this was still within water vole breeding season and is therefore not considered a constraint to the survey.

2.4.10 Dense vegetation was found along the watercourse channels during the survey. Where it was not possible to survey from the watercourse, spot checks and searches from the bankside were employed to identify field signs and ascertain the presence or likely absence of water vole within the watercourse.

Great Crested Newt Presence/Absence Survey (eDNA)

2.4.11 Fifteen ponds were identified within 250m of the two Site land parcels and one adjacent to the cable route from OS and aerial mapping, with none present within the Site itself. Three of the ponds (P1, P10 and P14) were accessed during the survey. Four ponds (P7, P8, P9 and P15) were viewed from Public Rights of Way (PRoW) or adjacent land and therefore some limited information, including photographs, was able to be collected. The remainder were not able to be accessed due to land ownership constraints.

3 BASELINE

3.1 Designated Sites for Nature Conservation

Statutory Designated Sites

3.1.1 Five international statutory designated sites for nature conservation were identified within 10km of the main Site boundary (proposed cable route excluded). The closest of these sites are the Essex Estuaries Special Area of Conservation (SAC) and the Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Special Protection Area (SPA) and Ramsar Site, which are all 8.5km east. The Thames Estuary and Marshes SPA and Ramsar are situated 9.9km south of the Site.

3.1.2 Seven national statutory designated sites for nature conservation are located within 5km of the Site, the closest being Mill Meadow Local Nature Reserve (LNR), located approximately 1.2km north-west. A summary of these twelve statutory designated sites is provided in **Table 3.1.**

3.1.3 The review of MAGIC identifies that the Site is located within a Site of Special Scientific Interest (SSSI) Impact Risk Zone (IRZ) and meets the criteria (solar schemes with footprint >0.5ha) whereby the LPA should consult with Natural England regarding potential risks to the applicable SSSI and/or other associated statutory designated sites.

3.1.4 This Section should be read with reference to **Figure 2**.

Table 3.1: Statutory designated sites
SSSI: Site of Special Scientific Interest; SPA: Special Protection Area; SAC: Special Area of Conservation; LNR: Local Nature Reserve.

Site Name	Approximate Distance and Direction from Site	Description
Mill Meadow LNR	1.2km north-west	A 90-acre reserve with examples of old grazing meadows, scrub and developing woodland. Has a great diversity of wildlife including rare species[42].
Mill Meadows Billericay SSSI	1.3km north-west	Five adjoining grassland units that overlie Claygate beds (sandy clay or loam) and London Clay. These grassland units are separated by old hedge lines, some of which are associated with ditches. The Site supports a characteristic flora of a grassland type that is very much reduced within the Essex landscape[43].
Norsey Wood LNR and SSSI	1.8km north	Ancient woodland. A large mixed chestnut coppice derived from acid oak woodland. Notable county rarity plants include Water violet and *Sphagnum cuspidum.* Hard fern represents one of the largest populations in the county. Nine species of dragonfly are present[44,45].

[42] https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1009033
[43] https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=s2000373
[44] https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1009048
[45] https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=s1001833

Site Name	Approximate Distance and Direction from Site	Description
Langdon Ridge SSSI	3.1km south	Supports a diverse mosaic of semi-natural habitats, including species-rich neutral grasslands, fen meadows, ancient and semi-natural woodlands, scrub, species-rich hedgerows and ponds. Notable assemblages of invertebrates chiefly associated with open short sward and scrub-heath are present, as well as notable populations of Deptford pink[46].
Hanningfield Reservoir SSSI	3.9km north-east	The second largest reservoir in Essex. Important site for breeding and wintering wildfowl. Supports nationally important numbers of gadwall as well as populations of pochard, shoveler, teal, tufted duck, pintail and shelduck. Also contains an interesting plant community, including locally uncommon *Brachythecium mildeanum,* golden dock, marsh dock and sea aster[47].
Vange Hill LNR	4.8km south-east	Woodland, scrub and species rich grassland. Thames Terrace grasslands form a very important habitat of regional significance as they hold rare assemblages of plants and invertebrates[48].
Essex Estuaries SAC / SAC (Marine Components GB)	8.5km east	Qualifying features: Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks; Estuaries; Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats; Salicornia and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand; Spartina swards (*Spartinion maritimae*); Cord-grass swards; Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticoseosi*); Mediterranean saltmarsh scrub[49].
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA / SPA (Marine	8.5km east	Qualifying features: Populations of dark-bellied brent goose (non-breeding); and, Waterbird assemblage[50].

[46] https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=s2000857
[47] https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=s1003253
[48] https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1421596
[49] https://publications.naturalengland.org.uk/publication/4781199427895296
[50] https://publications.naturalengland.org.uk/publication/5048504904843264

Site Name	Approximate Distance and Direction from Site	Description
Components GB) and Ramsar Site		Qualifies under Ramsar Criteria 2, 5 and 6[51].
Thames Estuary and Marshes SPA / SPA (Marine Components GB) and Ramsar Site	9.9km south	Qualifying features: Hen harrier (non-breeding); Pied avocet (non-breeding); Ringed plover (non-breeding); Grey plover (non-breeding); Red knot (non-breeding); Dunlin (non-breeding); Black-tailed godwit (non-breeding); Common redshank (non-breeding); and, Waterbird assemblage[52]. Qualifies under Ramsar Criteria 2, 5 and 6[53].

Non-statutory Designated Sites

3.1.5 A review of the data provided by EFC confirms that the eastern Site parcel is directly adjacent to the Parsonage Farm Green Local Wildlife Site (LoWS) (see **Figure 3** and **Photograph 8** in **Appendix 1**). The Site lies within B-Lines and the Green Belt.

3.1.6 The search identified seventeen LoWS within 2km of the Site. Details of these non-statutory designations are provided in **Table 3.2**. This Section should be read with reference to **Figure 3**.

Table 3.2: Non-statutory designated sites.
LoWS: Local Wildlife Site.

Site Name	Approximate Distance and Direction from Site	Description
B-Lines	Within the Site	The B-Lines are a series of 'insect pathways' running through countryside and towns. They include areas of restored and created wildflower-rich habitat stepping-stones that link existing wildlife areas together, creating a network across the UK landscape. This will provide large areas of brand-new habitat benefiting bees and butterflies– but also a host of other wildlife.
Parsonage Farm Green LoWS	Adjacent to Site boundary	This site comprises predominantly hedgerows with semi natural broad-leaved woodland that has the potential to be a woodland wildlife corridor or "stepping stone" between the tree-lined River Crouch to the south and the large ancient woods of Billericay to the north.

[51] https://jncc.gov.uk/jncc-assets/RIS/UK11058.pdf
[52] https://publications.naturalengland.org.uk/publication/4698344811134976
[53] https://rsis.ramsar.org/RISapp/files/RISrep/GB1025RIS.pdf

Site Name	Approximate Distance and Direction from Site	Description
Little Burstead Woods LoWS	320m west	This Site comprises of an unusual chain of three woodlands and a narrow strip of possibly ancient streamside woodland along the course of the infant River Crouch. Forms a woodland corridor between Little Burstead and Noak Bridge.
Crays Hall Meadow LoWS	490m east	This riverside meadow comprises a varied mix of grass species. This site represents one of the few remaining species-rich grasslands within the Crouch valley.
River Crouch at Noak Bridge LoWS	500m south-west	The area consists of two distinct habitats: the River Crouch and its banks; and a flood alleviation area east of the river. The flood alleviation area includes a scrubby, raised ridge surrounded by low-lying, herb rich grassland.
Moses' Spring/Barrenleys/Claypitshills Woods LoWS	710m north-east	A large, mainly ancient woodland complex, bounded to the north by a railway line. A stream skirting Moses Spring Wood and a remnant green lane extending south from Claypitshills Wood provide additional habitats to that of dense canopy woodland.
Barrenleys Meadow LoWS	1km north-east	The grassland community contains some of the species typical of acidic grasslands in Essex, although species diversity is low.
Laindon Common LoWS	1km north-west	Supports ancient acid grassland and several ancient woodland indicator plants are present.
Devils/Crays Wood, Ramsden Heath LoWS	1km north-east	A lowland mixed deciduous ancient woodland of coppice-with-standards comprising hornbeam, ash and sweet chestnut with sycamore and field maple.
Meepshole Wood and Lane LoWS	1.2km north-east	A lowland mixed deciduous woodland comprising ancient and secondary components. The ancient section has hornbeam, sweet chestnut and ash as dominant coppice stands, with oak standards interspersed throughout. A distinctive feature of this wood is the presence of wych elm, occurring in greater quantity than is usually found in the woods of eastern England.
Mill Meadows LoWS	1.2km north	Comprises part of the Mill Meadows Local Nature Reserve that does not meet designation criteria for the SSSI. It lies largely within a stream valley and supports a large area of grassland with a network of overgrown hedges, patches of woodland and scrub.
St Nicholas Church Complex LoWS	1.3km south-west	Designated in recognition of its reptile and amphibian populations. Also contains important

Site Name	Approximate Distance and Direction from Site	Description
		relatively unimproved, unintensively managed grassland.
Noak Bridge Reserve LoWS	1.4km south	This site includes the Noak Bridge Nature Reserve. Grassy meadows, clearings and path edges support a range of herbs. A number of ponds are scattered throughout the scrub. Along the southwest edge is a band of broadleaf woodland planted on a high bund beside the A127.
Nutton's Wood LoWS	1.5km south-east	A pedunculate oak dominated wood.
Frith Wood LoWS	1.5km north-west	Frith Wood is actively managed ancient woodland, the current coppicing regime allows for a varied and species rich flora. This site forms part of a valuable chain of sites, including Laindon Common immediately to the south.
Poles Wood LoWS	1.8km south-west	A small broadleaved wood, with a pond in the north-eastern corner of the wood provides an additional aquatic habitat.
Norsey Meadow LoWS	2km north	This ancient grassland site comprises a mosaic of rough grassland, flower-rich meadowland, with scattered trees and scrub.
Little Burstead Common LoWs	2km north-west	Little Burstead Common is centrally located within a cluster of important sites stretching from Billericay into Brentwood District and, as such, is an integral part of a valuable wildlife corridor as well as being of interest in its own right.

3.2 Priority Habitats – Existing Records

3.2.1 A review of MAGIC, the extended habitat survey, Ordinance Survey Maps and aerial imagery identified eight habitats of Principal Importance (also known as priority habitats) under Section 41 of the NERC Act/UK Biodiversity Action Plan within 2km of the Site. Seven priority habitats listed under the Essex Biodiversity Action Plan were identified within 2km of the Site.

3.2.2 Information on priority habitats within 2km of the Site is presented in **Table 3.3**. 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 – existing records

NERC S.41: Natural Environment and Rural Communities (NERC) Act (2006); UKBAP: UK Biodiversity Action Plan Priority Habitat); LBAP: Local Biodiversity Action Plan Priority Habitat; AWI: Ancient Woodland Inventory.

Priority habitat name	Designation	Approximate Distance from Site
Hedgerows	NERC S.41, UKBAP, LBAP	Within the Site
Arable field margins	NERC S.41, UKBAP, LBAP	Within the Site
Streams	NERC S.41, UKBAP	Within the Site
Deciduous woodland	NERC S.41, UKBAP	Within the Site
Coastal and floodplain grazing marsh	NERC S.41, UKBAP, LBAP	Adjacent to the Site boundary
Ponds	NERC S.41, UKBAP	Adjacent to the Site boundary
Urban areas	LBAP	Cemetery adjacent to the Site boundary
Traditional orchards	NERC S.41, UKBAP, LBAP	590m north
Ancient woodland	AWI, LBAP	720m north
Lowland meadows	NERC S.41, UKBAP	1.3km north-west

3.3 Ancient and Irreplaceable Habitats

3.3.1 Review of MAGIC and the Natural England Open Data Geoportal identified no ancient or irreplaceable habitats, such as ancient woodland or peaty soils, within the Site or within 500m of the Site boundary.

3.3.2 Review of the Woodland Trust Ancient Tree Inventory identified no notable trees within the Site, however, four notable trees were located approximately 130m north-west of the western Site land parcel.

3.3.3 During the extended habitat survey, three of the notable trees recorded on-Site were considered to be potential veteran standards. This included a potential veteran willow tree (**TN7**) centrally located in the eastern Site parcel where it is situated adjacent to the on-Site ditch that runs through the Site. The other potential veteran trees are both mature oaks (**TN9 and TN10**) located at the western Site parcel's northern boundary, where they are positioned within a boundary tree line.

3.4 Extended Habitat Survey

3.4.1 This section should be read in conjunction with the UKHab Habitat Plan as presented in **Figure 4**; descriptions are provided in **Table 3.4**, target notes presented in **Table 3.5** and photographs are presented in **Appendix 1**.

Table 3.4: UKHab habitats summary

Habitat Code	Descriptions	Photo No
c1c	Cereal crops	1
g4	Modified grassland	-
g3c	Other neutral grassland	2
h2a	Native hedgerow (Habitat of Principal Importance)	3
h3d	Bramble scrub	-
h3h	Mixed scrub	-
r1.191	Standing open water and canals – ditch	4
r2a	River (Habitat of Principal Importance)	5
w1g6	Line of trees	6
w1f7	Semi-natural woodland (Habitat of Principal Importance)	7
u1b	Developed land; sealed surface	-
u1c	Artificial unvegetated, unsealed surface	-
u1e	Built linear features	-

3.4.2 The Site forms two land parcels connected by a route that mostly follows an existing road network. Both land parcels are dominated by arable fields with cereal crops (**Photograph 1**). The western parcel also included two fields of other neutral grassland, with sections of modified grassland recreational fields partially located along the cable route connecting the two land parcels. A network of ditches (wet, seasonally wet and dry), streams, hedgerows, tree lines, fencing and scattered trees/scrub form the field boundaries of the Site, with the River Crouch (**Photograph 5**) bounding the southern Site boundary of both land parcels. Habitats recorded within the Site are considered to be typical of dominant habitats within the wider landscape.

3.4.3 No development is proposed in the western Site parcel.

Eastern Site Parcel

3.4.4 The eastern Site parcel sloped from north-west to south-east and was dominated by arable fields. Fields were tilled with bare ground at the time of survey in 2023 (**Photograph 1**), but were known to be cropped with wheat in 2021.

3.4.5 The fields were bounded by a combination of tree line (**Photograph 6**) and species-poor hedgerows (**Photograph 3**) along the northern, eastern and southern boundaries. The western boundary included various sections of mature and semi-mature oak tree, as well as areas of intact, unmanaged species-poor hedgerow dominated by blackthorn and hawthorn.

3.4.6 The northern boundary is comprised of two parallel tree lines either side of a public footpath, which follow partially along the north-eastern boundary. The trees are mostly semi-mature and immature, with some mature standards scattered within. The species assemblage includes hawthorn, oak, ash, blackthorn, sycamore, field maple and birch.

3.4.7 The eastern boundary includes semi-mature and immature tree lines composed of oak, elm, blackthorn and hawthorn, as well as species-poor hedgerow dominated by hawthorn and blackthorn, with limited field maple present. Hedgerows include sections of varying management and range between 2m to 5m tall and 1m to 2m wide. Scattered trees are present within hedgerow sections and include mature oak and semi-mature ash.

3.4.8 Along the southern boundary is a riparian tree line that follows the River Crouch. The tree line is composed of mature willow, oak and ash, with hawthorn and blackthorn scrub. The River Crouch in this section is approximately 3m wide and 0.5m deep, with a slow eastern flow (**Photograph 5**). The highly shaded waters are open with little aquatic vegetation. The earth banksides are approximately 1m deep and include scattered areas of Himalayan balsam (TN5; **Photograph 5**).

3.4.9 A large ditch flows through the centre of the eastern land parcel, separating the two arable fields (**Photograph 4**). The ditch flows into the River Crouch at the southern boundary. The wet ditch is approximately 0.5m wide, with waters at 10cm-30cm deep that slowly flow south. The banksides are 1m to 2m deep and vary with scattered trees, dense scrub, marginal tall herb vegetation and bare exposed earth along its length. Trees include mature oak and willow (TN7), with scrub comprising of blackthorn, elder, hawthorn and bramble at 3m to 4m tall. Smaller field ditches were also present along the Site boundaries. These watercourses ranged in water depth, with some dry and seasonally wet. These ditches ranged between 0.5m to 2m wide.

3.4.10 Field boundaries and ditches were in places found to include other neutral grassland margins and banksides, varying between 1m to 3m wide (**Photograph 2**). The species composition included false-oat grass, cocksfoot, meadow grass, nettle, creeping thistle and hogweed. During the 2021 survey, a small section of field margin also included bluebell, however this was not recorded in 2023 due to the time of year.

3.4.11 The south-eastern corner of the eastern land parcel was recorded with a small area of deciduous semi natural woodland (**Photograph 7**). The woodland corner is dominated by mature ash and oak, with an understory of blackthorn, hawthorn and field maple. The River Crouch passes through the woodland.

Western Site Parcel

3.4.12 The western land parcel comprised a series of tilled arable fields similar to those in the eastern parcel, as well as mown other neutral grassland fields containing cocksfoot, false-oat grass and perennial rye. Field margins present contained other neutral grassland and measured approximately 3m to 5m wide. A strip of grassland bisects the western arable fields to form a grass track, which continues eastwards and changes into a stone track that connects to the A129 east of the land parcel.

3.4.13 The Site was bounded to the south by the River Crouch, that varied between 2m to 3m wide and 10cm to >1m deep. The clear water flowed east and was highly shaded from a mature riparian tree line composed of willow, oak, elder, hawthorn, field maple, ash and blackthorn.

3.4.14 A series of wet and dry ditches bound the field boundaries and bisects the land parcel itself. Ditches were all approximately 0.5m wide, with various shallow depths between 5cm to 30cm deep. Banks varied between 1m to 1.5m deep, and were dominated often by other neutral grassland similar to field margins. Some ditches included areas of scrub and/or marginal tall herb vegetation.

3.4.15 Field boundaries also included a network of tree lines and hedgerow. Tree lines comprised a varying assemblage of mature, semi-mature and immature trees composed of willow, blackthorn, hawthorn, oak, elder, dogwood, field maple, holly, cypress, ash, Scot's pine, elm, horse chestnut, Norway maple, poplar and laurel. Hedgerows were primarily species-poor and varied between being managed and unmanaged. Dominant hedgerow species included hawthorn and blackthorn, with scattered oak, willow and field maple trees present in sections. During 2021, ground flora at some hedgerow bases recorded common bluebell which was not identified in 2023.

Proposed Cable Route

3.4.16 The proposed cable route primarily follows existing roads, most of which was identified from aerial imagery due to health and safety restrictions. Roads connecting the two land parcels were included in the 2023 survey and were situated adjacent to arable fields and modified grassland recreational sport

fields. Sections of species-poor hedgerow, oak tree line and wet and dry ditch lie adjacent to the roads linking the two land parcels.

