Land at South Farm, Wickwar, South Gloucestershire

Ecological Appraisal

Prepared by:
The Environmental Dimension Partnership Ltd

On behalf of:
Bloor Homes (South West)

December 2021
Report Reference
edp6190_r007

Contents

Appendices

Plans

Plan EDP 2 Statutory Designations
(edp6190_d007b 13 December 2021 GY/EM)

Plan EDP 3a Breeding Bird Survey Results – April 2021
(edp6190_d023 09 December 2021 VMS/EWi)

Plan EDP 3b Breeding Bird Survey Results – May 2021
(edp6190_d024 09 December 2021 VMS/EWi)

Plan EDP 3c Breeding Bird Survey Results – June 2021
(edp6190_d025 09 December 2021 VMS/EWi)

Plan EDP 4a Automated Detector Locations and Transect Route
(edp6190_d017 18 October 2021 DJ/EWi)

Plan EDP 4b Bat Transect Results – June (Dusk)
(edp6190_d018 26 November 2021 MJC/EWi)

Plan EDP 4c Bat Transect Results – June (Dawn)
(edp6190_d019 26 November 2021 MJC/EWi)

Plan EDP 4d Bat Transect Results – July
(edp6190_d020 26 November 2021 MJC/EWi)

Plan EDP 4e Bat Transect Results – August
(edp6190_d021 26 November 2021 MJC/EWi)

Plan EDP 4f Bat Transect Results – September
(edp6190_d022 26 November 2021 MJC/EW)

Plan EDP 5 Dormouse Nest Tube Locations and Survey Results
(edp6190_d013a 15 October 2021 PD/EWi)

Plan EDP 6 Badger Survey Results (Confidential)
(edp6190_d015a 15 October 2021 DJ/EW)

Plan EDP 7 Otter and Water Vole Survey Results
(edp6190_d016a 15 October 2021 DJ/EW)

Plan EDP 8 Great Crested Newt Survey Results
(edp6190_d014a 15 October 2021 GY/EWi)

This version is intended for electronic viewing only

	Report Ref: edp6190_r007			
	Author	**Formatted**	**Peer Review**	**Proofed by/Date**
r007	EW	FM	KH	FJ 071221

This page has been left blank intentionally

Executive Summary

S1 This Ecological Appraisal has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Bloor Homes (South West) (hereafter referred to as 'the Applicant'), in relation to proposed residential development of Land at South Farm, Wickwar (hereafter referred to as 'the Application Site').

S2 The proposed development will comprise up to 180 homes and associated infrastructure mixed-use development with all matters observed except from the main access.

S3 To establish the ecological baseline of the Application Site and subsequently inform a new outline planning application for residential development, a desk study, Extended Phase 1 Habitat survey and further detailed surveys for bats, breeding birds, badger (*Meles meles*) and great crested newt (*Triturus cristatus*) were completed by EDP during 2020 and 2021.

S4 With respect to habitats onsite, the Application Site comprises several agricultural fields, represented by arable crop and improved/poor semi-improved grassland of limited ecological importance, whilst the boundaries of the Application Site and internal field boundaries are delineated by native hedgerows of importance at the Local level. Such habitats are considered suitable for a local bat assemblage, breeding birds, badger, great crested newt, common reptiles and notable mammals. Of particular pertinence, a small great crested newt population was identified in association with offsite ponds.

S5 Of further pertinence, the Application Site is located within 670m of Bishop's Hill Woods Site of Special Scientific Interest (SSSI) and Site of Nature Conservation Interest (SNCI) and within 1.18km of Lower Woods SSSI. The tributary of Ladden Brook SNCI is also located 210m west of the Application Site.

S6 Accordingly, EDP has contributed to the design of the masterplan assessed by this report. Specific proposals for the avoidance, mitigation and compensation of any predicted impacts include, where possible, the retention, protection and enhancement of those features of greater ecological importance. This is in addition to the inclusion of open green space within the development to be managed for both biodiversity and recreation, and additional landscape planting. Further specifications regarding sensitive working methodologies and best working practices during the construction phase should also be incorporated to avoid impacts upon retained habitats and ensure the avoidance of harm/injury and disturbance to protected species present/potentially present.

S7 Provided those recommendations detailed within this report in respect of mitigation and sensitive working methodologies are implemented, it is considered that the proposals could proceed lawfully and in line with planning policy requirements.

This page has been left blank intentionally

Section 1
Introduction, Purpose and Context

1.1 This Ecological Appraisal has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Bloor Homes (South West) (hereafter referred to as 'the Applicant'), in relation to proposed residential development of Land at South Farm, Wickwar (hereafter referred to as 'the Application Site').

1.2 EDP is an independent environmental planning consultancy with offices in Cirencester, Cardiff and Cheltenham. The practice provides advice to private and public sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and masterplanning. Details of the practice can be obtained at our website www.edp-uk.co.uk.

Site Context

1.3 The Application Site is centred approximately at Ordnance Survey Grid Reference (OSGR) ST 72387 87684, at the southern edge of the village of Wickwar in south Gloucestershire. The wider landscape is dominated by agricultural land, predominately grazing pasture and arable fields subdivided by native hedgerow.

1.4 Overall, the Application Site is circa 7.8 hectares (ha) in size and comprises four field parcels predominantly within agricultural use, divided by native hedgerows reinforced in places with wire fencing. South Farm, comprising a complex of agricultural buildings, is present offsite adjacent to the northern boundary of the Application Site bordered by Sodbury Road. The southern boundary of the Application Site is bordered by additional areas of agricultural land with Frith Lane located further south.

1.5 The location and extents of the Application Site are illustrated at **Plan EDP 1**.

Development Proposals

1.6 A Framework Masterplan is provided at **Appendix EDP 1**. In brief, proposals concern development of up to 180 homes and associated infrastructure mixed-use development with all matters observed except from the main access.

1.7 To inform the outline planning application for the Application Site, this Ecological Appraisal describes the current ecological interest within and around the Application Site, which has been identified through standard desk- and field-based investigations. This Ecological Appraisal then considers the potential ecological impacts and opportunities for ecological enhancement based on the masterplan for the Application Site, in the context of relevant legislation and planning policy. Finally, this assessment identifies likely necessary measures to avoid, mitigate or provide compensation for potential ecological impacts.

1.8 The remainder of this report is structured as follows:

- **Section 2** summarises the methodology employed in determining the baseline ecological conditions within and around the Application Site (with further details provided within Appendices and on Plans where appropriate);

- **Section 3** summarises the baseline ecological conditions (with further details also provided within Appendices and on Plans where appropriate) and identifies and evaluates any pertinent ecological features/receptors;

- **Section 4** describes the development proposals, how the design has been influenced by ecological factors, EDP input to the design process and key components of inherent mitigation;

- **Section 5** considers the potential impacts of the proposal on pertinent ecological features in the context of legislative, planning policy and biodiversity action planning considerations. Recommended mitigation and enhancement measures are provided for the current and possible future planning stages; and

- **Section 6** summarises the inherent and recommended additional mitigation measures and provides the overall conclusions of the Appraisal.

Section 2
Methodology (Baseline Investigations)

2.1 This section of the Ecological Appraisal summarises the methodologies employed in determining the baseline ecological conditions within and around the Application Site. The appraisal has been undertaken by appropriately qualified ecologists using relevant best practice methodologies wherever possible. Reasons for any departure from best practice methodology are given and normally relate to the timing of EDP's commission and/or the availability of access to parts of the site or wider study area. Full details of the techniques and process adopted are, where appropriate, provided within appendices and on plans to the rear of this report.

Desk Study

2.2 The desk study is an important element of establishing the ecological baseline of a site proposed for development, enabling the initial collation and review of contextual information, such as designated sites, together with known records of protected and priority[1] species.

2.3 The desk study involved collating biodiversity information from the following sources:

- Bristol Regional Environmental Records Centre (BRERC);
- Gloucester Centre for Environmental Records; and
- Multi-Agency Geographic Information for the Countryside (MAGIC) website[2].

2.4 The desk study was undertaken during February 2020 and involved obtaining the following information:

- International statutory designations (within a 10km radius around site);
- National statutory designations (2km radius);
- Non-statutory local sites (2km radius);
- Annex II bat species[3] records (6km radius); and

[1] Priority species comprise those of principal importance for the conservation of biodiversity, as listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
[2] www.magic.gov.uk
[3] Annex II species comprise those listed under Annex II of the Habitats Directive which occur in the UK and for which SACs are designated. The objectives of the National Site Network, which includes all SACs and SPAs, are to maintain or, where appropriate, restore such species to a favourable conservation status. Bat species listed in Annex II include: greater horseshoe; lesser horseshoe; barbastelle; and Bechstein's bat.

- All other protected/notable species records (2km radius).

2.5 The above search areas are considered sufficient to cover the potential zones of influence[4] of the proposed development in relation to designated sites, habitats and species. Statutory and non-statutory designations are illustrated at **Plan EDP 2** and **Appendix EDP 2**.

Extended Phase 1 survey

2.6 The survey technique adopted for the initial habitat assessment was at a level intermediate between a standard Phase 1 survey technique[5], based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 survey. This level of survey does not aim to compile a complete floral and faunal inventory for the Application Site.