Table 3.5: Target Notes

Map Ref.	Details
TN1	Mature oak tree with loose bark and holes situated in the branches. Moderate bat roost potential.
TN2	Mature oak tree with loose bark and holes situated in the branches. Moderate bat roost potential.
TN3	Mature oak tree with loose bark and holes situated in the branches. Moderate bat roost potential.
TN4	Standing dead tree with cracks and loose bark. Low to moderate bat roost potential.
TN5	Himalayan balsam located on the riverbank (**Photograph 5**).
TN6	Mature oak tree with over six woodpecker holes. High bat roost potential (**Photograph 9**).
TN7	Potential veteran willow tree with woodpecker holes and a broken branch. Moderate bat roost potential (**Photograph 10**).
TN8	Semi-mature ash tree with a woodpecker hole. Moderate bat roost potential.
TN9	Possible veteran mature oak tree with multiple cracks and holes present in dead branches. Moderate bat roost potential.
TN10	Possible veteran mature oak tree with multiple cracks and holes present in dead branches. Moderate bat roost potential
TN11	Mature ash tree with two woodpecker holes. Moderate bat roost potential.
TN12	Mature ash tree with over four woodpecker holes. High bat roost potential.
TN13	Mature oak tree with large cracks visible down the trunk. Moderate bat roost potential.
TN14	An unknown dead tree with cracks and holes. Moderate bat roost potential.
TN15	Water vole latrine below a willow tree along the ditch. Located in 2021 (**Photograph 11**).
TN16	Mature oak at footbridge with crevices and holes within main trunk. Moderate bat roosting potential. Recorded in 2021.
TN17	Small mammal burrow located along a ditch bankside. Identified in 2021.
TN18	Small mammal droppings (x4) and burrows (x2) located along the ditch bankside. Considered likely to be rat. Recorded in 2021.
TN19	Mature oak in the hedgerow with moderate bat roosting potential; cracked main trunk and rot holes present. Located in 2021.
TN20	Stand of Himalayan balsam along the river and at the confluence between the river and ditch. Identified in 2021.

3.5 Protected and Notable Species

Birds

3.5.1 The data search returned 564 bird records comprising eighty-nine species within 2km of the Site boundary. This included barn owl, black redstart, brambling, fieldfare, green sandpiper, hobby, kingfisher, marsh harrier, red kite and redwing, which are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

3.5.2 Species returned in the 2km search area that are listed on Annex 1 of the Directive 2009/147/EC (Birds Directive) include common tern, crane, great white egret, kingfisher, little egret, marsh harrier and red kite. The habitats within the Site are considered largely unsuitable for these species, with the exception of ditches and the River Crouch.

3.5.3 Sixteen Natural Environment & Rural Communities (NERC) Act Section 41 Species were returned from EFC including bullfinch, corn bunting, cuckoo, dunnock, herring gull, house sparrow, lapwing, lesser redpoll, linnet, reed bunting, skylark, song thrush, starling, tree sparrow, yellow wagtail and yellowhammer.

3.5.4 The data search returned twenty BoCC Red List species and thirty-three BoCC Amber List species within 2km of the Site boundary. Skylark and song thrush are further listed under the Essex Biodiversity Action Plan.

3.5.5 A review of the MAGIC shows that the Site is not allocated as an Important Bird Area.

Wintering Bird Surveys

3.5.6 The Site does not fall within an area of known importance to wintering (migratory) waterbirds, and is situated, in the wider context, a predominantly urban location. The closest important site for wintering birds is the Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar / SPA, which is located approximately 8.5km to the east of the Site at the closest point (**Table 3.1**). This site is designated for populations of non-breeding dark bellied brent geese. Brent geese rarely stray from estuaries and the immediately adjacent coastal fields, and so it can be reasonably assumed that the Site does not regularly support significant numbers of this species.

Breeding Bird Surveys

3.5.7 The 2021 breeding bird assemblage recorded within the survey area is representative of farmland habitats, consisting of predominantly common species. A total of twenty-one species were considered to be breeding, including seven Notable Species. These consisted of two Amber List species (dunnock and reed bunting), and five Red List species (skylark, house sparrow, yellow wagtail, linnet and yellowhammer). All seven species are also species listed as rare and most threatened species under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act (2006) and skylark is listed as an Essex Local Biodiversity Action Plan (LBAP) species. The number of breeding territories of Notable Species was typically below four territories, with the only exception being skylark, with 7 territories recorded within the Site.

3.5.8 The Notable Species breeding assemblage was typically associated with vegetation along field boundaries within the Survey Area, principally hedgerows and tree lines.

3.5.9 Skylark and yellow wagtail were the only ground-nesting Notable Species recorded within the Survey Area, both of which are known to nest in open fields.

3.5.10 All breeding species recorded along with an estimated number of territories are detailed within **Table 3.1** in **Appendix 2**. Those species in bold are considered Notable Species. The indicative locations of the territories of Notable Species are provided in **Figure 2.1** in **Appendix 2**.

Bats

3.5.11 The EFC data search returned eleven bat records within 2km of the Site, dated within the last 10 years. These include brown long-eared bat, common pipistrelle, soprano pipistrelle and serotine, with only common pipistrelle listed as an LBAP species. No records were returned within the Site itself.

3.5.12 A review of the MAGIC website identified no Natural England protected species licence for bats within 2km of the Site.

Roosting Bats

3.5.13 During the two habitat surveys, a number of trees within the Site were noted to have varying suitability for roosting bats (ranging between low to high). Such trees include TN1, TN2, TN3, TN4, TN6, TN7, TN8, TN9, TN10, TN11, TN12, TN13, TN14, TN16 and TN19. Further information is listed in **Table 3.5.**

Foraging and Commuting Bats

3.5.14 Habitats within the Site are considered to fit the description most closely for land of 'moderate' interest for foraging bats in accordance with Bat Conservation Trust (BCT) guidance, with continuous habitat connected to the wider landscape that could be used for commuting and foraging.

3.5.15 Linear features within and around the Site such as tree lines, hedgerows, field margins, woodland edges and watercourses are considered to offer the most favourable habitats for foraging/commuting bats, particularly the River Crouch.

Badger

3.5.16 Discussed separately within **Appendix 3**: *Confidential Badger Survey Report*.

Otter

3.5.17 The EFC data search returned no records of otter within 2km of the Site.

3.5.18 No otter field signs were identified within the Site during the extended habitat survey and subsequent water vole and otter surveys.

3.5.19 Full survey details regarding otter and water voles are provided in **Appendix 4**: *Water Vole and Otter Survey Report.*

Water Vole

3.5.20 The EFC data search returned no records of water vole within 2km of the Site.

3.5.21 Water vole latrines were found during 2021, confirming presence along the eastern perimeter of the western Site parcel during the extended Phase 1 habitat survey and water vole and otter surveys. No signs were identified in the 2023 extended habitat survey.

3.5.22 Full survey details regarding otter and water voles are provided in **Appendix 4**: *Water Vole and Otter Survey Report.*

Hazel Dormouse

3.5.23 The EFC data search returned no records of hazel dormouse within 2km of the Site during the past ten years. However, four historical records in woodland 2km north-west of the Site was returned indicating species presence in the wider area in 1998.

3.5.24 A review of MAGIC identified three granted Natural England licences for dormice within 2km. The licences (case reference: 2019-40018-EPS-AD1; 2019-40018-EPS-AD1-1 and 2019-40018-EPS-AD1-2) were all situated in the same location approximately 1.75km north of the eastern parcel in woodland north and functionally linked of Devils/Crays Woods (ancient woodland). The licences permitted the impact, damage and destruction of a hazel dormouse breeding site and resting place.

3.5.25 During the habitat survey no signs of hazel dormouse were recorded. The dominant arable habitat within the Site provides negligible suitability for hazel dormouse. However, the small area of woodland and field boundary hedgerows and tree lines offer potential habitat for this species.

Amphibians and Reptiles

3.5.26 The data received from EFC included forty-seven records of amphibian within 2km of the Site during the last ten years. This comprised sixteen GCN, five marsh frog, nine common frog, five palmate newt and twelve smooth newt. No records were returned within the Site itself, with the closest GCN record returned 1km south of the western Site parcel.

3.5.27 A review of MAGIC identified two granted Natural England licences for GCN within 2km of the Site. One licence was granted in 2012 and permitted the destruction of a resting place approximately 1.3km south-east of the western Site parcel (case reference: EPSM2010-2249). The second licence was granted between 2019 and 2025 and permitted the destruction and damage of a GCN resting place approximately 1.8km south of the Site (case reference: 2019-40709-EPS-MIT).

3.5.28 Further review of MAGIC identified twenty GCN Class Survey Licence Returns in eight locations, all of which had confirmed presence of GCN between 2014-2017. The closest of these was identified 800m north-west of the eastern Site parcel.

3.5.29 The EFC data search returned sixteen reptile species within 2km of the Site including slow-worm, common lizard, grass snake and adder. No records were returned within the Site itself, with the closest recording located 230m south of the Site.

3.5.30 Three ponds (P1, P10 and P14) surrounding the Site were subject to eDNA sampling and Habitat Suitability Index (HSI) Assessments in 2021, while the remainder could not be surveyed due to access constraints. One of the three ponds, P10 found GCN to be present. For further details please refer to **Appendix 5**: *Great Crested Newt Presence or Absence (eDNA) Survey Report.*

3.5.31 The vast majority of the Site is arable land and much of the cable route is within the road, both of which have negligible suitability for amphibians and reptiles. No ponds are present within the Site; however, several suitable ponds are located within 250m of the Site, with ten surrounding the western Site parcel and five around the eastern Site parcel (see **Figure 1** in **Appendix 5**). Habitats within the Site such as ditches, woodland, hedgerow/tree line bases and associated grassland field-margins provide more suitable habitat for hibernating, commuting and foraging.

Other Notable Species

3.5.32 The data search returned records of other notable species including hedgehog and several invertebrate species (mostly Lepidoptera, Diptera, Hymenopteran and Coleoptera species) within 2km of the Site during the last ten years. Of these, two records were identified within the Site itself. This includes a small heath located in the western parcel during 2020 adjacent to the River Crouch, and a cinnabar moth in the eastern parcel in 2022.

3.5.33 The hedgerows, woodland, tree lines and field margins within the Site provide the greatest opportunities for breeding, foraging and shelter for brown hare and hedgehog. 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.

3.5.34 Of the plant species returned, only bluebell was listed under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended). Bluebell was identified within the Site during the extended phase 1 habitat survey in 2021 along the northern boundary of the western Site parcel.

3.6 Invasive Non-native Species

3.6.1 EFC returned one invasive species record within the Site; false-acacia in the western Site parcel. Several other species were returned in the wider area.

3.6.2 Himalayan balsam was identified within the eastern Site parcel along the River Crouch during habitat surveys of the Site in 2021 and 2023 (TN5 and TN20 in **Table 3.5**). Two mink scats and footprints were identified within the western Site parcel, along the River Crouch, during the September 2021 water vole and otter survey. Please refer **to Appendix 4** for more details.

4 DISCUSSION

4.1 Overview

4.1.1 This section seeks to identify the potential for effects to occur on habitats and protected and notable species which could be considered as reasonably likely to occur as a result of the Proposed Development. 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, and recommendations are made for further pre-construction surveys and mitigation, if required.

4.1.2 The Proposed Development has been designed to minimise the potential for effects on sensitive ecological features; thereby ensuring existing wildlife corridors and habitat connectivity are maintained and enhanced. A series of biodiversity enhancements have also been adopted.

4.1.3 Full details of mitigation measures and biodiversity enhancement measures are provided in Biodiversity Management Plan (**Appendix 6**).

4.2 Statutory Designated Sites

4.2.1 Five international statutory designated sites for nature conservation are located within 10km of the Site boundary. The closest of these sites are the Essex Estuaries SAC and the Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA and Ramsar Site, which are all approximately 8.5km east. Seven national statutory designated sites for nature conservation are located within 5km of the Site, the closest being Mill Meadow LNR, located approximately 1.2km north-west.

4.2.2 The Site lies within a Site of Special Scientific Interest (SSSI) Impact Risk Zone (IRZ) and meets the criteria (solar schemes with footprint >0.5ha) whereby the Local Planning Authority (LPA) should consult with Natural England regarding potential risks to the applicable SSSI and/or other associated statutory designated sites.

4.2.3 It is considered highly unlikely that qualifying species of the internationally designated sites will use the Site due to the distance of over 8.5km and extensive development between them. In addition, due to the nature of the development and distance of spatial separation, it is considered highly unlikely that any direct impacts will occur to any statutory designated sites or the habitats and species they support as a result of the Proposed Development. Indirect effects will be similarly avoided through the implementation of standard good practice drainage management and pollutions prevention and runoff control measures during the construction and operation of the Proposed Development. Subsequently, the potential likely significant effects on internationally designated sites can be reasonably precluded.

4.3 Non-Statutory Designated Sites

4.3.1 Seventeen LoWS are situated within 2km of the Site. The eastern parcel of the Site lies directly adjacent to Parsonage Farm Green LoWS. Outwood Solar Farm is situated approximately 100m north-east of the Site within Parsonage Farm Green LoWS. In addition, the recently consented Crays Hall Solar Farm lies also lies within Parsonage farm green LoWS in land directly adjacent to the Site's eastern parcel. B-Lines are also present within the Site itself in areas of the northern section of the eastern land parcel, as well as is the north-western corner of the western parcel.

4.3.2 There will be no direct effects on any LoWS as the Proposed Development will maintain stand-off buffers from the boundary features. In addition, a buffer of 23m will be retained from the adjacent Parsonage Farm Green LoWS, with security perimeter fencing situated at this distance and solar panel construction sited 31m from the LoWS. Standard measures to ensure runoff control and pollution prevention will be implemented during construction. These measures will safeguard off-site habitats and the species they support. With such measures in place, no indirect effects are anticipated on non-statutory designated sites in the wider area.

4.3.3 Bird, bat and hedgehog boxes as well as hibernacula are proposed along the boundaries of the LoWS, which will increase biodiversity in the area. In addition, a linear strip of species diverse grassland is proposed between the LoWS and the River Crouch. This will be largely undisturbed and increase ecological connectivity in the area, providing a 'stepping stone' between the LoWS and the River Crouch, in line with the LoWS designation.

4.3.4 Areas overlapping B-Lines within the western Site parcel will be fully retained, with overlapping areas of the eastern parcel primarily enhanced. The northern section of the eastern land parcel that lies within B-Lines, is proposed to be converted from arable land to species-rich, structurally diverse grassland. This will include areas of open meadow grassland at the northern and eastern boundaries of the land parcel, as well as grassland under and around the solar panels. With the inclusion of native hedgerow and tree planting in this area, land within the B-Lines will benefit invertebrates with improved landscape connectivity. Habitat enhancements of this area will contribute to Buglife's[54] aim of creating 'insect pathways' that link and create a network between existing wildlife areas (e.g., land functionally linked to Parsonage Farm Green LoWS).

4.4 Habitats

4.4.1 The habitats within the Site itself primarily comprise arable fields, with some areas comprising other neutral grassland fields. The arable field margins, hedgerows, trees, woodland and watercourses are of higher biodiversity value at a local geographic scale.

4.4.2 Construction works associated with the Proposed Development is only proposed in the eastern Site land parcel, with habitats in the western land parcel to be retained.

4.4.3 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 land in the eastern land parcel, which is widely present in the local landscape.

4.4.4 Effects during construction relate to physical disturbance and removal of arable land and short sections of other neutral grassland margins, primarily comprising temporary compaction and soil disturbance from plant machinery and vehicles. For the operational lifetime of the Proposed Development the intensively managed arable 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.

4.4.5 The proposed access tracks will exploit existing farm accesses and gaps in hedgerows, and will also avoid mature trees. However, a short section of earth bank that contains with scattered scrub and tall herb is proposed to be removed on the western boundary of the eastern land parcel to facilitate a road access. The layout of the Proposed Development has mostly been designed to maintain a stand-off buffer from the boundary features including the main river, River Crouch, as well as ditches, hedgerows and trees. A stand-off buffer of at least 8m will be implemented from the River Crouch and typically 5-8m around ditches. However, one small section of seasonally wet ditch will be impacted by

[54] https://www.buglife.org.uk/our-work/b-lines/

the creation of a new crossing point to accommodate an access route in the eastern parcel. The new crossing will cross a ditch that often dries, linking a proposed access road to Granites Chase in the south-western section of the land parcel. Overall, the network of hedgerows, tree lines and ditches will be retained and protected, maintaining habitat connectivity and linkages across the Site itself and with the surrounding wider landscape. These habitats will be enhanced as set out in the landscaping plan.

4.4.6 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 potential 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. The only requirement for lighting is the 'emergency lighting' at the entrances to the high voltage equipment within the substation compound. Such lighting will only be used in the rare instances of unplanned or emergency works where these need to take place at time of insufficient natural light.

4.4.7 The solar panel array layout and construction process has been designed to avoid impact to hedgerows and trees, as far as practicable. These will be retained and protected during construction, following British Standards BS5837:2012 *Trees in relation to design, demolition and construction,* with measures including root zone protection and clear instructions on the location of materials storage areas away from trees and their root protection zones, as set out in the Arboricultural Impact Assessment (AIA).

4.4.8 Opportunities have been 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 and enhancing potentially important wildlife corridors i.e. through strengthening connectivity and linked habitats through native species hedgerow and tree planting, woodland buffer planting and through the creation of extensive species and structurally diverse grassland habitats under and around the solar panels, and around the 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 insect hotel/refuge is also proposed. Land to the north and east of the eastern parcel are targeted as wildlife meadows to increase biodiversity provisions within the Site.

4.4.9 Habitat enhancement measures are proposed for the Site, set out in the BMP and illustrated in the *Landscape Proposals*. These include:

Native tree and hedgerow planting, including infilling of existing hedge gaps;

Native woodland planting;

Development of extensive areas of structurally and species-diverse grassland, including two areas of open meadow grassland (which will also serve to provide beneficial habitats for nesting skylarks); and,

The addition of bat, bird and hedgehog boxes as well as insect hotel/refuge.

4.5 Biodiversity Net Gain Assessment

4.5.1 In order to assess the biodiversity impacts associated with the Proposed Development the Natural England Biodiversity Net Gain Metric Calculator was utilised. Based on the information provided within the *Landscape Proposals Plan* (Drawing Number: 01; Revision: E), the calculation results show that the

Proposed Development will result in a biodiversity net gain of 86.45% in Habitat Units, a 25.94% net gain in Hedgerow Units and an 11.57% net gain in Watercourse 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 7.**

4.5.2 The Proposed Development adheres to all trading principles enshrined within the Metric. The Metric does not account for species-specific mitigation or enhancement measures which are referred to elsewhere in this assessment.

Biodiversity Net Gain Calculation Headline Results (Defra metric 4.0)

FINAL RESULTS		
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	215.51
	Hedgerow units	9.31
	Watercourse units	2.64
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	86.45%
	Hedgerow units	25.94%
	Watercourse units	11.57%
Trading rules satisfied?	Yes ✓	

Unit Type	Target	Baseline Units	Units Required	Unit Deficit	
Habitat units	10.00%	249.28	274.20	0.00	Unit requirement met or surpassed ✓
Hedgerow units	10.00%	35.90	39.49	0.00	Unit requirement met or surpassed ✓
Watercourse units	10.00%	22.83	25.11	0.00	Unit requirement met or surpassed ✓

4.6 Protected and Notable Species

Birds

Protecting Active Nest Sites

4.6.1 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').

4.6.2 Additionally, a further forty-nine bird species are listed under Section 41 of the NERC Act 2006, with five species also listed within the LBAP. Such species are therefore a material consideration within the planning process.

4.6.3 No Schedule 1 species were recorded breeding within the Site.

4.6.4 The breeding bird assemblage using the Site is typical of farmland habitats in the region and is likely to be of no more than local value. 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 most associated with vegetation along field boundaries.

4.6.5 In order to reasonably 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 any vegetation removal takes place outside of the bird breeding season (March-August inclusive). If vegetation works are necessary during the breeding season, any suitable nesting habitat (including arable and grassland

areas) to be affected by works should be checked by a suitably experienced ecologist prior to works commencing. Works would be permitted to proceed only when the ecologist is satisfied that no offence will occur under the legislation.

Habitat Loss

4.6.6 The footprint of a solar farm is relatively low, and the Proposed Development will only result in the loss of approximately 43ha of agricultural land in the eastern land parcel, with all habitats retained in the western land parcel. Habitat in and around the Proposed Development scheme will be mostly changed from intensively managed arable land to extensive areas of undisturbed species-rich grassland, which will benefit a range of ground-nesting species.

4.6.7 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 such as skylark.

4.6.8 Skylarks and yellow wagtails (both as a ground-nesting species) are discussed below under 'Displacement'.

Displacement

4.6.9 The main potential effect of construction of the Proposed Development is the displacement of foraging and nesting birds. The majority of the breeding birds within the Site (including five out of seven Notable Species) are associated with woodland and field boundary vegetation, particularly tree lines and hedgerows. These boundary features will not be directly impacted by the Proposed Development and will be protected, with an appropriate buffer zone, to ensure the 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.

4.6.10 Birds nesting on open ground, such as skylark and yellow wagtail, may be temporarily displaced if construction takes place during the breeding season; however, in the context of comparable habitats locally the area lost will be small.

4.6.11 A recent study by Fox (2022)[55] found little evidence to suggest that skylarks successfully breed within operational solar farms. It is assumed that the presence of the panels renders a solar farm unsuitable for nesting as the 'open aspect' is lost. However, the study did find that skylarks have been recorded many times foraging within solar arrays and even feeding recently fledged young. It is therefore evident that skylarks will utilise a suitably managed solar farm as a foraging resource and possibly also as a 'nursery' habitat where nesting takes place on adjacent farmland. Subsequently, it is assumed that the Proposed Development site will no longer be utilised by breeding skylark in areas with panels positioned. However, this21ha footprint proposed for solar panel positioning that is situated only in the eastern land parcel will continue to be available for foraging.

4.6.12 Mitigation for the loss of suitable nesting habitat for skylarks will therefore be provided. This will include creation of permanent grassland and also the provision of 'skylark plots' within land identified

[55] Fox, H. (2022). Blithe Spirit: Are Skylarks Being Overlooked in Impact Assessment? CIEEM. 117 pp. 47-51.

as the 'Skylark Mitigation Area' in **Figure 5**, secured through a Section106 agreement or a Conservation Covenant.

4.6.13 Although seven skylark territories were recorded within the Survey Area, four of these territories were identified in the western land parcel where no construction works associated with the Proposed Development are planned take place (**Appendix 2**). Therefore, the three territories identified in the eastern land parcel, where construction works associated with the Proposed Development are planned, was used as the basis for mitigation. At the time of the Breeding Bird Survey visits, the survey area was under spring wheat crop. The study by Fox (2022) indicates that spring cereal crops have an average density of 0.46 skylark territories per hectare, which is higher than most other crop types. Subsequently, it can reasonably be assumed that the eastern Site parcel is unlikely to support more than three breeding pairs under other crop-types. Further, the Site will continue to be available for foraging skylarks in grassland situated within the proposed solar panel footprint, with permanent breeding and foraging habitat available in northern sections of the eastern Site parcel where arable land is converted to open species-rich wild-flower grassland (**Figure 5**).

4.6.14 Two skylark territories in the eastern land parcel are situated in areas proposed for conversion to open meadow habitat. Such habitat will provide natural, permanent breeding habitat for skylark as opposed to various conditions of habitat suitability under changing crop rotations. As such, this area of open meadow grassland is considered to continue to provide sufficient and more beneficial breeding habitat for the species as it will be permanently available and managed favourably. Skylark presence will therefore not be dictated by cropping regimes and, as grassland is natural skylark breeding habitat, it is considered that undisturbed meadow created in the eastern land parcel is beneficial to breeding skylarks. This area is therefore likely to support a higher density breeding population of the species and improved breeding productivity.

4.6.15 Two skylark plots will be created within arable land in the Skylark Mitigation Area (**Figure 5**) in accordance with RSPB Skylark Plot creation guidance[56]. The plots will be a minimum of 16m^2 in size.

4.6.16 With the adoption of mitigation measures outlined above, together with the creation of expansive areas of permanent open meadow breeding habitat, the local skylark population is considered likely to benefit; overall, there will be increased foraging resource for this species and reliable high-quality breeding grassland habitat available.

4.6.17 There is less clear evidence on potential impacts for yellow wagtail. This is a migratory species, who's numbers fluctuate but is generally in decline. Yellow wagtail nest on the ground, showing an early season preference for winter cereal but shifting nesting attempts to broad-leaved crops, especially potatoes (Kragten, 2011[57]). The species is known to benefit from a mosaic of open habitats, including wet grassland, meadow and pasture. As such, numbers will fluctuate entirely depending on crop-type and habitat variety. Subsequently, as the Proposed Development will increase habitat variety and structure, it can be reasonably assumed that this species will also benefit from the measures included in the BMP.

[56] RSPB. Farming for Wildlife: Skylark Plots. www.sdfarmbirds.com/_app_/resources/documents/www.sdfarmbirds.com/unused/rspb_skylark_plots.pdf [Accessed 01/11/2023]
[57] Kragten, S. (2011). Shift in crop preference during the breeding season by Yellow Wagtails on arable farms in The Netherlands. Journal of Ornithology 152(3):751-757

4.6.18 The Proposed Development is considered unlikely to impact other Notable Species recorded breeding on-Site as these species predominantly nest along field boundary vegetation, which itself will not be directly impacted. Any displacement of these nesting species as a result of works taking place during the breeding season are likely to be temporary and localised in scale.

Solar Farm Use by Breeding Birds through Habitat Enhancement

4.6.19 The Proposed Development will create over 21ha of new grassland between the solar panels and over 17ha of diverse grassland around the margins, replacing existing arable land. This grassland will provide permanent improved breeding habitats for ground-nesting birds, such as skylark and yellow wagtail, and where adjacent to tree lines and hedgerows, species such as yellowhammer.

4.6.20 A pilot report (Solar Energy UK)[58] outlining the results from 37 operational solar sites across the UK surveyed in 2022 using a standardised approach to ecological monitoring on solar farms found that there was a positive relationship between botanical diversity and bird diversity, which is likely due to an increase in food resources both through vegetation, seeds and invertebrate prey Recent studies conducted by the Royal Society for the Protection of Birds (RSPB)[59] further support high bird usage of solar farms by farmland bird species, including ground-nesting species such as yellow wagtail.

4.6.21 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 with species-rich wild-flower grassland including open meadow areas, planting hedgerows, 'gapping-up' existing defunct hedgerows, planting trees and deploying five bird boxes will enhance nesting and foraging opportunities for the bird assemblage within and adjacent to the Site.

4.6.22 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.

Bats

4.6.23 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 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.

4.6.24 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 NERC Act 2006, with common pipistrelle also listed within the LBAP.

4.6.1 The arable habitat within the Site is likely to be of low value to foraging bats. However, linear habitat features including hedgerows, tree lines, woodland edges, watercourses and grassland field margins

[58] Solar Energy UK (2023). Solar Habitat: Ecological Trends on Solar Farms in the UK. https://solarenergyuk.org/wp-content/uploads/2023/06/Solar-Habitat-Report-2023.pdf [Accessed 06/11/2023]
[59] https://community.rspb.org.uk/ourwork/b/biodiversity/posts/bird-use-on-solar-farms-final-results [Accessed 06/11/2023]

are likely to offer greater foraging and commuting potential. The River Crouch is likely to act as a major commuting and foraging corridor for bats in the wider landscape.

4.6.2 The Site contains no buildings or structures. Some of the mature trees on Site may have bat roost suitability (see **TNs** in **Table 3.5**), however, these and all other trees on Site will be retained and protected following British Standards BS5837:2012 *Trees in relation to design, demolition and construction*. Existing hedgerows will also be retained and protected during construction with additional hedgerow and tree planting proposed as part of the *Landscape Proposals Plan* and as described in the BMP. As a result, there will be no loss or disturbance to any trees with roost potential, and no significant loss of linear foraging habitat.

4.6.3 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 suspected to be impacted by the proposed works, the data gathered would be used to inform potential design amendments in order to avoid or reduce impacts, or failing that, support a licence application to Natural England to destroy/disturb the bat roost.

4.6.4 Structurally and species diverse grassland habitat creation proposed as part of the development, along with the cessation of agricultural pesticide use, will attract and support a higher number of flying insects compared to the existing arable land, which will in turn increase foraging opportunities for bat species locally present.

4.6.5 Once constructed the solar farm will not be routinely lit. Any lighting associated with the substations will be very localised and 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.

4.6.1 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*[60]. As long as lighting is designed and implemented in a sensitive manner, no discernible effects are anticipated on foraging/commuting bats.

4.6.2 The inclusion of five bat boxes and landscape planting, detailed within the BMP, would enhance opportunities for roosting/foraging/commuting bats. Overall, the development will retain current habitat features and provide additional benefits for roosting and foraging bats.

Badger

4.6.3 Discussed separately within the *Confidential Badger Survey Report* (**Appendix 3**).

Otter

4.6.4 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, and;

deliberately disturb an otter, particularly in a way which is likely to:

- to impair their ability to survive, breed or reproduce, rear or nurture young; or,

[60] 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.*

- to affect significantly the local distribution or abundance of the species.

4.6.5 Otter is listed as a priority species under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006, as well as the UK BAP and Essex LBAP. Otter is therefore a material consideration within the planning process.

4.6.6 Otter surveys were undertaken in July and September 2021. No signs of otter were recorded along the watercourses and associated terrestrial habitat. The aquatic habitat surveyed was assessed as largely providing sub-optimal habitat for otters, as the majority of the watercourses surveyed were dry or shallow (less than 0.5m deep) and evidence of seasonal drying was recorded. However, the watercourses do have good connectivity to the wider area. The River Crouch which flows along the southern boundaries of both parcels, does provide suitable habitat and could provide both aquatic and terrestrial habitat for the species. Full details of the otter survey results are discussed in **Appendix 4:** *Water Vole and Otter Survey Report.*

4.6.7 No otter records were returned by the EFC within 2km of the Site. However, the Site has been recorded as being sub-optimal, with the River Crouch providing higher suitability for the species. If present within the wider local area, otters may utilise the River Crouch, with the potential to use on-Site ditches for occasional commuting and foraging purposes.

4.6.8 The Proposed Development will not directly affect the majority of ditches or their banksides, with minimum 5-8m buffers being maintained and standard good practice measures will be employed to ensure runoff control and pollution prevention to protect aquatic/bankside habitats. Accesses and construction are proposed to utilise a single existing ditch crossing (**Photograph 12**), as well as existing farm tracks and field entrances. Woodland edges, hedgerows and ditches will be retained and protected with buffers.

4.6.9 However, a small section of ditch will be impacted along the western boundary of the eastern land parcel to accommodate a new access track that extends the current adjacent culvert links to Granites Chase. This grass dominated ditch is considered seasonally wet, with low water levels present at the time of survey. The ditch is connected to the River Crouch and therefore has potential for commuting otter usage.

4.6.10 It is recommended that a pre-construction otter survey be completed by a suitably qualified ecologist prior to commencement of works to check for signs of activity and/or newly created holts in and surrounding the Site.

4.6.11 In the event that baseline conditions have changed, the appointed ecologist will advise on the implementation of necessary mitigation measures to ensure legislative compliance including, if necessary, changes to the Site layout, working methods and/or a derogation licence from Natural England.

4.6.12 Once operational, the Proposed Development is not likely to have any effect on otters or their habitat. The new crossing point once completed will be small in size, approximately 5m in width, and this is therefore not considered to impact habitat connectivity within the Site and wider area.

4.6.13 Habitat enhancement and management could benefit otters, in the wider area including the creation/infilling of hedgerows and tree lines along watercourses, which they could use for foraging and commuting purposes. With a stop to inputs of pesticides and fertilisers, this could improve water quality in the area and also benefit the species.

Water Vole

4.6.14 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 listed under Section 41 of the Natural

Environment and Rural Communities (NERC) Act, UK BAP and Essex LBAP. It is therefore a material consideration within the planning process.

4.6.15 The watercourse/ditch sections were surveyed in July and September 2021 and assessed as providing varying suitability for water vole, ranging from unsuitable to optimal.

4.6.16 Evidence of water vole was found along the eastern boundary of the western land parcel during the surveys. Due to the low numbers of latrines, a low population of water voles is considered to be present in and around this area at the time of the surveys. Full details of the water vole survey results are discussed in **Appendix 4:** *Water Vole and Otter Survey Report.*

4.6.17 The majority of proposed works are situated over 5-8m from on-Site ditches, with accesses and construction mostly proposed to utilise an existing ditch crossings (**Photograph 12**) in the eastern parcel to facilitate the on-Site access track. However, one small section of seasonally wet ditch along the western boundary of the eastern most parcel will be impacted to create a crossing point to facilitate a new access track that links to Granites Chase. The access crossing will involve the extension of the currently adjacent culvert. This has the potential to disturb water voles present along this ditch section.

4.6.18 Although no water voles were identified in the eastern parcel, with species presence confirmed only in the western parcel where no construction works are proposed, the seasonally wet ditch section that is proposed to include a new ditch crossing was not included in the 2021 water vole and otter surveys. No signs of water vole were identified in the 2023 extended habitat survey; however, it is recommended that a pre-construction water vole survey is undertaken to determine continued species absence in this vicinity prior to works commencing.

4.6.19 In sections, where water vole is confirmed to be likely absent, temporary construction works affecting the ditch sections could be undertaken in accordance with specific RAMS and in line with a Construction Environmental Management Plan (CEMP), which could be conditioned. This would involve a pre-commencement survey prior to the works to ensure water voles have not moved into the area in the interim period.

4.6.20 Following a pre-commencement survey, should the baseline conditions change and works be proposed within 5m of ditch sections which have confirmed water vole presence, suitable protection and mitigation measures will be determined under the advice of the ecologist, and a licence may be required if disturbance cannot be avoided. Licenced works are restricted to certain times of the year e.g., works under a class licence must be undertaken between 15th February and 31st March in south-east England and for a site licence including trapping, between 1st March and 15th April.

4.6.21 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.

4.6.22 The access track once constructed will be for the most part situated over 5m away from the ditch and it is considered construction and operational maintenance traffic using this will have a negligible impact on water voles. The new crossing point and use of the existing crossing point in the eastern parcel will not adversely affect the potential free movement of the species into and around the Site ditch network.

4.6.23 Habitat enhancement and management as proposed could benefit water voles in the future. The Proposed Development will result in structurally and species diverse grassland, underneath the solar panels and at field margins that run adjacent to the ditch network. This and the creation/infilling of hedgerows could benefit water voles, through the use of these habitats for foraging and commuting purposes, providing a strengthened network of suitable connecting habitat across the Site and linking to the wider landscape. 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

4.6.24 The desk study identified hazel dormouse populations in the wider landscape, with the extended habitat survey establishing that tree lines and hedgerows within the Site have potential suitability. Hazel dormice are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Habitats Regulations. 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.

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

4.6.26 The dominant arable habitats within the Site are considered to have negligible potential to support the species, however, the intact species-rich tree lines, hedgerows and scrub offer suitability for foraging, commuting and hibernating hazel dormice, if present. The Site is well connected through the hedgerow networks and woodland habitats in the wider environment. Hedgerows will be retained and protected during the Proposed Development, as well as more favourable habitats in the wider area such as woodland and scrub. A small section of scattered scrub on an earth mound will be impacted by the proposed access route, but this is considered unsuitable scrub habitat that is spatially separated from suitable hedgerow and woodland features. In addition, hedgerow and tree planting around the Site will serve to provide further habitat for dormice as well as strengthening linkages to existing habitat in the wider area.

4.6.27 Due to the retention of hedgerows, woodland, scrub and tree lines 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). However, for the minor localised works required for access, Reasonable Avoidance Measures (RAMs) would be implemented as a precautionary measure during the construction phase to safeguard animals. Full details of RAMs are provided in the **Appendix 6**.

Amphibians and Reptiles

4.6.28 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 GCN;
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.

4.6.29 Common reptile species namely the common lizard, slow-worm, grass snake and adder are protected against killing, injuring and sale under the Wildlife & Countryside Act 1981 (as amended). GCN, 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. GCN is further listed under the Essex LBAP.

4.6.30 There are no ponds within the Site, but fifteen ponds are located within 250m of the Site perimeter. The vast majority of the Site is arable farmland, which is of very low suitability for amphibian and reptile species. As discussed in **Appendix 5**, three ponds surrounding the Site were subject to eDNA sampling and Habitat Suitability Index (HSI) Assessments to determine the occupancy status of GCN. One of the three ponds, P10 returned a positive eDNA result, indicating GCN presence. This pond is located adjacent to the south-eastern boundary of the western parcel and therefore GCN may be utilising suitable habitats within the Site. Negative eDNA results were returned for the other two ponds surveyed, Pond P1 which is located adjacent to the east of the western parcel and Pond P14 situated west of eastern parcel.

4.6.31 The cable route is mainly focused within the highway of main A roads; as this is negligible habitat for amphibian and reptile species, ponds in vicinity of the highway route have been discounted. However, one pond is present adjacent to the cable route that passes through agricultural fields, within a residential garden. This was not subject to survey due to access restrictions. Works associated with the cable route will be of a small scale, temporary and land will be reinstated upon completion.

4.6.32 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) that may be used by amphibians and reptiles.

4.6.33 Works across the Site are primarily focussed within low value habitats including arable and short managed grassland margins where amphibians and reptiles are unlikely to be present. Higher value habitats (ponds, scrub, woodland, tree line bases and hedgerows) within the vicinity of the ponds, will be retained and protected through a suitable working method statement and standard good practice pollution prevention and runoff control measures as part of the construction methodology.

4.6.34 Reasonable Avoidance Measures (RAMs) will also be implemented during the construction phase to safeguard animals during works; including the minor removal of suitable habitat within the Site and any works within 50m of the cable route pond P16.

4.6.35 With the measures set out above it is considered that there would be no likely effects on the local population of amphibian or reptile species or on dispersal, breeding or foraging opportunities. Full details of RAMs are provided in **Appendix 6**.