2.7 The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present therein. Additionally, any actual or potential protected or priority species/habitats[6] are identified and scoped.

2.8 The Extended Phase 1 survey was undertaken by a suitably experienced surveyor on 12 and 13 March 2020 with a further update assessment undertaken on 22 January 2021.

2.9 The principal habitat features within the Application Site (identified through site survey) are illustrated at **Plan EDP 1**. Habitat descriptions and illustrative photographs provided at **Appendix EDP 3**.

Detailed (Phase 2) Surveys

2.10 The scope of Phase 2 Surveys undertaken within the Application Site was defined following the initial studies described above (desk study and Extended Phase 1 survey).

2.11 The surveys 'scoped in' based upon the findings of the Extended Phase 1 survey are summarised in turn below, with reference to sources of further detailed information where applicable.

[4] Zone of Influence - the areas and resources that may be affected by the proposed development.
[5] Joint Nature Conservation Council (2004) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit* (reprinted with minor corrections for original Nature Conservancy Council publication).
[6] Priority species and habitats comprise those of Principal importance for the purpose of conserving biodiversity, as listed under Section 41 (England) of the NERC Act (2006).

Hedgerow Survey

2.12 Owing to the presence of a network of hedgerows within the Application Site which have variable quality and species-diversity, a detailed survey was undertaken to assess their value with reference to the Wildlife and Landscape criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997. The survey was completed on 22 January 2021. Further details of the methodologies employed are provided in **Appendix EDP 4**.

Breeding Birds

2.13 The Application Site comprises areas of mixed farmland and therefore has the potential to support an assemblage of breeding birds including declining farmland species. Full breeding bird surveys (BBS) were, therefore, undertaken with reference to standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach. This involves the completion of three visits to the Application Site, undertaken monthly between April and July, i.e. at the height of the breeding bird season for lowland Britain.

2.14 Breeding bird surveys were completed on three occasions during the main bird breeding season, on 20 April, 27 May and 18 June 2021. Surveys were completed by experienced ornithologists utilising standard methodology which entails a modified Common Bird Census (CBC) 'territory mapping' approach.

2.15 Further details of the methodologies employed are provided in **Appendix EDP 5** whilst the results are illustrated at **Plan EDP 3a** - **3c**.

Bat Surveys

2.16 During the Extended Phase 1 survey, a number of mature trees present within, or immediately adjacent to the Application Site were considered to have the potential to support roosting bats. In addition, a number of habitats present within the Application Site, including mature trees, scattered scrub and hedgerows were identified as having the potential to support foraging and commuting bats. Habitats within the wider landscape, including Bishop's Hill Wood SSSI 670m east of the Application Site are also recognised for their importance to support roosts of Annex II bat species.

2.17 The following surveys for bats were therefore undertaken with reference to national best practice guidelines[7]:

1. 'Bat Roosting:

a) Visual assessments of mature trees for bat roosting potential; and

[7] Collins, J. (ed.) (2016). *Bat Surveys: for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London

b) Aerial inspection of mature trees with moderate-high bat roost potential to confirm presence/infer absence of roosting bats.

2. Bat Foraging/Commuting Activity:

a) Manual transect surveys; and

b) Automated detector surveys'.

2.18 Full details of survey effort undertaken with respect to roosting and commuting/foraging bats are provided in **Appendix EDP 6** and illustrated at **Plans EDP 4a-4f**.

Dormouse Survey

2.19 Owing to the suitability of the hedgerow network within the Application Site for dormouse (*Muscardinus avellanarius*), a nest tube survey to determine the presence/likely absence of the species was undertaken.

2.20 A total of 71 nest tubes were deployed onsite on 27 March 2020. Due to the Covid pandemic, however, dormouse checks could not commence until October 2020, with subsequent checks undertaken in November 2020, April 2021, May 2021, June 2021 and August 2021.

2.21 A search for characteristically gnawed hazel nuts was also undertaken alongside the nest tube survey where present. Given the limited distribution of fruiting hazel stands however, no systematic search was possible.

2.22 Full details of the dormouse survey are provided at **Appendix EDP 7**.

Badger Survey

2.23 The Application Site offers suitable foraging and sett building opportunities for badgers (*Meles meles*). As such, a detailed walkover survey of the Application Site and wider land ownership boundary was undertaken during the Extended Phase 1 survey on 12 and 13 March 2020 with a further update assessment undertaken on 22 January 2021. Full details of the badger survey are provided at **Appendix EDP 8**. The survey area and results are illustrated at **Plan EDP 6**.