4.6.36 The risk of habitat loss or disturbance affecting individuals or the local population through displacement or loss of habitat for foraging or shelter is considered to be negligible. Should design changes increase the possibility of risk to GCNs, suitable ecological advice will be sought on necessary protection measures, including works under a licence from Natural England if required to ensure legislative compliance.

4.6.37 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.

4.6.38 Given the measures of mitigation planned, the Proposed Development will not affect the favourable conservation status of reptiles and amphibians, or risk harm to individual animals as a result.

4.6.39 As a result of habitat enhancements, including the creation of new grassland areas, woodland buffer planting and new hedgerow planting as well as four hibernacula, the completed development will provide higher value terrestrial habitat for wildlife, including amphibians and reptiles.

Other species

4.6.40 The Site and wider area may potentially support brown hare, hedgehog, and a variety of invertebrates. However, these species are not considered to be a significant constraint in terms of the Proposed Development. Brown hare and hedgehog are listed as a priority species under Section 41 (England) of the NERC Act 2006 and UK BAP, and brown hare is also an Essex Biodiversity Action Plan species.

4.6.41 The loss of a relatively small area of arable land is not considered to affect local populations of these species, especially when considered in the context of the extensive availability of more suitable habitats in the wider area and the proposed creation of more favourable species diverse grassland habitat. The enhanced grassland habitat and hedgerow planting 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.

4.6.42 Bluebells which are listed under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) were found at the bases of hedgerows and these will be retained and protected.

4.6.43 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, thereby maintaining dispersal routes and opportunities to access relatively undisturbed habitat within the secured Site and connectivity in the wider landscape.

4.6.44 The retention/enhancement of hedgerows on Site will likely continue to 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. In addition, the installation of an insect hotel will further benefit invertebrate species within the Site.

4.7 Invasive Non-native species

4.7.1 Evidence of mink was recorded during survey on Site along the River Crouch in 2021. It is likely that it uses this as part of its wider territory, which can extend up to 6km. Records of the species, will be sent to the Local Record Centre to assist with monitoring in the area.

4.7.2 Himalayan balsam was recorded within the Site along the River Crouch. Himalayan balsam 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 the Site under appropriate waste management documentation (under the Environmental Protection Act 1990).

4.7.3 A pre-construction check will be undertaken to determine the extent of which the invasive species has colonised the Proposed Development area. The Himalayan balsam within the Site was found along the River Crouch (TN5 and TN20).

4.7.4 A minimum 8m buffer will be implemented from the river channel and therefore it is considered unlikely that the Proposed Development will cause further spread of this species. However, if this is changes, suitable biosecurity measures will be employed to prevent the accidental introduction or spread of such species during or after construction.

4.7.5 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 MITIGATION AND ENHANCEMENT SUMMARY

5.1.1 **Table 5.1** summarises the mitigation and enhancement recommended in for the Proposed Development.

5.1.2 In addition, a BMP has been produced to outline the objectives to achieve Biodiversity Net Gain and includes associated management and monitoring.

Table 5.1: Mitigation and Enhancement Summary

Feature	Summary of Mitigation and Enhancement
Designated Sites	The closest statutory designated site is Mill Meadow LNR, which is located 1.2km north-west of the Site boundary. The Site lies within a SSSI 'Impact Risk Zone' (IRZ) and meets the criteria (solar schemes with footprint >0.5ha) whereby the LPA should consult with Natural England regarding potential risks to the applicable SSSI and/or other associated statutory designated site. The Site lies directly adjacent to Parsonage Farm Green LoWS, with the north and east boundaries of the eastern parcel adjoining part of the non-statutory designated site. Outwood Solar Farm is situated within Parsonage Farm Green LoWS. No impacts on statutory or non-statutory designated sites for nature conservation are anticipated due to the lack of functionally linked land, retention of field boundary habitats, implementation of buffer zones as well as pollution prevention and surface water runoff management measures. Landscape proposals will increase biodiversity and ecological connectivity in the area, particularly with undisturbed species diverse grassland linking the LoWS and the River Crouch.
Habitats	Existing features of biodiversity value will largely be retained and protected throughout the construction and operation phases. All trees necessitating protection during the construction will be protected during construction works in-line with BS 5837:2012 Trees in relation to design, demolition and construction. Pollution prevention measures will be implemented to prevent pollution and run-off occurring during the construction and specific control measures will be implemented to protect the watercourses/ditches/ponds within and off Site. The scheme delivers an 86.45% net gain in Habitat Units, a 25.94% net gain in Hedgerow Units and an 11.57% net gain in Watercourse Units.
Birds	Removal of nesting bird habitats should be undertaken outside of the bird breeding season (01 March to 31 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. Skylark plots will be created within arable land in the Skylark Mitigation Area. Arable land converted to permanent meadow grassland will provide suitable breeding skylark habitat, with grassland under solar panels providing suitable foraging habitat.
Bats	No works are proposed that are likely to affect conservation status or risk disturbance to bats. Should plans change, preliminary bat roost assessments will be undertaken on any trees identified for removal, which may identify further survey requirements, including dusk emergence/dawn re-entry surveys or inspections at height. If bats are confirmed to be roosting within any tree to be impacted by proposed works, the data gathered would be used to support a licence application to Natural England to destroy/disturb the bat roost and to inform potential mitigation measure to reduce and/or avoid impacts if appropriate.

Feature	Summary of Mitigation and Enhancement
Badgers	A pre-construction survey will be undertaken to check current status of badgers around the Site. Suitable protection, avoidance or mitigation measures will be implemented to ensure legislative compliance, if required, such as the implementation of buffer zones. Precautionary good practice measures will be adopted during construction to protect badgers and other wildlife such as covering open excavations overnight and securing stored materials.
Otter & Water Vole	A pre-construction check for otter and water vole will be completed by a suitably qualified ecologist prior to the commencement of any work affecting ditches/watercourses, or any works undertaken within 5m of any ditches/watercourses. In sections, where water vole is confirmed to be likely absent, temporary construction works potentially affecting the ditch sections could be undertaken in accordance with specific RAMS. 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.
Hazel Dormouse	Arable land within the Site has negligible potential to support hazel dormouse. However, habitats such as species-rich tree lines and hedgerows along the Site boundary are more optimal for them. These habitats will be retained and protected during the works. Any potential works affecting suitable habitat, will be undertaken under Reasonable Avoidance Measures (RAMs).
Amphibians and Reptiles	Precautionary – Works to be undertaken under Reasonable Avoidance Measures (RAMs).
Other Species	Brown hare, hedgehog and a range of invertebrate species are potentially present within/close to the Site. Precautionary – Works to be undertaken under Reasonable Avoidance Measures (RAMs).

FIGURES

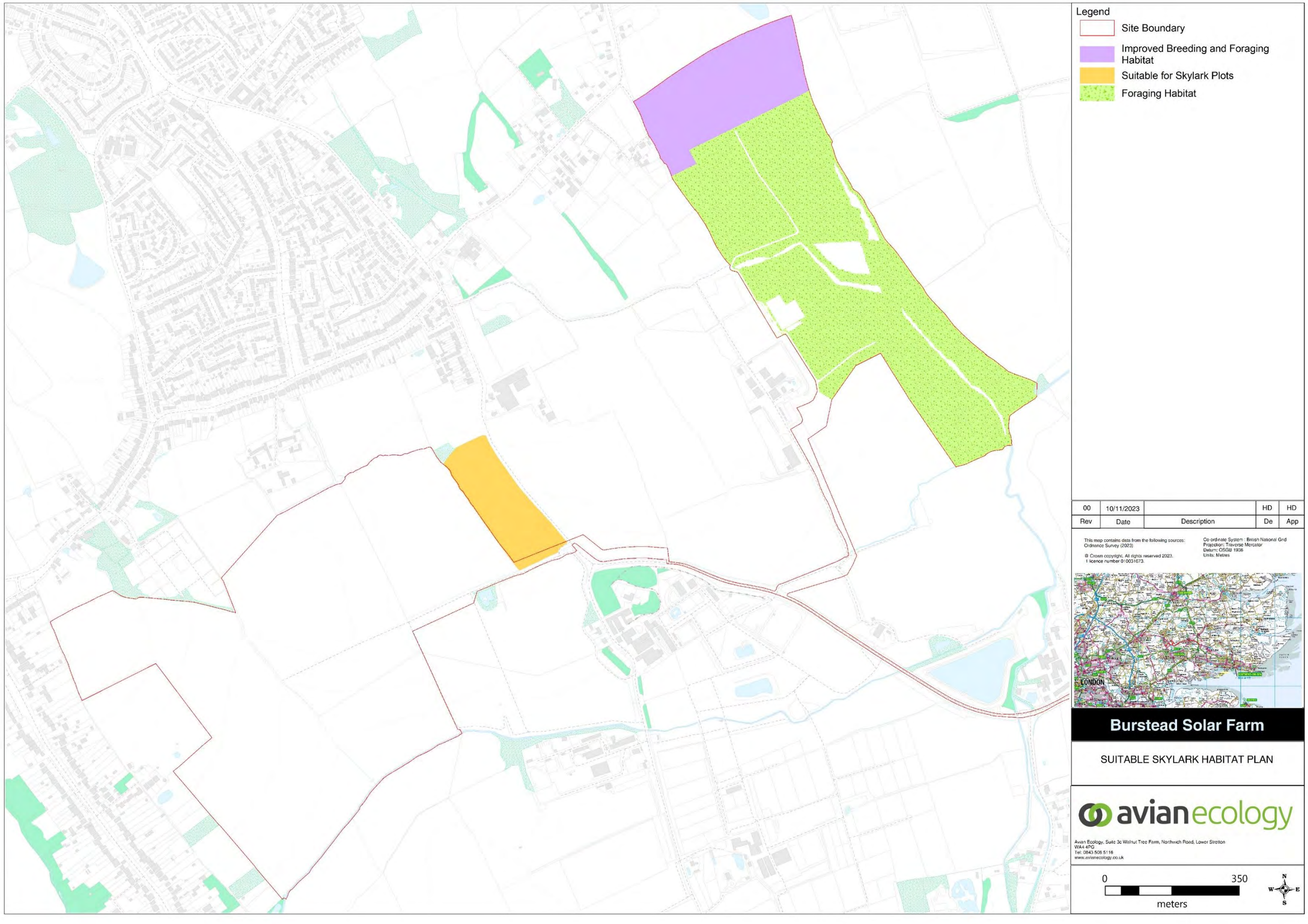
Figure 1: Site Location Plan

Figure 2: Statutory Designated Sites Plan

Figure 3: Non-statutory Designated Sites Plan

Figure 4: Habitat Plan

Figure 5: Suitable Skylark Habitat Plan



ECOLOGICAL ASSESSMENT REPORT
APPENDIX 1:
PHOTOGRAPHS

BURSTEAD SOLAR FARM AND BATTERY STORAGE ‘FREE GO’

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

NOVEMBER 2023

APPENDIX 1: PHOTOGRAPHS

Photograph 1: Example of arable field with bare ground following a harvest of the cereal crop in the Site's eastern land parcel.

Photograph 2: A grassland field margin/bankside situated on the eastern boundary of the eastern land parcel.

Photograph 3: An example of a hedgerow with scattered trees located at the eastern parcel's Site boundary.

Photograph 4: An on-Site drainage ditch situated in the eastern Site boundary.

Photograph 5: The River crouch situated along the southern boundary of the eastern land parcel. Pictured is Himalayan balsam (TN5) on the bankside.

Photograph 6: A tree line situated along the northern and eastern Site boundary of the eastern land parcel.

Photograph 7: A semi-natural woodland situated in the south-eastern corner of the eastern land parcel.

Photograph 8: Parsonage Farm Green Local Wildlife Site (LoWS) located directly adjacent to the Site boundary of the eastern land parcel.

Photograph 9: TN6 - Mature oak tree with over six woodpecker holes. High bat roost potential.

Photograph 10: **TN7** - Potential veteran willow tree with woodpecker holes and a broken branch. Moderate bat roost potential.

Photograph 11: TN15 - Water vole latrine below a willow tree along the ditch. Located in 2021 in the western land parcel.

Photograph 12: An existing ditch crossing point located in the eastern parcel that will be utilised for a proposed access road.

APPENDIX 2: BREEDING BIRD SURVEY REPORT

ECOLOGICAL ASSESSMENT REPORT
APPENDIX 2:
BREEDING BIRD SURVEY REPORT

BURSTEAD SOLAR FARM AND BATTERY STORAGE 'FREE GO'

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

NOVEMBER 2023

Burstead Solar Farm 'Free Go'

on behalf of Enso Green Holdings J Limited

Appendix 2: Breeding Bird Survey Report

avian ecology

Document Control				
Project Name:		Burstead Solar Farm 'Free Go'		
Project Number:		EnsoE-517-003564		
Report Title:		Appendix 2: Breeding Bird Survey Report		
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	14/11/2023	Final	K Love *MSc*	J. Stevens *BSc (Hons.)*

CONTENTS

FIGURES

ANNEXES

1 INTRODUCTION

1.1 Project Background

1.1.1 Avian Ecology Ltd. was commissioned by Enso Green Holdings J Limited to undertake breeding bird surveys in relation to the proposed installation of a Solar Farm and battery storage facility with associated infrastructure ('Proposed Development'), forming a 'Free Go' application following a previous refusal, on land located to the south and east of Great Burstead, Billericay, Essex (the 'Site').

1.1.2 The Site was previously included in a submitted cross-boundary planning application for a solar farm and battery storage facility, which was refused planning permission by Basildon Borough Council and Rochford District Council (application numbers: 22/00411/FULL (Basildon) and 22/00359/FUL (Rochford)). The revised development area (Proposed Development) is reduced in scale to the previous submission.

1.1.3 The objectives of this report are to:

Provide baseline information on the current breeding ornithological features within the Site;

Identify the presence of notable breeding bird species within the Site;

Assess the importance of the breeding bird assemblage which the Site supports; and,

Provide recommendations for further pre-construction checks and / or mitigation measures related to breeding birds, if required.

1.1.4 Only common bird species names are referred to within the main text of this Appendix. **Annex 2.1** provides a summary of all bird species recorded during the surveys. Both common and species names together with a summary of their conservation status as relevant is provided.

1.2 Site Overview

1.2.1 The Site as illustrated by the red-line application boundary shown on **Figure 2.1** includes two land parcels of approximately 119ha comprised of agricultural land, and a grid connection route. The two land parcels are approximately 900m apart and are located south and east of Great Burstead which is south-east of Billericay, Essex.

1.2.2 The Site comprises a series of fields in arable cultivation, with the two land parcels located to the west and east of Southend Road (A129). The arable fields are marked by a network of drainage ditches, tree lines, hedgerows and scattered trees. The River Crouch runs adjacent to the southern Site boundaries of both land parcels.

1.2.3 In the wider context, the Site is surrounded by further extensive areas of farmland and residential settlements with the operational Outwood Solar Farm located approximately 100m to the north-east of the eastern parcel. In addition, the recently consented Crays Hall Solar Farm is situated on land directly east of the Site's eastern land parcel.

1.3 Legislation

1.3.1 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[1], 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')[2].

1.3.2 Additionally, a further forty-nine bird species are listed under Section 41 of the NERC Act 2006[3], with five species also listed within the Essex Local Biodiversity Action Plan (LBAP)[4]. Such species are therefore a material consideration within the planning process.

2 METHODOLOGY

2.1 Breeding Bird Survey

2.1.1 Three breeding bird surveys were undertaken between April and June 2021. All three surveys were carried out between dawn and intended to be completed by midday, although the first survey started later due to dawn fog and ceased at 12:45hrs. All surveys were carried out in conditions conducive for breeding bird surveys (avoiding heavy rain and strong winds). The 'Survey Area' for the breeding bird survey was the Site excluding the temporary cable route and access tracks which will largely utilise existing track ways. This Survey Area was extended to all habitats within a 100m buffer for the recording of those species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

2.1.2 Breeding bird surveys were undertaken J Hanlon *BSc (Hons.)*, who is an experienced ornithologist.

2.1.3 The methodology employed was based upon an adapted version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) technique, as detailed in Gilbert *et al*. (1998[5]). 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 Survey Area were determined using standard territory mapping techniques to identify and isolate areas within which birds consistently displayed breeding behaviours (following Gilbert *et al.* 1998). The territory mapping method is based on the observation that many species during the breeding season are territorial. This is most marked in passerines where territories are often determined by conspicuous song, display and territorial disputes with neighbouring conspecifics. The expected outcome of this technique is that mapped registrations fall into clusters, approximately coinciding with territories. Records of birds just visiting the Survey Area (e.g., gulls feeding in fields) and birds flying over the Site were also made and the records of these are summarised; however, these have been discounted from further analysis, given they are not breeding within the Survey Area and are therefore not considered relevant to the assessment.

2.1.4 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

[1] https://www.rspb.org.uk/birds-and-wildlife/advice/wildlife-and-the-law/wildlife-and-countryside-act/schedules/
[2] Annex 1 – species listed on Annex 1 of the EC Directive 2009/147/EC of the European Parliament on the conservation of wild birds. https://ec.europa.eu/environment/nature/conservation/wildbirds/threatened/index_en.htm
[3] https://www.gov.uk/government/publications/habitats-and-species-of-principal-importance-in-england
[4] https://www.castlepoint.gov.uk/download.cfm?doc=docm93jijm4n5168.pdf&ver=8595
[5] Gilbert, G., Gibbons, D.W & Evans, J. (1998) *Bird monitoring methods*. A manual of techniques for key UK species. RSPB.

(BoCC Amber and Red List Species (Eaton *et al.* 2015[6]), Annex 1/Schedule 1[7] raptors and owls, priority species listed under Section 41 of the NERC Act 2006 and Essex LBAP species.

2.1.5 Details of the surveys are summarised in **Table 2.1** and presented in further detail in **Annex 2**.

Table 2.1: Breeding bird survey effort.

Date	Start time (24hrs)	End time (24hrs)	Sunrise times (24hrs)	Survey conditions
20/04/2021	09:15*	12:45	05:52	Easterly light breeze (2 on the Beaufort Scale), broken cloud, but dry. Good visibility. 12°C. *Survey started later than intended due to fog at sunrise.
07/05/2021	07:05	10:35	05:19	Westerly light breeze (3 on the Beaufort Scale), broken cloud and dry. Good visibility. 9°C.
24/06/2021	07:55	10:50	04:41	North-westerly light breeze (2 on the Beaufort Scale), light cloud and dry. Good visibility. 14°C.

Limitations

2.1.6 Areas outside of the 100m buffer, assigned for the temporary cable route and access tracks were not included within the Survey Area. Works for the cable route will be temporary, short term and habitats will be reinstated upon completion. The access routes will largely utilise existing access tracks, along field boundaries. These areas are small in size and representative of habitats within the Survey Area. This is not considered to be a constraint to the survey or assessment.

2.1.7 The results of the surveys are only a snap-shot of the habitat use and activity of the bird assemblage within the Site. However, the surveys have provided indicative evidence of the breeding bird assemblage within the Site.