Otter and Water Vole Survey

2.24 Several wet ditches were recorded within the Application Site and wider survey area, whilst Ladden Brook delineates the south-western boundary of the wider survey area. An initial assessment of the suitability of each ditch to support otter and water vole was undertaken during the Extended Phase 1 Habitat survey on the 12 and 13 March 2021. Following the initial habitat assessment, a detailed survey of each suitable watercourse/waterbody for signs of otter and water vole activity was subsequently undertaken by an experienced surveyor on two occasions: 26 May 2021 and

28 July 2021. Full details of the otter and water vole survey are provided at **Appendix EDP 9**. The survey area and results are illustrated at **Plan EDP 7**.

2.25 Each survey was undertaken in accordance with best practice guidelines for otter[8] and water vole[9] during which all signs of otter and water vole activity were recorded. The otter survey involved a visual inspection for characteristic signs of otter, including evidence of feeding remains, prints, tracks, spraints and resting sites including lay-ups and holts. Features considered to have the potential to be used as holts were also documented during the survey. In the case of water vole, the survey involved a search for feeding stations (including feeding stations and grazed lawns), faeces (latrines and droppings), footprints, burrows and possible runs.

Great Crested Newt Survey

2.26 No waterbodies were identified within the boundaries of the Application Site. However, a single waterbody was identified circa 10m north of the Application Site (**P1**), whilst four additional waterbodies (**P2** - **P5**) were identified within the same ownership boundary, the closest being circa 416m east (**P2**) of the Application Site. **P3** - **P5** are located within 500m of the Application Site and following confirmation of the red line boundary are considered to be within the zone of influence of the Application Site in respect of great crested newt (*Triturus cristatus*). In addition to the above, a desk study identified a further three (**P6** - **P8**) waterbodies within 500m of the Application Site, as illustrated at **Plan EDP 8**.

Habitat Suitability Assessment of Waterbodies

2.27 A Habitat Suitability Index (HSI) assessment, as developed by Oldham *et al*. (2000)[10], of **P1** and **P2** was initially undertaken on 27 March 2020 by a suitably qualified ecologist and further updated on 16 April 2021 alongside a HSI of **P3** - **P5** to assess their suitability to support great crested newt. This is a standard assessment system which uses numerous criteria to derive a score to indicate the suitability of the waterbody for great crested newt. There was no access to waterbodies **P6** - **P8** however.

Environmental DNA Sampling of Waterbodies

2.28 To determine the presence/likely absence of great crested newt within those waterbodies identified within and near to the Application Site, water sampling was undertaken of two waterbodies (**P1** and **P3**) on 16 April 2021, in accordance with those methodologies set out by the Freshwater Habitats Trust[11]. Waterbodies **P2**, **P4** and **P5** were dry such that no

8 Chanin P (2003). *Monitoring the Otter* Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.

9 Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) *The Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series)* Mammal Society, London

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

11 As approved by Natural England. http://www.freshwaterhabitats.org.uk/wordpress/wp-content/uploads/2013/09/eDNA- water-sample-methods-FHT.pdf

survey could be undertaken. There was no access to **P6** - **P8**, with land surrounding **P6** currently under construction whilst **P7** and **P8** are located on private land with no permitted access.

2.29 Samples were analysed by SureScreen for great crested newt environmental DNA (eDNA), using real-time Polymerase Chain Reaction (PCR) as detailed within Biggs *et al.* (2014)[12]. Full details are provided in **Appendix EDP 10**.

Presence/Absence Surveys and Population Size Assessment

2.30 Ponds **P1** - **P5** were also subject to initial, traditional presence/absence surveys to confirm the presence or likely absence of great crested newt until such time as the results of the eDNA surveys were made available following laboratory analysis. Due to confirmation of great crested newt presence recorded for ponds **P1** and **P3** with positive eDNA results returned, detailed surveys continued to allow for a total of six visits necessary to determine population size. Visits to ponds **P2**, **P4** and **P5** were also continued to confirm whether they remained dry during the survey period.

Surveys Scoped Out

2.31 **Table EDP 2.1** summarises other survey types which, while commonly required as part of an Ecological Appraisal for development sites, were not considered necessary/appropriate in this case.

Table EDP 2.1: Ecology surveys scoped out.

Survey Type	Reasons for scoping out
Reptiles	In respect of the limited extent of suitable habitat for common reptiles restricted to field margins, no further survey effort is considered necessary. In this instance, however, precautionary measures during future site clearance should be adopted to avoid harm/injury in the unlikely event a reptile population is identified.
Invertebrates	The Application Site is dominated by agricultural land likely to support a limited assemblage of common and widespread species. No further survey was undertaken.

[12] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Section 3
Results (Baseline Conditions)

3.1 This section of the Ecological Appraisal summarises the baseline ecological conditions determined through the course of desk-based and field-based investigations described in **Section 2**. In particular, this section identifies and evaluates those ecological features/receptors that lie within the Application Site's potential zone of influence and which are pertinent in the context of the proposed development. Further technical details are, where appropriate, provided within Appendices and on Plans to the rear of this report.

Designated Sites

3.2 Information regarding designated sites was obtained during the desk study from the MAGIC website and local records centre (Bristol Regional Environmental Records Centre (BRERC)/Gloucestershire Centre for Environmental Records (GCER)). Statutory designations (those receiving legal protection) and non-statutory designations (those receiving planning policy protection only) are discussed in turn below.

Statutory Designations

3.3 Statutory designations represent the most significant ecological receptors, being of recognised importance at an international and/or national level. International designations include Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites. National designations include Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs).

3.4 No part of the Application Site is covered by any statutory designations. However, there are two such designations within the Application Site's potential zone of influence, as summarised in **Table EDP 3.1** and illustrated at **Plan EDP 2**.

Table EDP 3.1: Statutory designations within the Application Site's potential zone of influence.

Designation	Distance from site	Interest Feature(s)
Bishop's Hill Woods SSSI	670m east	This site consists of species-rich, ancient broadleaved woodland and steeply sloping, neutral-grassland habitats on damp and heavy soils in the north of Avon. Adder (*Vipera berus*) is present on some of the sunny and sheltered banks. Nightingale (*Luscinia megarhynchos*) has been recorded from the denser thickets bordering the woodland.
Lower Woods SSSI	1.2km east	Lower Woods are the most extensive ancient woodlands in Avon. The site supports large populations of passerine birds and has a rich invertebrate fauna.

Non-Statutory Designations

3.5 Non-statutory designations are also commonly referred to in planning policies as 'local sites', although in fact these designations are typically considered to be important at County level. In Gloucestershire and Bristol, such designations are referred to as Sites of Nature Conservation Interest (SNCI) and Wildlife Trust Reserves (WTR). Additional designated sites which should be considered at this level include Local Nature Reserves (LNRs) and Ancient Semi-natural Woodland (ASNW) where these are not covered by other designations. A summary is provided within **Table EDP 3.2** with locations illustrated at **Appendix EDP 2**.

Table EDP 3.2: Non-statutory designations within the Application Site's potential zone of influence.

Designation	Distance from site	Interest Feature(s)
Tributary of Ladden Brook SNCI	210m west	Flowing, open water and associated bank side vegetation.
Bishop's Hill Wood SNCI	670m east	Ancient woodland.
Little Avon River and Tributary, West of Wetmoor SNCI	720m east	Flowing, open water and associated bank side vegetation.
Loandra Fields and Sturt Brake SNCI	1.07km north-east	Species-rich, unimproved neutral and calcareous grassland, broadleaved woodland and a watercourse.
Lower Woods SSSI and Wetmoor Complex SNCI and Lower Woods Avon Wildlife Trust (AWT)	1.1km east	An area comprising ancient woodland and neutral grassland supporting populations of common dormouse.
Disused Quarry and Fields, Bury Hill SNCI	1.33km south	Calcareous grassland and open standing water.
Lady's Wood SNCI	1.5km south-east	Ancient woodland.
Ladden Brook and Mill Pond, Yate Court SNCI	1.97km south-west	Flowing, open water and associated bank side vegetation, marshy grassland and ponds with population of grass snake (*Natrix natrix*).

Habitats

3.6 Information on habitats within and around the Application Site was obtained during the Desk Study, Extended Phase 1 survey and subsequent, detailed survey of hedgerow habitat.

3.7 The distribution of the different habitat types within and adjacent to the Application Site is illustrated at **Plan EDP 1**. Detailed descriptions of these habitat types, together with an assessment of their ecological value, are included within **Appendix EDP 3** (general habitats) and **Appendix EDP 4** (hedgerow regulations assessment).

3.8 A summary and qualitative assessment of these habitats is provided in **Table EDP 3.3**.

Table EDP 3.3: Summary of habitats within the Application Site.