2.1.8 It is appreciated that factors, including the cropping regime will influence habitat use within the Site by birds. It is an assumption that the cropping regime during the survey period is typical.

2.1.9 The first survey in April ran past the targeted finish of 12:00hrs by less than one hour. Birds were considered to still be showing breeding behaviour with territorial males of several species still singing after midday, so this was not considered to be a limiting factor. Furthermore, reduced daytime temperatures during April lead to bird activity being less influenced by daylight heat, as later in the season. Additionally, follow up surveys were all completed within the targeted survey window.

2.1.10 The surveys were undertaken in 2021 and Notable species were recorded in line with current guidance at the time including BoCC4, Eaton *et al*. (2015). This has since been updated to BoCC5, Stanbury *et al.* (2021)[8]. In line with the survey results, the assessment has been undertaken following BoCC4, but this is not considered to be a constraint to the assessment. The survey results include no additional ground-nesting species since added to the BoCC5 list that could be considered vulnerable to the impacts of the Proposed Development.

[6] 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.

[7] 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).

[8] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., & 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 114:723-747.

3 RESULTS

3.1 Breeding Bird Surveys

3.1.1 The breeding bird assemblage recorded within the Survey Area is representative of farmland habitats, consisting of predominantly common species (BoCC Green List species). A total of 21 breeding species were recorded within the Survey Area based on indicative breeding behaviour, with seven breeding Notable Species recorded. These consisted of two Amber List species (dunnock and reed bunting), and five Red List species (skylark, house sparrow, yellow wagtail, linnet and yellowhammer). All seven species are also species listed as rare and most threatened species under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act (2006). Skylark is also listed as an Essex Local Biodiversity Action Plan species. The number of breeding territories of Notable Species was typically low (≤4 territories), with the only exception skylark, with seven territories.

3.1.2 The Notable Species breeding assemblage was typically associated with vegetation along field boundaries within the Survey Area, principally hedgerows and tree-lines.

3.1.3 Skylark and yellow wagtail were the only ground-nesting Notable Species, known to nest in open fields, recorded within the Survey Area.

3.1.4 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 2.1: Breeding Bird Survey Results**.

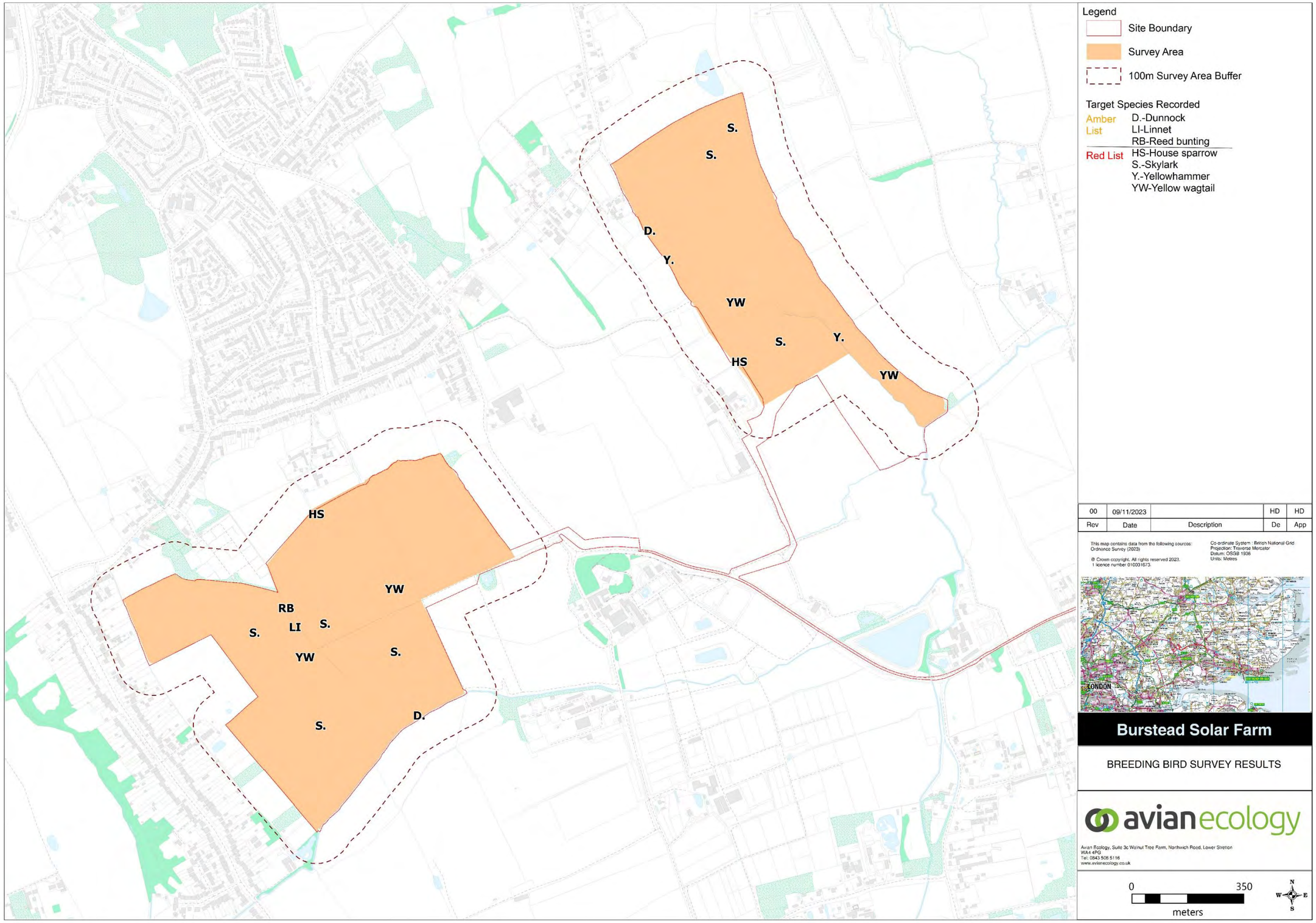
Table 3.1: Breeding bird survey results

Common name	Estimated number of territories	Comments
Moorhen	1	Associated with boundary waterbody in the south-west parcel.
Woodpigeon	2	Associated with vegetation along field boundaries.
Skylark	**7**	**Ground nesting within arable land.**
Wren	9	Associated with vegetation along field boundaries.
Dunnock	**2**	**Associated with vegetation along field boundaries.**
Blackbird	1	Associated with vegetation along field boundaries.
Robin	6	Associated with vegetation along field boundaries.
House sparrow	**2**	**Associated with habitats close to adjacent farm buildings in the north-eastern and south-western land parcels**
Blue tit	3	Associated with vegetation along field boundaries.
Great tit	1	Associated with vegetation along field boundaries.
Long-tailed tit	1	Associated with vegetation along field boundaries.
Chiffchaff	3	Associated with vegetation along field boundaries.
Lesser whitethroat	1	Associated with vegetation along field boundaries.

Whitethroat	9	Associated with vegetation along field boundaries.
Blackcap	4	Associated with vegetation along field boundaries.
Yellow wagtail	**4**	**Associated with open arable fields in both parcels of land.**
Chaffinch	1	Associated with boundary woodland vegetation.
Goldfinch	3	Associated with vegetation along field boundaries.
Linnet	**1**	**Located along field boundaries towards the north of the south-western land parcel.**
Reed bunting	**1**	**Located along field boundaries towards the north of the south-western land parcel.**
Yellowhammer	**2**	**Present along field boundaries in the north-eastern land parcel.**

3.1.5 During the surveys a small number of species were recorded which were not considered as breeding within the Survey Area. These consisted of species flying over the Survey Area only (starling) and those considered only visiting the Survey Area to forage (pheasant, green woodpecker, jackdaw, carrion crow, magpie and mistle thrush).

FIGURE 2.1: BREEDING BIRD SURVEY RESULTS



ANNEX 2.1: BIRD SPECIES SUMMARY

Table A2-1 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 (Eaton *et al*., 2015);
NERC S41 - species listed as rare and most threatened on the NERC Act (2006); and,
LBAP - Essex Biodiversity Action Plan species.

Table A2-1: Summary of bird species.

Common name	Species name	Conservation status
Pheasant	*Phasianus colchicus*	-
Moorhen	*Gallinula chloropus*	-
Woodpigeon	*Columba palumbus*	-
Green woodpecker	*Picus viridus*	-
Skylark	*Alauda arvensis*	NERC S41, BoCC – Red, LBAP
Magpie	*Pica pica*	-
Carrion crow	*Corvus corone*	-
Jackdaw	*Corvus monedula*	-
Great tit	*Parus major*	-
Blue tit	*Cyanistes caeruleus*	-
Long-tailed tit	*Aegithalos caudatus*	-
Chiffchaff	*Phylloscopus collybita*	-
Blackcap	*Sylvia atricapilla*	-
Lesser whitethroat	*Curruca curruca*	-
Whitethroat	*Curruca communis*	-
Wren	*Troglodytes troglodytes*	-
Starling	*Sturnus vulgaris*	BoCC – Red, NERC S41
House sparrow	*Passer domesiticus*	NERC S41, BoCC - Red
Blackbird	*Turdus merula*	-
Mistle thrush	*Turdus viscivorus*	BoCC - Red
Robin	*Erithacus rubecula*	-
Dunnock	*Prunella modularis*	BoCC – Amber, NERC S41
Yellow wagtail	*Motacilla flava*	NERC S41, BoCC - Red

Common name	Species name	Conservation status
Chaffinch	*Fringella coelebs*	-
Goldfinch	*Carduelis carduelis*	-
Linnet	*Linnaria cannabina*	NERC S41, BoCC – Red
Reed bunting	*Emberiza schoeniclus*	NERC S41, BoCC – Amber
Yellowhammer	*Emberiza citrinella*	NERC S41, BoCC – Red

ANNEX 2.2: BREEDING BIRD SURVEY EFFORT

Date	Start Time (24 hrs)	End time (24 hrs)	Wind Speed	Wind Direction	Rain	Cloud Height	Cloud Cover	Visibility	Frost	Snow	Temperature (°C)
20/04/2021	09:15	12:45	2	E	0	2	6	2	0	0	12
07/05/2021	07:05	10:35	3	W	0	2	4	2	0	0	9
24/06/2021	07:55	10:50	2	NW	0	2	1	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 4: WATER VOLE AND OTTER SURVEY REPORT

ECOLOGICAL ASSESSMENT REPORT
APPENDIX 4:
WATER VOLE AND OTTER SURVEY REPORT

BURSTEAD SOLAR FARM AND BATTERY STORAGE 'FREE GO'

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

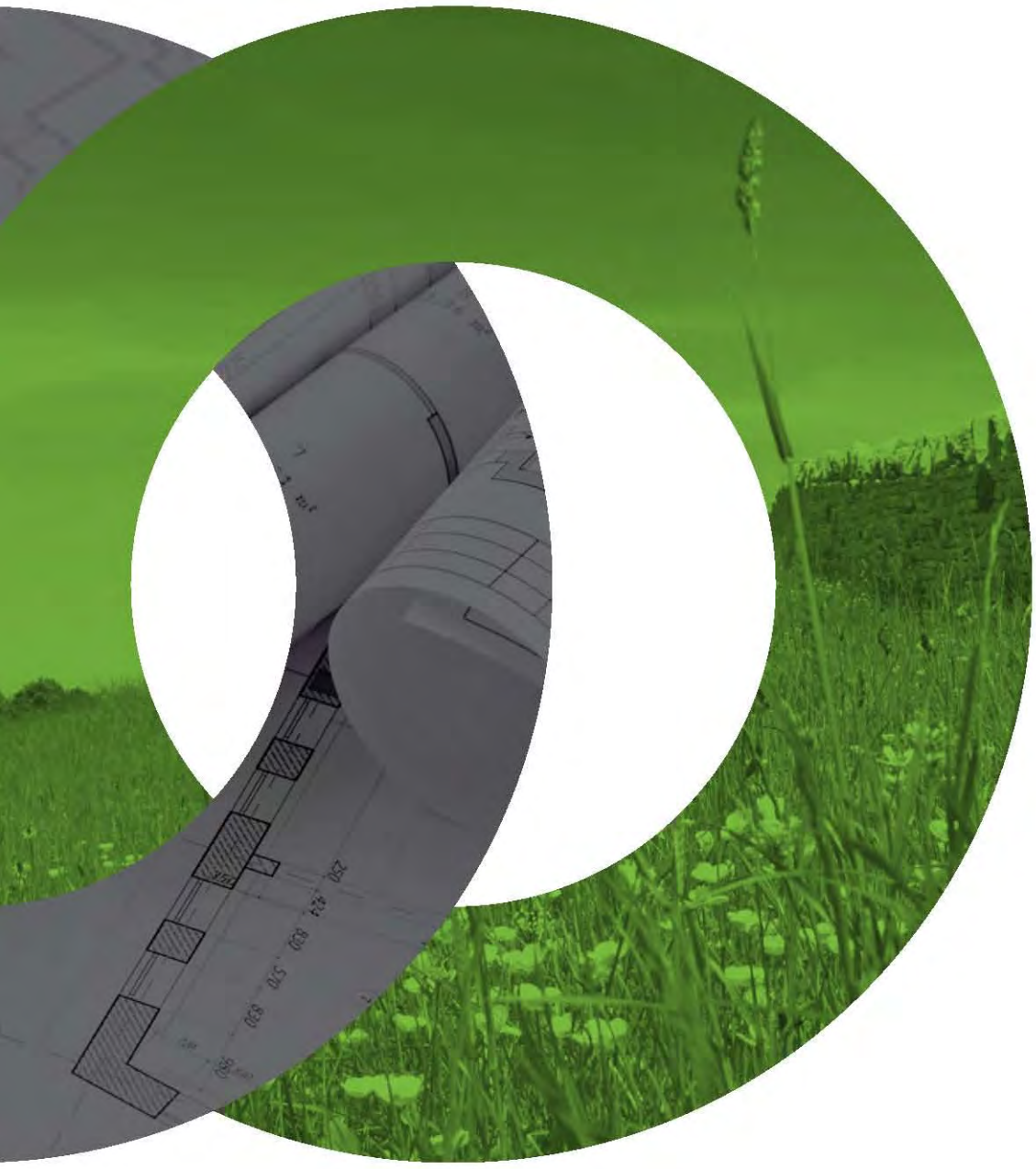
NOVEMBER 2023

www.ensoenergy.co.uk

Burstead Solar Farm 'Free Go'

on behalf of Enso Green Holdings J Limited

Appendix 4 - Water Vole and Otter Survey Report



avianecology

Document Control				
Project Name:	Burstead Solar Farm 'Free Go'			
Project Number:	EnsoE-517-003564			
Report Title	Appendix 4: Water Vole and Otter Survey Report			
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	14/11/2023	Final	K Love *MSc*	J. Stevens *BSc (Hons.)*

CONTENTS

FIGURES

ANNEXES

1 INTRODUCTION

1.1 Project Background

1.1.1 Avian Ecology Limited (AEL) was commissioned by Enso Green Holdings J Limited to undertake an Ecological Assessment in relation to the proposed installation of a Solar Farm and battery storage facility with associated infrastructure (the 'Proposed Development'), forming a 'Free Go' application following a previous refusal, on land located to the south and east of Great Burstead, Billericay, Essex (the 'Site'), as illustrated on the **Figure 4.1**.

1.1.2 The Site was previously included in a submitted cross-boundary planning application for a solar farm and battery storage facility, which was refused planning permission by Basildon Borough Council and Rochford District Council (application numbers: 22/00411/FULL (Basildon) and 22/00359/FUL (Rochford)). The revised development area (Proposed Development) is reduced in scale to the previous submission.

1.1.3 This report details the methodologies, results of a desktop study and field surveys undertaken in May, July and September 2021 by AEL., to determine presence or likely absence of water vole and otter within and immediately surrounding the Site.

1.2 Site Overview

1.2.1 The Site as illustrated by the red-line application boundary shown on **Figure 4.1** includes two land parcels of approximately 119ha comprised of agricultural land, and a grid connection route. The two land parcels are approximately 900m apart and are located south and east of Great Burstead which is south-east of Billericay, Essex.

1.2.2 The Site comprises a series of fields in arable cultivation, with the two land parcels located to the west and east of Southend Road (A129). The arable fields are marked by a network of drainage ditches, tree lines, hedgerows and scattered trees. The River Crouch runs adjacent to the southern Site boundaries of both land parcels.

1.2.3 In the wider context, the Site is surrounded by further extensive areas of farmland and residential settlements with the operational Outwood Solar Farm located approximately 100m to the north-east of the eastern parcel. In addition, the recently consented Crays Hall Solar Farm is situated on land directly east of the Site's eastern land parcel.

1.3 Legislation

Otter

1.3.1 Otters are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); they receive further protection under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. 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) impair their ability to survive, breed or reproduce, rear or nurture young, and;

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

1.3.2 Otter is also listed under Section 41 of the NERC Act 2006, as well as the Essex Local Biodiversity Action Plan (LBAP)

1.3.3 Any development which may result in interference with otters or otter holts/resting places will require a licence from Natural England (NE).

Water Vole

1.3.4 Water voles are protected in England under the provisions of the Wildlife and Countryside Act 1981 (as amended). The species is listed on Schedule 5 of the Act and is protected under Section 9, which makes it an offence to:

Intentionally kill, take or injure a water vole;

Possess or control any live or dead water vole or any part or derivative;

Intentionally or recklessly damage or destroy a water vole's place of shelter or protection;

Intentionally or recklessly disturb a water vole while it is occupying a structure or place which it uses for shelter or protection; or,

Intentionally or recklessly obstruct access to a water vole's place of shelter or protection.

1.3.5 The Act also prohibits the selling, offering of sale, or possessing or transporting for the purposes of sale, any live or dead water vole, or any part or derivative, or advertising any of these for buying or selling, however this is irrelevant in relation to this report.

1.3.6 Water vole is also listed under Section 41 of the NERC Act 2006, as well as the Essex Local Biodiversity Action Plan (LBAP).

1.3.7 It is generally agreed that a place of shelter or protection used by water voles includes a network of active burrows and/or any nests that have been constructed within the burrow system or above ground amongst dense vegetation.

1.3.8 Any development which may disturb water vole or damage their burrows/resting places will require works to be carried out under either a Class Licence or a Site licence from Natural England (NE). Site licences can't be issued for the specific purpose of development; however, NE will consider issuing a licence in relation to a development proposal if the licensed action is going to provide a conservation benefit for water voles.

2 METHODOLOGY

2.1 Desktop Study

2.1.1 A desktop study was undertaken in November 2023 to identify any known records for otter and water vole within a 2km radius of the Site. Biological record data was requested from the Essex Field Club (EFC).

2.1.2 The results of the desktop study are provided in **Section 4.1** and further detailed within the main Ecological Assessment Report.

2.2 Field Survey

2.2.1 An extended Phase 1 habitat survey was initially undertaken on 6th May 2021 by T. *Stones MSc, MCIEEM, CEnV*, which included a preliminary check for signs of otter and water vole. Watercourses (including ditches) present within and adjacent to the Site were identified during this initial survey.

This included a network of wet and dry ditches and the River Crouch which extends along the southern boundary of both land parcels, as shown in **Figure 4.1**.

2.2.2 Following this initial survey, a combined otter and water vole survey was undertaken on the 3rd and 4th July 2021, between the hours of 08.00 and 18.00 in fair weather conducive to survey and not following any periods of prolonged rainfall resulting in high water levels. A second survey visit was conducted on the 11th September 2021 in similar weather conditions.

2.2.3 The surveys were undertaken by E. Gorse *MCIEEM,* who is competent in the identification of field signs of water voles and otters, as well as using the appropriate survey methodologies. She was assisted by a health and safety second due to working in and near water.

2.2.4 An updated extended habitat survey was conducted on 25th October 2023, by K. Love *MSc* following the UK industry standard UKHab methodology. This survey included a check for signs of otter and water vole within the Site.

Otter

2.2.5 The survey comprised an assessment of the relative habitat suitability of each watercourse within and near the Site. Notes were also taken on any field signs encountered including spraints, footprints, feeding remains, slides and potential holts (or other resting or breeding place).

Water Vole

2.2.6 The water vole survey methodology was designed using methods detailed within Dean (2021)[1] and Dean *et al* (2016)[2]. Field surveys for water vole in the context of a development have two key elements; a habitat suitability assessment and a search for field signs, indicating presence or possible presence of water vole. In most cases, two surveys are required; one in the first half of the season (mid-April to end of June) and one in the second half of the season (July-September).

2.2.7 The first survey visit was undertaken in July 2021 with a second visit conducted in September 2021. Both visits have been timed to be undertaken during the water vole breeding season, which is generally considered to be between March-September (Dean, 2021 & Dean *et al.,* 2016).

Water Vole Habitat Suitability Assessment

2.2.8 A habitat suitability assessment was undertaken along each surveyed section of the watercourse (a survey section is an approximate 100-200m section of watercourse) (Shown on **Figure 4.1**). This was to determine whether or not habitat preferred by water voles was present, also distinguishing any variation of habitat suitability for the species within the surveyed sections. Searches for field signs indicating the presence of water voles were also undertaken.

2.2.9 The habitat assessment was undertaken with reference to "*Habitat survey assessment guidelines*" for water vole prepared by Cheshire Wildlife Trust and adapted from '*A Method for Assessing Water Vole Habitat Suitability'* (Harris *et al*., 2009)[3].

2.2.10 **Table 3.1** provides a summary of the habitat suitability scoring criteria for assessing water vole habitat.

[1] Dean, M. (2021) *Water Vole Field Signs and Habitat Assessment; A Practical Guide to Water Vole Survey.* Pelagic Publishing, Exeter.

[2] Dean, M., Strachan, R., Gow, D. & Andrews, R. (2016) *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

[3] Harris, J., Markwell, H. & Raybould, B. (2009) A method for assessing water vole habitat suitability. *Ecology and Environmental Management - In Practice*, **65**, pp. 28 -

Table 3.1: Water Vole Habitat Assessment Scoring Criteria

Habitat score	Habitat Suitability for water Voles	Notes
<3	Unsuitable	Water voles usually absent
3-6	Sub-optimal	Occasional field signs for water vole, particularly in late summer when numbers are higher
7-10	Optimal	Water voles usually present

Water Vole Survey

2.2.11 A search of the watercourse was undertaken predominantly by wading along the ditch channel and where this was not possible, undertaking spot checks and searches from the bankside to record the location of any water vole field signs. Searches for field signs were undertaken from the toe[4] of the watercourse bank within each section, up to at least 1m out into the water and at least 1m up the bank, in accordance with guidance (Dean *et al*., 2016). The surveyed sections of the watercourse are shown on **Figure 4.1**.

2.2.12 Searches for the following field signs of water vole presence as per Strachan *et al*. (2011)[5] were undertaken along each survey section:

Sightings;

Droppings/latrines;

Burrows;

Footprints;

Pathways;

Feeding stations; and,

Lawns.

Population Density Estimates

2.2.13 The presence of water vole droppings/latrines is the only field sign that can be used reliably on its own to confirm species presence. The number of latrines recorded during a survey is also able to provide an indication of relative population densities and identify the most important parts of a study area for water vole for the purposes of assessing impacts and approach to mitigation.

2.2.14 **Table 3.2** outlines an approach to estimating the relative population densities on the basis of latrine counts in accordance with current guidance (Dean et al., 2016). The guidance notes that counts of latrines for each survey section are made until a count of 10 or more during the first half of the survey season or 20 or more during the second half of the survey season is reached at which point a high population density can be concluded.

[4] In accordance with Dean *et al.* (2016) the toe of the bank is defined here as the area of the bank at, and immediately above, water level.

[5] Strachan, R., Moorhouse, T. & Gelling, M. (2011). *The water vole conservation handbook (3rd edition)*. Wildcru, Oxford.

Table 3.2: Relative water vole population densities on the basis of latrine counts
(As adapted from Dean et al. (2016).

Relative Population Density	Approximate number of latrines per 100m of bankside habitat	
	First half of survey season (mid-April to end of June)	Second half of survey season (July to September)
High	10 or more	20 or more
Medium	3-9	6-19
Low	≤2 (or non, but with other confirmatory field signs)	≤5 (or non, but with other confirmatory field signs)

Limitations

2.2.15 The first survey visit was undertaken at the beginning of July, just outside of the first half of the survey season which is at the end of June. However, this was still within water vole breeding season, and only marginally (3 days) outside the recommended window and is therefore not considered a constraint to the survey.

2.2.16 Dense vegetation was found along the watercourse channels during the survey. Where it was not possible to survey from the watercourse, spot checks and searches from the bankside were employed to accurately record the location of any field signs.

3 BASELINE

3.1 Desktop Study Results

3.1.1 The EFC data search returned no records of otter or water vole within 2km of the Site over the previous ten years.

3.2 Otter Habitat Assessment Results

3.2.1 The aquatic habitat surveyed was assessed as providing sub-optimal habitat for otters. The majority of the watercourses surveyed were dry or shallow (less than 0.5m deep) and evidence of seasonal drying was recorded. The watercourses have good connectivity to the wider area, and the River Crouch which flows along the southern boundaries, could provide both suitable aquatic and terrestrial habitat for otter holt creation, as well as for shelter, foraging and commuting purposes.

3.3 Water Vole Habitat Assessment Results

3.3.1 Aquatic habitats surveyed were assessed to provide varying scores of suitability for water vole, ranging from unsuitable to optimal, with the majority of sections being optimal. Section 5 and parts of Sections 1 and 2 were found to be dry during both visits.

3.3.2 **Table 4.1** provides a summary of the assessment for each survey section. Detailed results are presented in **Annex 4.1** and are shown on **Figure 4.1**.

Table 4.1: Water vole habitat assessment results - summary

Site Parcel	Section	Total Score	Habitat Suitability (No of sections)
Western parcel	1 A-K	6 - 9	Sub-optimal (5) - Optimal (6)
	2 A-I	4 - 7	Sub-optimal (3) – Optimal (5)
	3 A-F	7	Optimal (6)
Eastern parcel	4 A-I	6 - 9	Sub-optimal (5) - Optimal (4)
	5	NA	Unsuitable (dry)

3.4 Field Survey Results

This section should be read with reference to **Figure 4.1** and photographs in **Appendix 4.2.**

Otter

3.4.1 No signs of otter were recorded along the watercourses and associated terrestrial habitat. On-Site ditches were considered to have suitability for otter, with mostly only commuting opportunities provided. The River Crouch was considered to be more suitable for otter, with foraging, commuting and holt/resting areas suitably available. Although no signs of otter were identified, it is possible for the species to occur in watercourses within and adjacent to the Site.

Water Vole

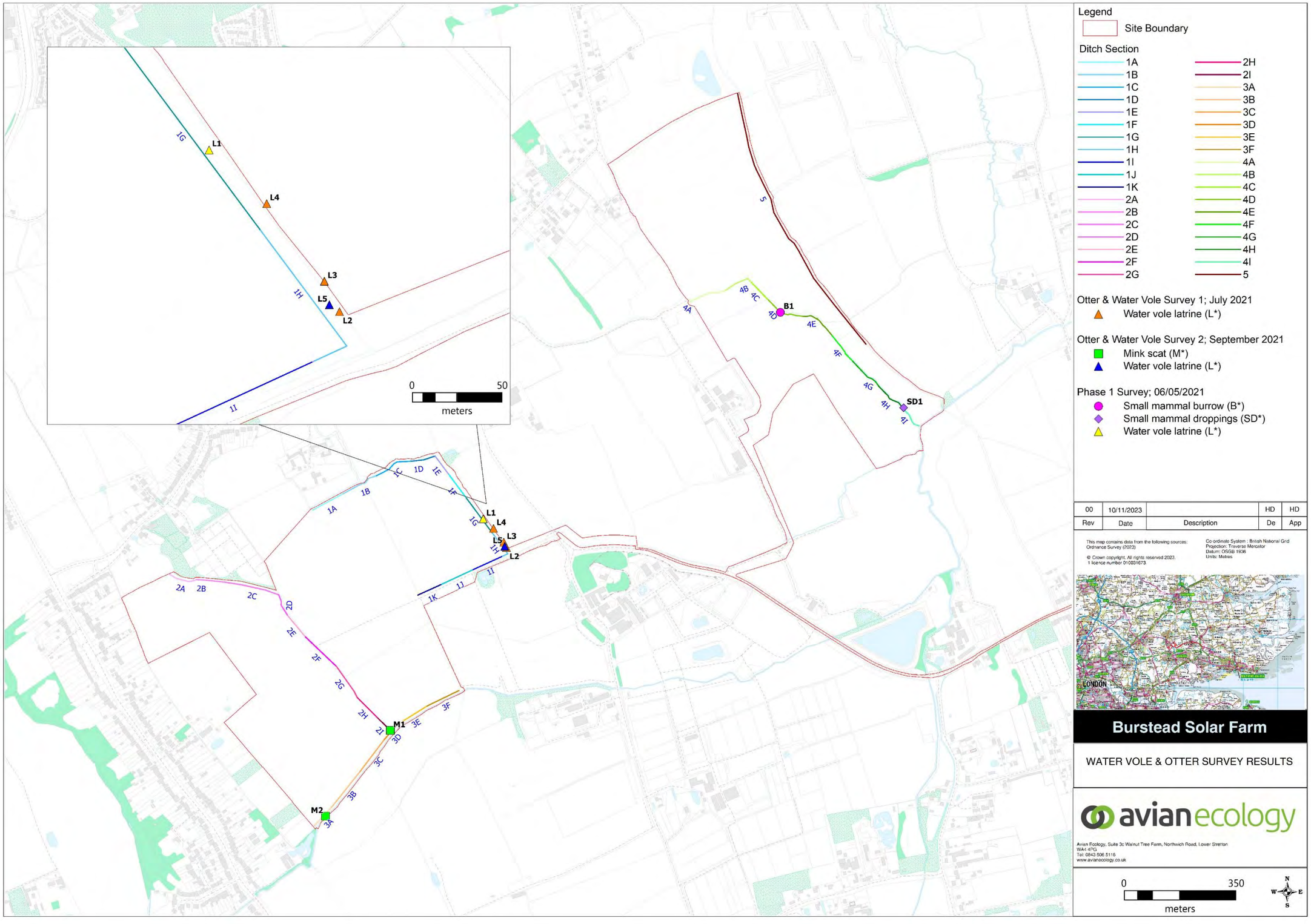
3.4.2 One water vole latrine (L1) was found within Section 1G of the western land parcel during the extended Phase 1 habitat survey in 2021. Three water vole latrines (L2, L3 and L4) with associated small mammal runs were found during the first water vole survey visit in Sections 1G and 1H of the western land parcel. Similarly, during the second visit a single water vole latrine (L5) was recorded in Section 1H. All conclusive water vole signs were identified along the same wet ditch between Sections 1G and 1H. Latrines were identified in a clustered area of this ditch and considered to represent a low population of localised water voles.

3.4.3 No signs of water vole were recorded in the 2023 extended habitat survey; however, this survey type is not as thorough and conclusive of species presence as the targeted water vole surveys conducted in July and September 2021.

3.4.4 No conclusive evidence of water vole was found in the eastern land parcel. Evidence of small mammals were however found; a small mammal burrow (B1) was recorded in Section 4D and small mammal droppings (SD1) were identified in Section 4I. The latter of which was determined to likely belong to brown rat.

3.4.5 Mink presence was detected during the second survey visit with a print and two scats (M1 and M2) identified in Sections 3A and 3C.

Figure 4.1: Water Vole and Otter Survey Results



ANNEX 4.1

HABITAT ASSESSMENT

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 A, B, C, D

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**A**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°		2-5m		1-2m		Slow	**x**
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6**	**4**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 E

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**F**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°		2-5m		1-2m		Slow	**x**
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**8 Optimal**	**6 Sub-optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 F

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**O**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m		<0.5m	**x**	Rapid	
Shallow <45°		1-2m	x	0.5-1m		Fast	
Steep >45°	x	2-5m		1-2m		Slow	**x**
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**9**	**8**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 G

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**O**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**N**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**F**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath		**Disturbance:** n/a	
				Fen			
				Cattle/grazing			
				Bank fenced			

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**9**	**8**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 H

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	x	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**N**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**F**
Upland Loch Reservoir		Earth	x	Peat bog		Reeds/sedges	**F**
Running Water		Rock cliffs		Arable crop	x	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	x	<0.5m	x	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	x	2-5m		1-2m		Slow	x
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**9**	**7**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 l

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**A**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**O**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	**x**
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7 Optimal**	**6 Sub-optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	1 J, K

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**N**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop		Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh	**x**	Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath		**Disturbance:**	
				Fen		n/a	
				Cattle/grazing			
				Bank fenced			

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**X (dry)**	Rapid	**N/A**
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**0**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6**	**4**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	2 A, B, C

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**A**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**R**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**X (dry)**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	**X (dry)**
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**0**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**4**	**4**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	2 D

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**N**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**O**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7**	**7**	
	Optimal	**Optimal**	

Photo; No photos available.

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	2 E

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**A**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**R**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7**	**7**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	2 F

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	x	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**N**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**F**
Upland Loch Reservoir		Earth	x	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	x	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden		**Disturbance:**	
		Reinforced		Heath		n/a	
				Fen			
				Cattle/grazing			
				Bank fenced			

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	x	<0.5m	x	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	x	2-5m		1-2m		Slow	x
Vertical/undercut		5-10m		>2m		Sluggish	x
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7**	**7**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	2 G, H, I

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	x	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass	x	Bushes (hedges)	**O**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**R**
Upland Loch Reservoir		Earth	x	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop		Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh	x	Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	x	<0.5m	x	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	x	2-5m		1-2m		Slow	x
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**0**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7**	**7**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 3rd July 2021; Visit 2: 11th September 2021
Ditch Section	3A-F

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch		Boulders		Upland grass		Bankside trees	**D**
Dyke		Sand		Permanent/temporary grass	**x**	Bushes (hedges)	**A**
Gravel Pit		Gravel				Herbs	**N**
Lowland Lake		Silt		Mixed broadleaf woodland	**x**	Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Conifer wood		Reeds/sedges	**N**
Running Water	**x**	Rock cliffs		Peat bog		Tall grass	**R**
Marsh/bog		Earth Cliffs		Arable crop	**x**	Short grass	**N**
Canal		Canalized		Salt marsh			
		Poached		Urban/industrial			
		Reinforced		Park/garden			
				Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance:
Some trees removed recently along bank (30m section) in a localised area.

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m		<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	**x**
Steep >45°	**x**	2-5m	**x**	1-2m		Slow	**x**
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7 Optimal**	**6 Sub-optimal**	

Photo;

Visit 1

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 A, B

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	x	Boulders		Upland grass		Bankside trees	**O**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**R**
Upland Loch Reservoir		Earth	x	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	x	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	x	<0.5m	x	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°		2-5m		1-2m		Slow	x
Vertical/undercut	x	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7**	**7**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 C

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**N**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**R**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath		**Disturbance:** n/a	
				Fen			
				Cattle/grazing			
				Bank fenced			

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**9**	**9**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 D

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**R**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m		<0.5m	**x**	Rapid	
Shallow <45°		1-2m	**x**	0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut		5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**1**	**1**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6** **Sub-optimal**	**6** **Sub-optimal**	

Photo;

Visit 1

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 E

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**O**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m		<0.5m	**x**	Rapid	
Shallow <45°		1-2m	**x**	0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**1**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6**	**6**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 F

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**O**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**O**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	**x**	<0.5m	**x**	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°		2-5m		1-2m		Slow	**x**
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6**	**6**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1 **Visit 2**

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 G

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	**x**	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**F**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**O**
Upland Loch Reservoir		Earth	**x**	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	**x**	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m		<0.5m	**x**	Rapid	
Shallow <45°		1-2m	**x**	0.5-1m		Fast	
Steep >45°	**x**	2-5m		1-2m		Slow	**x**
Vertical/undercut	**x**	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**1**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**7**	**7**	
	Optimal	**Optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 H

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	x	Boulders		Upland grass		Bankside trees	**N**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**A**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**O**
Upland Loch Reservoir		Earth	x	Peat bog		Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop	x	Tall grass	**D**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance: n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m		<0.5m	x	Rapid	
Shallow <45°		1-2m	x	0.5-1m		Fast	
Steep >45°	x	2-5m		1-2m		Slow	x
Vertical/undercut	x	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)

(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**0**	**0**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**1**	**1**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**1**	**O**ccasional 21-40%
(f) Open water for swimming	**1**	**1**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**0**	**0**	
(i) Slow flowing current or static water	**1**	**1**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6**	**6**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1

Visit 2

Date	Visit 1: 4th July 2021; Visit 2: 11th September 2021
Ditch Section	4 I

Habitat Information

Habitat		**Shore/bank**		**Bordering land use**		**Vegetation (DAFORN*)**	
Ditch	x	Boulders		Upland grass		Bankside trees	**A**
Dyke		Sand		Permanent/temporary grass		Bushes (hedges)	**D**
Gravel Pit		Gravel		Mixed broadleaf woodland		Herbs	**N**
Lowland Lake		Silt		Conifer wood		Submerged weed	**N**
Upland Loch Reservoir		Earth	x	Peat bog	x	Reeds/sedges	**N**
Running Water		Rock cliffs		Arable crop		Tall grass	**A**
Marsh/bog		Earth Cliffs		Salt marsh		Short grass	**N**
Canal		Canalized		Urban/industrial			
		Poached		Park/garden			
		Reinforced		Heath			
				Fen			
				Cattle/grazing			
				Bank fenced			

Disturbance:
n/a

Bank Profile (tick)		**Width (tick)**		**Depth (tick)**		**Current (tick)**	
Flat <10°		1m	x	<0.5m	x	Rapid	
Shallow <45°		1-2m		0.5-1m		Fast	
Steep >45°		2-5m		1-2m		Slow	x
Vertical/undercut	x	5-10m		>2m		Sluggish	
		10-20m				Static	
		20-40m					
		>40m					

Water Vole Habitat Suitability Assessment (Score 1 if feature present and 0 if absent)			
(a) Well developed (>60%) bankside **and** emergent vegetation providing food & cover	**1**	**1**	***DAFORN**
(b) A good variety of food plants including favoured plants and winter food sources	**0**	**0**	**D**ominant 81-100%
(c) Suitable refuge areas above extremes in water levels	**1**	**1**	**A**bundant 61-80%
(d) Soft, earth banks suitable for burrowing (30 to 60 degree slope)	**0**	**0**	**F**requent 41-60%
(e) Water permanently present (does not dry up)	**1**	**0**	**O**ccasional 21-40%
(f) Open water for swimming	**0**	**0**	**R**are 1-20%
(g) Ledge or berm present at or close to water level	**0**	**0**	**N**one 0%
(h) Lack of damage or erosion to the banks	**1**	**1**	
(i) Slow flowing current or static water	**1**	**0**	
(j) Non-native invasive plant species absent (Himalayan Balsam, Japanese knotweed)	**1**	**1**	
HABITAT ASSESSMENT SCOT (Total score of features present)	**6**	**4**	
	Sub-optimal	**Sub-optimal**	

Photo;

Visit 1

Visit 2

ANNEX 4.2

PHOTOGRAPHS

Photo	Description
	**Photo 1**: Water vole latrine identified during the first water vole survey in Section 1.
	**Photo 2:** Mink footprint recorded in Section 3 during the second survey visit.
	**Photo 3:** Mink scat located in Section 3 during the second survey visit.