Habitat or feature	Distribution within Application Site	Intrinsic ecological value
Arable	Field **F1**.	**Negligible** – widespread and species-poor.
Improved Grassland	Fields **F2-F4** subject to grazing.	**Negligible –** widespread, species-poor.
Poor Semi-improved Grassland	Field **F5** subject to light grazing.	**Negligible** – widespread, species-poor and limited in extent.
Dense and Scattered Scrub	Scattered patches around agricultural buildings associated with South Farm.	**Negligible** – owing to limited extent, low distinctiveness and diversity.
Tree Lines	Coniferous tree line (**H11**).	**Negligible –** owing to limited extent, characterised by non-native species.
Scattered Trees	Within hedgerow boundaries	**Site** – owing to maturity and potential to support protected species.
Hedgerows	Hedgerow network forming boundaries of agricultural land.	**Local –** a priority habitat for England providing connectivity to the wider landscape.
Wet and Dry Ditches	Ephemeral ditches distributed across the site in association with field boundaries; ditches mostly dry at time of survey.	**Site –** ditches provide connectivity to wider landscape.

3.9 To inform the Framework Masterplan and a planning submission, a Biodiversity Net Gain (BNG) assessment using the 'DEFRA Biodiversity Metric 3.0' (JP039)[13] has been completed by an Associate Ecological Consultant with experience of using such calculators.

3.10 The assessment has been based on the Extended Phase 1 Habitat survey by EDP on 12 and 13 March 2020 with a further update assessment undertaken on 22 January 2021. GIS software has been used to calculate approximate areas of habitat to be lost, retained, enhanced and/or created. BNG calculations are provided within a separate document to be submitted with the outline planning application (report reference: edp6190_r006). In brief, however, the biodiversity impact habitat area score of the proposed development has been calculated as follows:

- Total net unit change = 4.15units (net gain); and
- Total net percentage change = 26.2% (net gain).

3.11 With respect to the biodiversity impact score of the proposed development for hedgerows specifically, this has been calculated as follows:

[13] http://publications.naturalengland.org.uk/publication/6049804846366720

- Total net unit change = 5.42 units (net gain); and
- Total net percentage change = 35.25% (net gain).

Protected and/or Notable Species

3.12 The likelihood of presence, or confirmed presence, of protected/and or notable wildlife species within the Application Site is summarised below, with reference to desk study records, habitat suitability and detailed surveys where relevant. Further details are made available within the appendices and plans where referenced.

3.13 Where a particular species or taxonomic group has been confirmed to be present, or presence is inferred based on habitat suitability, the ecological value or significance of the population or assemblage is assessed on a geographical scale.

Breeding Birds

3.14 A large number of records of bird species were returned during the desk study assessment which include several Schedule 1 species, species listed on Section 41 of the NERC Act (2006), and/or RSPB red/amber listed species[14]. Red listed species include marsh tit (*Poecile palustris*), swift (*Apus apus*), nightingale (*Luscinia megarhynchos),* house martin (*Delichon urbicum*), grasshopper warbler (*Locustella naevia*), woodcock (*Scolopax rusticola*), starling (*Sturnus vulgaris*) mistle thrush (*Turdus viscivorus*), skylark (*Alauda arvensis*), spotted flycatcher (*Mucipcapa* striata), yellow hammer (*Emberiza citronella*), tree sparrow (*Passer montanus*), linnet (*Linaria cannabina*) turtle dove (*Streptopelia turtur*), house sparrow (*Passer domesticus*), cuckoo (*Cuculus canorus*) and lapwing (*Vanellus vanellus*).

3.15 Amber listed species include meadow pipit (*Anthus pratensis*), grey wagtail (*Motacilla cincerea*), willow warbler (*Phylloccopus trochilus*), song thrush (*Turdus philomelos*),whitethroat (Sylvia *communis*), lesser black backed gull (*Larus fuscus*), snipe (*Gallinago gallinago*), reed bunting (*Emberiza schoeniclus*), dunnock (*Prunella modularis*), bullfinch (*Pyrrhula pyrrhula*), and kestrel (*Falco tinnunculus*).

3.16 Records of Schedule 1 species include hobby (*Falco subbuteo*), barn owl (*Tyto alba*), fieldfare (*Turdus* pilaris), brambling (*Fringilla montifringilla*), peregrine (*Falco peregrinus*) and merlin (*Falco columbarius*).

3.17 The majority of records are associated with Lower Woods SSSI to the east of the Application Site whilst several records were also returned for land within and around Wickwar including such farmland species as lapwing, skylark and yellowhammer.

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

3.18 A total of 30 species of bird, representing 21 families, were recorded during the breeding bird survey visits undertaken of the Application Site during 2021. Of those, 13 (i.e. 43%) are regarded to be of conservation concern within the UK[15] or benefit from legal protection in some way. Six of those species are listed on the Birds of Conservation Concern (BoCC4) Red list and seven on the Amber list. Furthermore, five of those BoCC4-listed species also comprise Priority species. Of these species, two are confirmed to be breeding, three are considered to probably be breeding on-site, two is possibly breeding, and one is considered non-breeder.