APPENDIX 5: GREAT CRESTED NEWT PRESENCE OR ABSENCE (EDNA) SURVEY REPORT

ECOLOGICAL ASSESSMENT REPORT
APPENDIX 5:
GREAT CRESTED NEWT PRESENCE OR ABSENCE (eDNA) SURVEY REPORT

BURSTEAD SOLAR FARM AND BATTERY STORAGE 'FREE GO'

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

NOVEMBER 2023

Burstead Solar Farm 'Free Go'

on behalf of Enso Green Holdings J Limited

Appendix 5 - Great Crested Newt Presence or Absence (eDNA) Survey Report

avianecology

Document Control				
Project Name:	Burstead Solar Farm 'Free Go'			
Project / Report Number:	EnsoE-517-003564			
Report Title	Appendix 5: Great Crested Newt Presence or Absence (eDNA) Survey Report			
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	14/11/2023	Final	K Love *MSc*	J. Stevens *BSc (Hons.)*

CONTENTS

FIGURES

ANNEXES

1 INTRODUCTION

1.1 Project Background

1.1.1 Avian Ecology Ltd. (AEL) was commissioned by Enso Green Holdings J Limited to undertake great crested newt (GCN) presence/absence surveys adopting the environmental DNA (eDNA) sampling methodology. The surveys were in relation to the proposed installation of a Solar Farm and battery storage facility with associated infrastructure ('Proposed Development'), forming a 'Free Go' application following a previous refusal, on land located to the south and east of Great Burstead, Billericay, Essex (the 'Site'), as illustrated on **Figure 5.1**.

1.1.2 The Site was previously included in a submitted cross-boundary planning application for a solar farm and battery storage facility, which was refused planning permission by Basildon Borough Council and Rochford District Council (application numbers: 22/00411/FULL (Basildon) and 22/00359/FUL (Rochford)). The revised development area (Proposed Development) is reduced in scale to the previous submission.

1.1.3 This report subsequently provides detailed survey methodology and results.

1.2 Site Overview

1.2.1 The Site as illustrated by the red-line application boundary shown on **Figure 1** includes two land parcels of approximately 119ha comprised of agricultural land, and a grid connection route. The two land parcels are approximately 900m apart and are located south and east of Great Burstead which is south-east of Billericay, Essex.

1.2.2 The Site comprises a series of fields in arable cultivation, with the two land parcels located to the west and east of Southend Road (A129). The arable fields are marked by a network of drainage ditches, tree lines, hedgerows and scattered trees. The River Crouch runs adjacent to the southern Site boundaries of both land parcels.

1.2.3 In the wider context, the Site is surrounded by further extensive areas of farmland and residential settlements with the operational Outwood Solar Farm located approximately 100m to the north-east of the eastern parcel. In addition, the recently consented Crays Hall Solar Farm is situated on land directly east of the Site's eastern land parcel.

1.3 Legislation

1.3.1 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 GCN;
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.

1.3.2 GCN and common toad are listed as priority species under Section 41 (England) of the NERC Act 2006 and UK BAP. GCN is further listed under the Essex Local Biodiversity Action Plan (LBAP)[1].

[1] https://www.castlepoint.gov.uk/download.cfm?doc=docm93jijm4n5168.pdf&ver=8595

2 METHODOLOGY

2.1 Overview

2.1.1 Ponds were identified from aerial images and Ordnance Survey (OS) maps on or within 250m of the Site and within 50m of the proposed cable route where this extends outside of the highway within suitable habitat. Due to the low impact of solar energy developments on GCN habitats, and reflecting guidance published by Natural England, ponds beyond 250m from the Site were not considered.

2.1.2 Ponds subject to assessment are identified on **Figure 5.1.**

2.1.3 Fifteen ponds were identified within 250m of the two Site land parcels from OS and aerial mapping (shown on Error! Reference source not found.). Of these, none were present within the Site itself. One pond is present east of the cable route that cuts through arable farmland, north-east of the existing National Grid Substation.

2.1.4 Three (P1, P10 and P14) of the ponds located within 250m of the Site were accessed during the survey. Three ponds (P7, P8 and P15) were viewed from Public Rights of Way (PRoW) or adjacent land and therefore some limited information, including photographs, was able to be collected by surveyors. All other ponds were not able to be surveyed due to access constraints.

2.1.5 Ponds that were accessed were assessed for their suitability to support great crested newt using the Habitat Suitability Index (HSI) Assessment methodology as developed by Oldham *et al.* (2000[2]) and as detailed within ARG UK guidance (ARG UK, 2010[3]). These ponds were also subject to eDNA survey sampling to determine the presence or likely absence of GCN.

2.2 HSI

2.2.1 The HSI assessment involves the measurement of ten different indices which, when combined, have been found to provide a good indication of the general suitability of ponds for GCN. Each of the indices is scored (between 0.01-1) using a series of graphs and figures within the guidance notes (ARG UK, 2010). These scores are then used to calculate an overall Habitat Suitability Score for each 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 al*., 2014a[4]). The technique for determining presence/absence of GCN uses Polymerase Chain Reaction (PCR) laboratory techniques to detect the species eDNA within water samples.

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[2] 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.

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

[4] 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.

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 eDNA 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 30th June, in strict accordance with the published technical advice note, by suitably trained, experienced and licensed GCN surveyors.

Field Sampling Technique

2.3.4 Ponds P1, P10 and P14 were sampled on 19th May 2021 by suitably experienced and licensed GCN surveyor, T. Stones (NE Licence number; 2020-44328-CLS-CLS). This is within the period accepted 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.

Limitations

2.3.12 Fifteen ponds were identified within 250m of the two Site land parcels and one adjacent to the cable route from OS and aerial mapping, with none present within the Site itself. Three of the ponds (P1, P10 and P14) were accessed during the survey. Four ponds (P7, P8, P9 and P15) were viewed from Public Rights of Way (PRoW) or adjacent land and therefore some limited information, including photographs, was able to be collected. The remainder were not able to be accessed due to land ownership constraints.

3 RESULTS

3.1.1 Photographs and brief descriptions of the ponds surveyed are provided in **Table 3.1** below. Pond locations are shown in **Figure 5.1**.

Table 3.1: Pond Information

Pond Reference	Approximate Location	Photograph
P1	15m from the Site Boundary	 Waterbody was located in the corner of a field within a small copse. The pond itself was difficult to access and surrounded immediately by willow scrub and almost entirely shaded (80% +). Water depth estimated at up to 50cm +. Marginal scrub vegetation included mainly hawthorn, blackthorn and common sallow, with bluebell included within ground flora.
P7	30m from the Site Boundary	 This pond was located within a section of golf course with no access at the time of survey. Located near to the western boundary of the western land parcel. Large areas of the pond appear to contain aquatic vegetation likely to be common reed.

P8	42m from the Site Boundary	 This pond is located in the south-western corner of an arable field. This waterbody is shallow (<10cm deep) and therefore prone to drying. It is heavily shaded by the surrounding hawthorn and willow scrub. Some soft rush is present in the pond, with approximately 30% of the pond covered by water forget-me-not.
P10	18m from the Site Boundary	 Large waterbody / pond (c. 45m x c. 37m) with two islands, adjacent to an archery range, the larger of which had established willow / oak trees on it. Access to pond was very difficult due to the ring of scrub and a raised bund along the western and southern boundaries. The pond was 'ringed' by c. 3m of bramble / willow scrub and marginal vegetation. Marginal vegetation around pond 100% comprising cow parsley, great willowherb, yellow flag, water dock, common nettle. Water clear but depth unknown (possibly c.1m). Banks combination of steep to 1m and shallow gradients.

P14	18m from the Site Boundary	 Small pond (8m x 7m) at the rear of a row of properties with arable land to one side. This pond was entirely fenced with tall metal fencing and panels, and extremely difficult to access even to view (via a resident's garden). The banks comprised steeply shelving (to 1m height) to shallow gradients, and the pond was heavily shaded.
P15	29m from the Site Boundary	 A large waterbody of c.0.5ha located to the north of the eastern land parcel. No access was available at the time of survey. The surface contains large areas of open water with bankside vegetation present.

3.1.1 The summary of the HSI and eDNA survey results are summarised in **Table 3.2** and **Table 3**.

3.2 HSI

3.2.1 Pond P1 received an HSI score of 0.7, indicting 'good' habitat suitability for GCN. Pond P10 received an HSI score of >0.8 indicting 'excellent' habitat suitability for GCN. Pond P14 received an HSI score of 0.6 indicting 'average' suitability for GCN.

Table 3.2: HSI survey results

Suitability Indices	**P1**	**P10**	**P14**
SI1 – Location	1	1	1
SI2 – Pond area	0.40	0.88	0.1
SI3 – Pond drying	0.9	0.9	1
SI4 – Water quality	0.67	0.67	0.33
SI5 – Shade	0.60	0.97	1
SI6 – Fowl	1	1	1
SI7 – Fish	1	0.67	1
SI8 – Ponds	0.75	0.88	0.75
SI9 – Terrestrial habitat	1	1	0.67
SI10 – Macrophytes	0.5	0.5	0.5
HSI	0.75	0.83	0.62
Suitability	**Good**	**Excellent**	**Average**

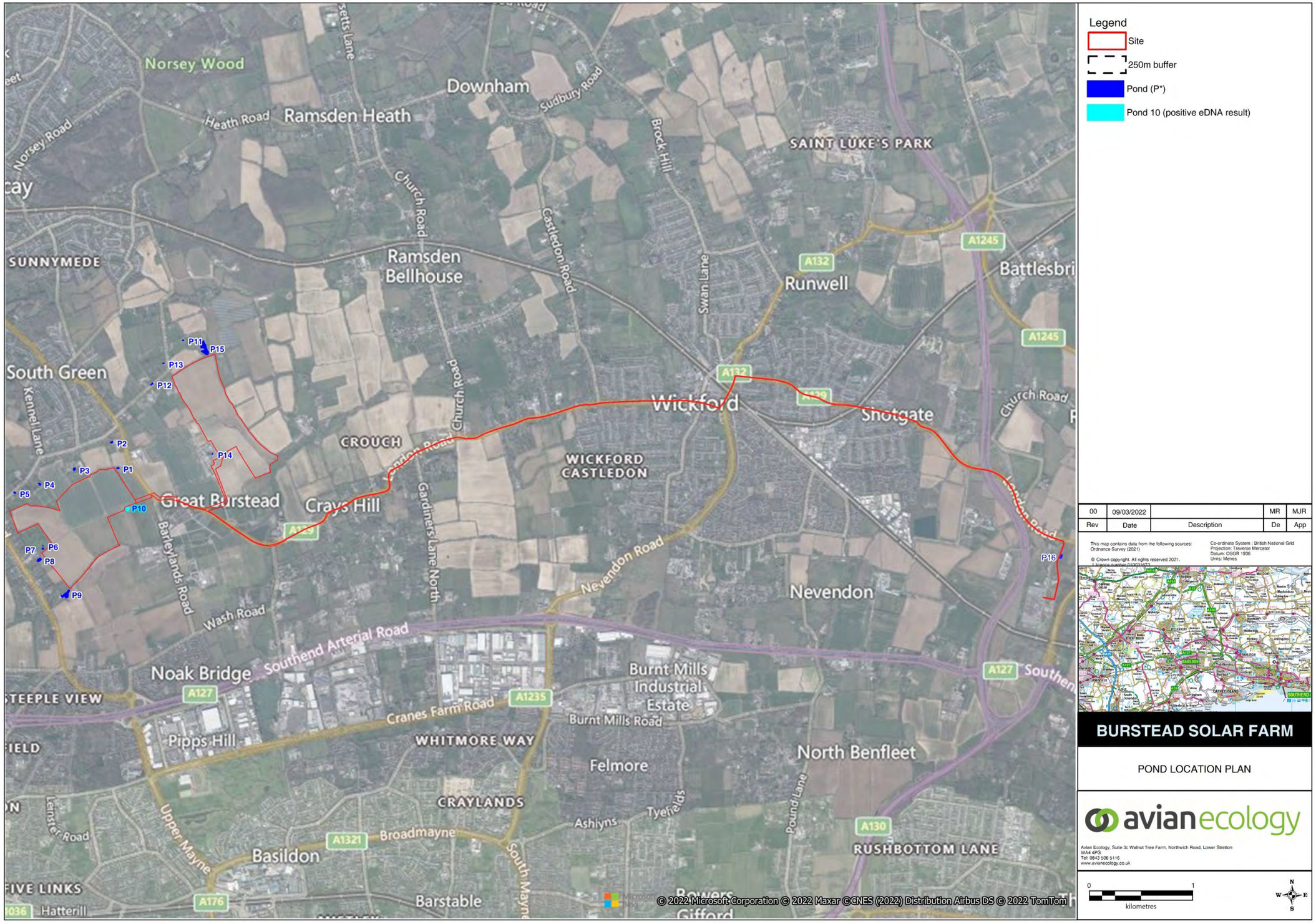
3.3 eDNA

3.3.1 Pond 10 returned a positive result for the presence of GCN and ponds P1 and P14 returned negative results, as summarised in **Table 3**. In addition, the laboratory reports are reproduced in **Annex 5.1**.

Table 3.3: eDNA survey results

Pond	**Sample Ref.**	**Sample Integrity Check**	**Degradation Check**	**Inhibition Check**	**Result**
P1	5266	Pass	Pass	Pass	Negative 0/12
P10	5267	Pass	Pass	Pass	**Positive** 9/12
P14	5270	Pass	Pass	Pass	Negative 0/12

FIGURE 5.1: POND LOCATION PLAN



Annex 5.1 – e-DNA Laboratory Results

SureScreen Scientifics

Fulu No: E10489
Report No: 1
Purchase Order: AE-214090
Client: AVIAN ECOLOGY
Contact: Fran Tarry

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: 21/05/2021
Date Reported: 28/05/2021
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
5266	POND 1	TQ 6899 9247	Pass	Pass	Pass	Negative	0
5267	POND 10	TQ 6910 9208	Pass	Pass	Pass	Positive	9
5270	POND 14	TQ 6989 9263	Pass	Pass	Pass	Negative	0

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

Reported by: Chris Troth **Approved by:** Chris Troth

Forensic Scientists and Consultant Engineers
SureScreen Scientifics Ltd, Morley Retreat, Church Lane, Morley, Derbyshire, DE7 6DE
UK Tel: +44 (0)1332 292093 Email: scientifics@surescreen.com
Company Registration No. 08950940

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 6: BIODIVERSITY MANAGEMENT PLAN

ECOLOGICAL ASSESSMENT REPORT
APPENDIX 6:
BIODIVERSITY MANAGEMENT PLAN

BURSTEAD SOLAR FARM AND BATTERY STORAGE 'FREE GO'

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

NOVEMBER 2023

www.ensoenergy.co.uk

Burstead Solar Farm 'Free Go'

on behalf of Enso Green Holdings J Limited

Appendix 6 - Biodiversity Management Plan

avian ecology

Document Control				
Project Name:		Burstead Solar Farm 'Free Go'		
Project Number:		EnsoE-517-003564		
Report Title		Appendix 6: Biodiversity Management Plan		
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	14/11/2023	Final	K Love *MSc*	J Stevens *BSc (Hons)*

CONTENTS

Annexes

Annex 6.3: 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 with associated infrastructure ('Proposed Development'), forming a 'Free Go' application following a previous refusal, on land located to the south and east of Great Burstead, Billericay, Essex (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)[1] 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) 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, 2023)[2].

2 ECOLOGICAL BASELINE- PRE-DEVELOPMENT

2.1.1 This BMP should be read in conjunction with both the *Site Location Plan* (Drawing Number: SP-01; Revision: 03) and *Proposed Site Plan* (Drawing Number: BU2.0; Revision: 08A) produced by Enso Energy; which details the Proposed Development layout on Site, as well as the *Landscape Proposals Plan* (Drawing Number: 01; Revision: E) produced by Briarwood Landscape Architecture. Detailed descriptions of habitats and species can be found in the Burstead Solar Farm 'Free Go' Ecological Assessment Report[3].

2.1.2 The Site as illustrated by the red-line application boundary shown on **Figure 1** includes two land parcels of approximately 119ha comprised of agricultural land, and a grid connection route. The two land parcels are approximately 900m apart and are located south and east of Great Burstead which is south-east of Billericay, Essex.

2.1.3 The Site comprises a series of fields in arable cultivation, with the two land parcels located to the west and east of Southend Road (A129). The arable fields are marked by a network of drainage ditches, tree

[1] BRE (2014). Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene.
[2] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[3] Avian Ecology Ltd (2023) Burstead Solar Farm 'Free Go' Ecological Assessment Report.

lines, hedgerows and scattered trees. The River Crouch runs adjacent to the southern Site boundaries of both land parcels.

2.1.4 In the wider context, the Site is surrounded by further extensive areas of farmland and residential settlements with the operational Outwood Solar Farm located approximately 100m to the north-east of the eastern parcel. In addition, the recently consented Crays Hall Solar Farm is situated on land directly east of the Site's eastern land parcel.

2.1.5 The Site is not located within or adjacent to any statutory designated sites for nature conservation. Five international statutory designated sites are located within 10km of the Site and seven nationally designated sites are located within 5km. The closest of which is Mill Meadow Local Nature Reserve (LNR) located approximately 1.2km north-west of the Site. Seventeen non-statutory designated sites occur within 2km of the Site, the closest of which, Parsonage Farm Green Local Wildlife Site (LoWS) is situated adjacent to the Site.