3.19 The majority of birds recorded during the three survey visits are Green-list species[16], mostly common resident and migrant passerines. However, populations of some species of conservation concern do exist within the Application Site, with linnet and starling confirmed breeding onsite.

3.20 Improved grassland and arable land subject to intensive agricultural management dominates the Application Site. Such areas could offer foraging opportunities to many bird species; however, disturbance from existing management regimes, including grazing by livestock and harvesting of silage and other crops, likely prevents nesting within the fields. Skylark, a ground nesting species was, however, recorded onsite whilst evidence of possible breeding behaviour was identified offsite to the west.

3.21 Dense scrub, native hedgerows and semi-mature/mature tree standards delineating field boundaries provides a suitable foraging and nesting resource for an assemblage of farmland and more common and widespread garden birds. Buildings associated with South Farm also provide suitable nesting opportunities for some species. Linnet was confirmed breeding across the southern extent of the Application Site whilst starling nesting behaviour was recorded in the north in the vicinity of South Farm. No schedule 1 species was recorded during the survey effort.

3.22 The assemblage of breeding bird species recorded on-site is considered to be typical for the range and quality of habitats present, and for its geographic and topographic location. From the survey data, a greater assemblage and diversity of birds is present around the hedgerows within and adjacent to the Application Site. Such habitats offer greater opportunities for nesting and foraging birds and for a wider range of species in comparison to the open pasture which dominates the Application Site. Although areas of open, grazed pasture do offer foraging opportunities for many species, disturbance from existing agricultural management regimes prevent nesting within the fields.

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

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

3.23 The overall abundance of birds recorded is not regarded as being important or exceptional for any species. The breeding bird assemblage supported by the Application Site is, therefore, assessed as being of **Local** Importance.

Bats

3.24 Both GCER and BRERC returned multiple records of bat species within 2km of the Application Site, predominantly in association with Lower Wood SSSI in addition to records around the village of Wickwar including; brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygaemus*), greater horseshoe (*Rhinolophus ferrumequinum*), lesser horseshoe (*Rhinolophus hipposideros*), noctule (*Nyctalus noctula*), Natterer's (*Myotis nattereri*), barbastelle (*Barbastella barbastellus*), serotine (*Eptesicus serotinus*), Myotis sp., whiskered (*Myotis mystacinus*) and Daubenton's (*Myotis daubentonii*) bats.

3.25 A number of these records are also associated with a number of breeding and low status roosts within the local landscape, including several tree roosts for Brandt's (*Myotis brandtii*) and Bechstein's (*Myotis bechsteinii*) bats across Lower Woods SSSI as well as a maternity barbastelle bat roost.

Investigations of Bat Roosting - Trees

3.26 The visual assessment of all trees across the Application Site confirmed the presence of trees with low, moderate and high bat roost potential. One tree is considered to have high potential to support roosting bats (**T4**), five trees are considered to have moderate potential (**T1** - **3** and **T6** - **8**), whilst two trees are considered to have low potential (**T5** and **T9**), all in association with hedgerow boundaries.

3.27 Following further detailed aerial inspections of those trees with moderate-high potential on 16 June 2021, no bats or evidence of bats were seen during the visual inspections. Trees **T2** and **T3** are reconfirmed to be of moderate potential to support roosting bats, whilst **T4** was downgraded from high to moderate potential, **T1** and **T7** downgraded from moderate to low potential, and **T6** and **T8** downgraded from moderate to negligible potential. The findings of the tree assessment are summarised within **Appendix EDP 6** and illustrated at **Plan EDP 1**.

Investigations of Bat Foraging/Commuting Activity

3.28 With respect to foraging and commuting bats, hedgerow boundaries provide suitable linear features for commuting bats and enhances the Application Site's connectivity to the wider landscape. Grassland habitat, particularly land grazed by livestock, also provides some foraging opportunities to a bat assemblage.

3.29 Bat foraging and commuting activity recorded during the transect and automated detector surveys undertaken between April 2021 and September 2021 is illustrated on **Plans EDP 4a-4f** with survey results provided at **Appendix EDP 6**. A minimum of 8 bat species/species groups (myotid bat species were not identified to species level), were

confirmed to be present foraging and/or commuting within the Application Site during the course of the automated detector surveys. During the automated detector surveys, the vast majority of this behaviour (average 53.2% of Anabat recordings) related to common pipistrelle bat. *Myotis* sp. accounted for 33.6% of all Anabat recordings whilst soprano pipistrelle accounted 6%. Noctule accounted for 1.8% and serotine for 5% of all Anabat recordings. Other species representing less than 1% of Anabat recordings include greater horseshoe, lesser horseshoe, long-eared and serotine bat species, accounting for 0.4% of all Anabat calls recorded in total during 2021.