3 ECOLOGICAL MITIGATION MEASURES

3.1 Designated Sites and Habitats

3.1.1 No statutory or non-statutory designated sites will be affected by the Proposed Development.

3.1.2 The eastern parcel of the Site lies directly adjacent to Parsonage Farm Green LoWS. Outwood Solar Farm is situated within the boundaries of Parsonage Farm Green LoWS. There will be no direct effects on any LoWS as the Proposed Development will maintain stand-off buffers from the boundary features. A buffer of 23m will be retained from the adjacent Parsonage Farm Green LoWS, with security perimeter fencing situated at this distance and solar panel construction sited 31m from the LoWS.

3.1.3 Construction works associated with the Proposed Development is only proposed in the eastern Site land parcel, with habitats in the western land parcel to be retained.

3.1.4 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. Typically, the buffers are 10m wide. 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 (see accompanying *Proposed Site Plan* (Drawing Number: BU2.0; Revision: 08A)). A new crossing point will be required over a ditch along the access track that connects to the eastern most parcel of the Site, which will include an extension of an existing culvert.

3.1.5 Hedgerows and tree lines 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*.

3.1.6 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.

3.1.7 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.

3.1.8 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*)*. 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 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 Artificial Lighting at Night*[4]. 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 not be lit, 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 Evidence of badger presence has been observed within the Site. Details are provided in **Appendix 3**: Confidential Badger Survey Report of the Burstead Solar Farm 'Free Go' Ecological Assessment Report.

3.4.2 Suitable habitat located within and adjacent to the Site includes grassland field boundaries, ditch banksides, woodland and hedgerows, with the neighbouring adjacent woodlands offering further foraging, commuting and sett establishment opportunities.

3.4.1 A precautionary 30m buffer has been adopted around badger setts and therefore it is considered that under current baseline conditions, the Proposed Development is to have no direct impact. If plans were to change, further assessment of the setts would be required to establish current use of the setts by badgers, this would inform safeguarding measures taken in relation to any works within 30m of the sett location, the requirement for micro-siting amendments, the implementation of Reasonable

[4] Institution of Lighting Professionals & the Bat Conservation Trust. (2023). *Guidance Note 08/23: Bats and artificial lighting in the UK Bats and the Built Environment series.*

Avoidance Measures (RAMs) under the watching brief of an ecologist and/or whether a disturbance licence from Natural England would be necessary.

3.4.2 Due to the highly mobile nature of badgers, a pre-construction badger check will be undertaken to confirm the status of badger setts within the Proposed Development area before commencement of works. If a newly established 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.

3.4.3 Disturbance during construction across the Site's eastern land parcel will not adversely affect badger foraging opportunities given the extent of suitable foraging habitat in the wider area, and temporary nature of such works, with the land subsequently reinstated to undisturbed grassland which will provide increased foraging opportunities for badgers. Existing linear features such as woodland, tree lines, hedgerows and ditches will all be retained and protected with a minimum 5m buffers throughout construction, maintaining free access around the Site.

3.4.4 As the solar panels are raised off the ground, and the perimeter security fence will include gaps / small mammal gates at the base to allow free movement of badgers, no habitat loss or severance effects will result during the operational lifetime of the solar farm.

3.4.5 Habitat enhancements to be implemented as part of the Proposed Development include the creation of species-diverse grassland and planting/enhancement of native hedgerows and trees across the Site. Such habitat enhancement is considered to provide badgers with additional foraging resources and refuge opportunities within a secure and relatively undisturbed environment.

3.5 Otter and Water Vole

3.5.1 A number of watercourses are present within and adjacent to the Site, including the River Crouch which runs adjacent to the southern Site boundaries of both land parcels.

3.5.2 The on-Site watercourses were considered to provide sub-optimal habitat for otter and varying suitability for water vole ranging from unsuitable to optimal.

3.5.3 Only signs of water vole were identified within the Site, with a low population considered present in the western land parcel. This ditch, as well as the majority of watercourses in the Site, is planned to be retained.

3.5.4 The Proposed Development will maintain a buffer of at least 5m from boundary ditches with the exception of a single culvert / crossing point along the access track connecting to the eastern most parcel. Works in this area include a proposed extension of an existing culvert over a seasonally wet ditch that links the proposed access track to Granites Chase. A further pre-construction otter and water vole survey will be undertaken by a suitably experienced ecologist prior any works commencing to the watercourse to check for new signs of activity.

3.5.5 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 class licence must be undertaken between 15th February and 31st March in south-east England and for a site (which must be obtained from Natural England) including trapping, between 1st March and 15th April.

3.5.6 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 desk study identified hazel dormouse populations in ancient woodland surrounding the Site. The dominant habitats within the Site (arable and other neutral grassland) are considered to be of negligible suitability for hazel dormouse but the hedgerows and tree lines within the Site have greater, but still limited suitability 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 6.3**.

3.6.3 New hedgerow and tree planting, together with native woodland 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 with managed other neutral grassland, which are intensively managed and considered to be unsuitable habitat to support and maintain viable amphibian populations. However, habitats such as grassland field boundaries, ditches, hedgerows and woodlands, which will be retained and protected, may provide suitable terrestrial habitat for amphibian species.

3.7.2 The presence of GCN has been confirmed through eDNA surveys within one of the ponds adjacent to the Site (P10). Ponds P1 and P14 returned a negative result. Three other ponds (P7, P8 and P15) were viewed from Public Rights of Way (PRoW) or adjacent land and therefore some limited information, including photographs, was able to be collected by surveyors. All other ponds were not able to be surveyed due to access constraints.

3.7.3 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. No works associated with the Proposed Development are planned in the western land parcel and therefore Pond P10 will not be impacted.

3.7.4 Works are primarily focussed within low value arable habitats where amphibians and reptiles are unlikely to be present. Although the majority of suitable terrestrial habitats will include stand-off buffers of a minimum of 5m, where short sections of vegetation removal is required to facilitate specific localised works, a precautionary approach is proposed to safeguard individual GCN and common reptiles potentially present. Construction works involving any removal of suitable habitat within the Site such as hedgerows, scattered scrub, tall herb and tall grassland, as well as within 50m of pond P16 which is associated with the cable route, will follow Reasonable Avoidance Measures (RAMs) under the supervision of a licensed ecologist. Outline RAMs are provided at **Annex 6.3**.

3.7.5 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.

3.7.6 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 planting, hibernacula, log piles and enhanced foraging opportunities 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. The Proposed Development will include no physical barriers to the movement of amphibian and reptile species into the Site, with proposed habitat enhancements considered to benefit habitat connectivity in the wider landscape.

3.8 Other Species

3.8.1 Brown hares and hedgehog may also 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. The creation of species-rich grassland, infilling of hedgerows, and installation of hedgehog boxes will also increase foraging opportunities and habitat provision within the Site for brown hare, hedgehog and other species.

3.8.3 The retention of hedgerows and other field boundary features will likely continue to provide habitat for a variety of invertebrate species associated with the field boundary features.

4 ECOLOGICAL ENHANCEMENT MEASURES

4.1 Habitat Enhancement

4.1.1 Habitat enhancement measures are only proposed within the eastern land parcel, with the western land parcel to be retained in current land use.

4.1.2 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 and tree lines within and around the Site, as well as native woodland creation. 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, such as skylark.

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[5]) 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.

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 Planting

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.

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

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[6]). 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 The main body of the Site is currently arable, particularly in the eastern land parcel where constructed works are proposed. Land beneath and around the solar panels will be converted to grassland through seeding with appropriate seed mix similar to *Emorsgate EG27 – Special Old Fashioned Grazing Mixture*. The northern section and perimeter areas of the eastern land parcel will be sown with *Emorsgate EM 2- Standard General Purpose Meadow Mixture* or similar, as shown on the *Landscape Proposals 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.

Seeding

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 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 5 bird boxes erected on semi-mature/mature trees located along the field boundaries within and bordering the eastern land parcel

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

of 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 6.1**.

Bat Roost Boxes

4.2.5 Additional bat roost provision will be made through the inclusion of a minimum of 5 bat roost boxes on suitable trees along the field boundaries within and bordering the eastern land parcel of the Site. Following BCT guidance[7], boxes will be erected at an appropriate height (ideally above 4m in height) and with clear flight paths to utilise the Site boundary features. Boxes should be positioned away from artificial light sources, sheltered from strong winds and exposed to the sun for part of the day (usually facing south, south-east or south-west). Multiple boxes should also be grouped, each with a different aspect to provide a number of different options for bats. 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 6.1**.

Hibernacula

4.2.7 Four hibernacula will be created in the grassland areas situated adjacent to field boundary tree line and hedgerows within the eastern land parcel. Each will measure approximately 2m x 2m x 1m in height. The hibernacula will be constructed from logs and / or clean bricks/rubble sourced locally as far as possible, or with 'clean' materials brought in from elsewhere where this is not possible and topped with soil and earth. The hibernacula will provide shelter and over-wintering refuge for an amphibian, reptiles, small mammals and invertebrates.

4.2.8 An example of hibernacula is provided in **Annex 6.2**.

Hedgehog

4.2.9 Additional hedgehog habitat provision will be made through the inclusion of a hedgehog box within the eastern land parcel of the Site. Precise location 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.

4.2.10 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.

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[7] https://cdn.bats.org.uk/uploads/pdf/Bat-Box-Information-Pack-Sept-2020-JF.pdf?v=1600095860&_gl=1*1p5xe9l*_ga*MjE0MDAwODIyMi4xNzAwMDYzNjk5*_ga_G28378TB9V*MTcwMDA2MzY5OS4xLjAuMTcwMDA2MzY5OS4wLjAuMA

4.2.11 Suitable specifications for hedgehog boxes are provided in **Annex 6.1**.

Invertebrates

4.2.12 Additional habitat provision for invertebrates will be made through the inclusion of an insect hotel/box erected within the eastern land parcel of the Site. Precise location will be subject to confirmation during the installation depending on the box/hotel and condition of trees (if required).

4.2.13 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.

4.2.14 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.

4.2.15 Suitable specifications for insect boxes/hotels are provided in **Annex 6.1**.

5 HABITAT MANAGEMENT

5.1.1 As detailed in the *Landscape Proposals Plan*, Habitat management is proposed only in the eastern land parcel of the Site where works associated with the Proposed Development are planned.

5.1.2 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 and Woodland Planting

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 in order to avoid shading of the panels and to protect the perimeter fencing from encroachment. Hedgerows should be managed on a 2–3-year flexible rotation so that not all hedgerows are cut in the same year, which will benefit wildlife and 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, as well as 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>Old Fashioned Grazing Mixture or similar- Main Body of the Site (eastern land parcel)</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.

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, spear thistle, creeping thistle, curled dock and broad-leaved dock; which are all listed within the Weeds Act 1959. These species should be removed from the grassland areas prior to enhancement works commencing[8 & 9].

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.

[8] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525269/pb9840-cop-ragwort-rev.pdf
[9] 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[10] 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).

[10]https://publications.naturalengland.org.uk/publication/35034

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, tree lines, woodland 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, together with created hibernacula 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 potential need to replace missing boxes or re-build damaged hibernacula. 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 / tree/ woodland planting	Walk full length of planted/infilled hedgerows and trees	Browse damage, dead whips, weeds, gaps, dead or damaged hedgerow plants.
Grassland Areas	Walkover of grassland areas- main body of eastern parcel of the 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	Inspect each hibernacula	Check for obvious damage. Note need for repair or for hibernacula to be built-up. Also note any barriers that may hinder 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 and hedgehog boxes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hibernacula creation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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 and hibernacula / replace and repair 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 and hibernacula / replace and repair as required	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

ANNEX 6.1: 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, with potential for use by roosting bats.
Starling box		A large box for nesting starling. *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 6.2: HIBERNACULA

Suitable Hibernacula	
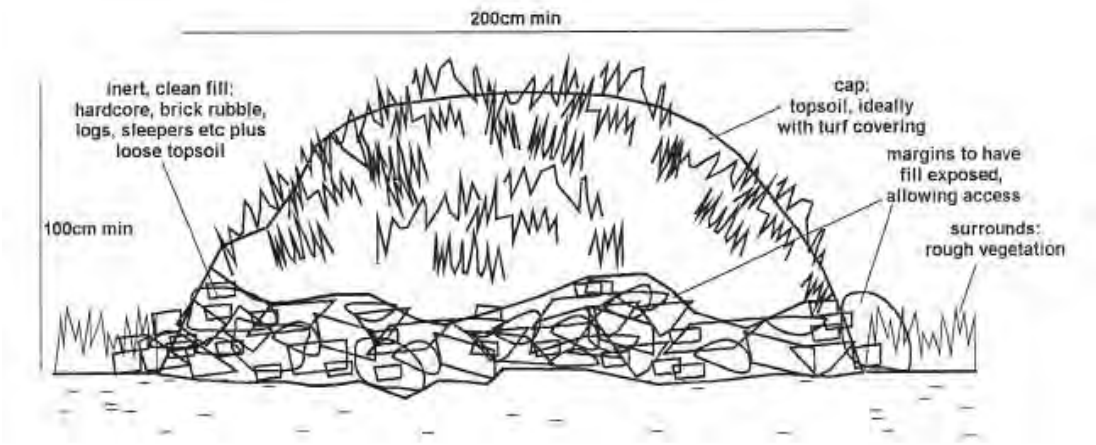	
Illustration of a hibernacula measuring 1m x 1m x 2m in height (taken from English Nature, 2001)	
	
Photograph of a hibernacula created as part of a haitat enhancment for biodiversity.	
Siting	Four loacted within grassland close to field boundary habitats.
References	English Nature (2001) *Great Crested Newt Mitigtaion Guidelines*, English Nature, Peterborough.

ANNEX 6.3: 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. Should RAMs be considered insufficient for great crested newts, 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 presence/absence environmental DNA survey and detailed Method Statement.

These RAMs relate to small scale removal of optimal habitat including hedgerows, scattered scrub, tall herb 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

Any clearance of habitats potentially suitable for hazel dormouse (hedgerow and 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. 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[11]). 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.

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

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 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.

Water Vole and Otter

Summary of Method Statement

Any development related activities on the Site, such as works required in or within 5m of a ditch/watercourse may potentially affect these species. This includes proposed works to extend an existing culvert to facilitate an access track linking to Granites Chase. As a result, safeguards must be implemented to protect these and other species, and the Method Statement below details measures to be implemented to ensure these objectives are achieved. If these measures are followed, then no impacts are likely to occur.

Method Statement

This Method Statement should be followed for small scale works in or within 5m of a ditch and/or water course to ensure legal compliance and that the objectives are achieved.

The following measures will be adopted throughout the construction period of the Proposed Development:

The developer, Site contractor or their representatives will appoint a suitably qualified ecologist to oversee works completed under this Method Statement for the duration of the construction period.

A pre-construction water vole and otter survey will be carried out if small scale, localised works are required in or within 5m of a ditch. <u>If the pre-construction survey were to confirm presence of water vole in the vicinity of the proposed works a licence may be required if disturbance cannot be avoided.</u>

Site operatives will be informed by a 'tool box' talk of the potential for water vole and otter species to occur on-Site, what to look out for and what to do in the event that animal is found. The tool box talk will be provided by a suitably experienced ecologist.

A suitably experienced ecologist will be present during all works considered to require advice and an ecological watching brief. The ecologist will be contactable by the Site Manager at all other times and available to further advise on Site, if necessary, as a contingency measure.

Works to be carried out in or within 5m of a ditch/watercourse must only commence after a careful visual inspection by a suitably qualified and experienced ecologist has determined that no animals or their burrows/holts are present. Vegetation should be reduced to a height of no less than 150mm prior to works commencing to aid visual searches. The ecologist will then search the areas prior to the vegetation being taken back to ground level / bare ground.

Should evidence (or potential evidence) of water vole or otter be found at any point during construction, works within suitable habitat and/or potentially disturbing works in close proximity must cease immediately and the ecologist will advise on the appropriate actions, including applying for a licence, if required.

No tools, vehicles, or materials will be stored within 5m of watercourses/ditches and stand-off buffers will be clearly marked by fencing (or similar), with appropriate signage.

Should any trenches and excavations be left open, particularly overnight, an escape route for animals that enter the trench must be provided. Ramps should be no greater than 45 degrees in angle. Ideally, any holes should be covered.

If left open, then excavations left open overnight or longer should be checked for animals prior to the continuation of works or infilling.

If an otter or water vole is found, work must stop immediately, and contact should be made with a suitably experienced ecologist.

Amphibians

Summary of Method Statement

Great crested newts have been found to be present adjacent to the Site at P10. 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.

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.

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 relate to works within 50m of cable route pond P16 as well as the removal of suitable habitat within the Site. 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 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.

If possible, the timing of any proposed tree or woodland works should avoid the hibernation period (November to February inclusive). This will reduce the likely presence of individual animals being disturbed during hibernation.

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 that may include removal of small areas of hedgerow and scattered scrub, as well as tall herb and 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 Construction Environment Management Plan (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, including applying for a licence, if required.

Other amphibians found during the visual inspection will be placed away from the development works in the wider area comprising of terrestrial habitats which will not be impacted by the proposed works and has excellent connectivity with surrounding terrestrial habitats.

APPENDIX 7: BIODIVERSITY NET GAIN CALCULATION

ECOLOGICAL ASSESSMENT REPORT
APPENDIX 7:
BIODIVERSITY NET GAIN ASSESSMENT (SUMMARY)

BURSTEAD SOLAR FARM AND BATTERY STORAGE 'FREE GO'

LAND SOUTH AND EAST OF GREAT BURSTEAD, BILLERICAY, ESSEX

NOVEMBER 2023

Burstead Solar Farm Re-submission

Headline Results

Scroll down for final results ⚠

Return to results menu

On-site baseline	*Habitat units*	249.28	
	Hedgerow units	35.90	
	Watercourse units	22.83	
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	464.78	
	Hedgerow units	45.21	
	Watercourse units	25.47	
On-site net change (units & percentage)	*Habitat units*	215.51	86.45%
	Hedgerow units	9.31	25.94%
	Watercourse units	2.64	11.57%
Off-site baseline	*Habitat units*	0.00	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00	
	Hedgerow units	0.00	
	Watercourse units	0.00	
Off-site net change (units & percentage)	*Habitat units*	0.00	0.00%
	Hedgerow units	0.00	0.00%
	Watercourse units	0.00	0.00%
Combined net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	215.51	
	Hedgerow units	9.31	
	Watercourse units	2.64	
Spatial risk multiplier (SRM) deductions	*Habitat units*	0.00	
	Hedgerow units	0.00	
	Watercourse units	0.00	

FINAL RESULTS

Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	215.51	
	Hedgerow units	9.31	
	Watercourse units	2.64	
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	86.45%	
	Hedgerow units	25.94%	
	Watercourse units	11.57%	
Trading rules satisfied?	Yes ✓		

Unit Type	Target	Baseline Units	Units Required	Unit Deficit	
Habitat units	10.00%	249.28	274.20	0.00	Unit requirement met or surpassed ✓
Hedgerow units	10.00%	35.90	39.49	0.00	Unit requirement met or surpassed ✓
Watercourse units	10.00%	22.83	25.11	0.00	Unit requirement met or surpassed ✓