3.30 No bats were recorded at Anabat location 2 during April 2021 whilst only low numbers of common pipistrelle and noctule bats were recorded at location 1 during April 2021 and at both locations during May 2021. Unseasonably cold night-time temperatures were recorded during April and May 2021 which may have suppressed bat activity to some extent. Moderate levels of activity were recorded across the Application Site for the remainder of the year, with a peak in activity recorded at location 2 during September 2021 dominated by common pipistrelle and *Myotis* sp. bats.

3.31 Only 4 species/species groups of bat (*Myotis* species were not always identified to species level) were confirmed to be foraging and/or commuting within the Application Site during the course of manual transect surveys undertaken between April and September 2021. The vast majority of this behaviour was attributed to common pipistrelle bat. Occurrences of noctule bat were identified during August 2021 whilst noctule, serotine and *Myotis* sp. were recorded during September 2021. Bat activity was largely associated with the southern extents of the Application Site. Overall, relatively low levels of bat activity were recorded in association with hedgerow boundaries across the Application Site during the course of the manual transect surveys.

3.32 Based on results of the manual bat transect and automated detector surveys undertaken during 2021 the overall bat population supported by the Application Site is likely to be of **Local** Importance.

Dormouse

3.33 A desk study returned several records for dormouse, all associated with Bishop's Hill and Lower Wood circa 900m east of the Application Site.

3.34 The Application Site supports a relatively extensive hedgerow network with good connectivity to additional hedgerow habitat present across the wider landscape. Such habitats are considered suitable to support dormouse, providing a potential foraging resource whilst offering suitable dispersal habitat. However, the quality of the hedgerow network is limited however due to agricultural management resulting in poor structure with relatively poor species diversity also.

3.35 As detailed in **Appendix EDP 7** and illustrated at **Plan EDP 5**, the dormouse surveys conducted between October 2020 and August 2021 found no evidence of dormouse. A small number of wood mice (*Apodemus sylvaticus*) and evidence of their activity (including nests) were found however.

3.36 Dormouse is therefore not considered to pose a constraint to the proposed development.

Badger

3.37 A desk study returned three records for badger, all road causalities associated with Wickwar Road which travels north to south along the eastern boundary of the Application Site.

3.38 The Application Site supports extensive areas of agricultural grassland which could provide seasonal foraging opportunities to badger. Additionally, the hedgerow network provides opportunities for sett building.

3.39 No badger setts or evidence of badger was identified within the Application Site. However, four badger setts were identified within the wider survey area during the Extended Phase 1 Habitat survey, including three active subsidiary setts (**S1**, **S2** and **S4**) and a single outlier sett (**S3**).

3.40 A full description and classification of each sett is provided within **Appendix EDP 8** with locations illustrated at **Plan EDP 6**.

Otter and Water Vole

3.41 No records for otter nor water vole within 2km of the Application Site were returned during the desk study.

3.42 The ditch network recorded across the Application Site is considered to be of negligible importance to water vole given the poor water quality, absence of a foraging resource and shallow banks subject to cattle poaching. Similarly, the Ladden Brook tributary located within the wider survey area is considered largely unsuitable given its fast flow and shallow banks, with limited burrowing opportunities and offering limited foraging resources.

3.43 The wet ditch network is similarly considered of negligible importance to otter given its poor water quality and absence of a notable fish population of value as a foraging resource. The ditch network may, however, facilitate dispersal of otter across the wider landscape whilst associated hedgerows provide some cover to this species. The Ladden Brook is considered of greater suitability for this species however, and likely to of value for both dispersal and foraging.

3.44 During the otter and water vole survey on 26 May 2021, a single otter spraint was identified along the Ladden Brook. A mammal feeding station was also identified along this stretch of watercourse although it could not be determined whether this was attributed to water vole or another similar mammal. No other evidence of water vole was identified along the watercourse. No signs or otter nor water vole were identified in association with the ditch network within the Application Site or wider survey area. During the second survey on 28 July 2021 no evidence of otter and water vole was recorded during the survey.

3.45 Further details are provided within **Appendix EDP 9** with the survey area and findings illustrated at **Plan EDP 7**.

Great Crested Newt

3.46 A desk study returned two records for great crested newt, the closest being within 160m of the Application Site, in association with **P6**, beyond Sodbury Road. The second record was circa 850m north-west of the Application Site. A desk study also returned records of common frog (*Rana temporaria*), common toad (*Bufo bufo*), smooth newt (*Lissotriton vulgaris*) and palmate newt (*Lissotriton helveticus*).

3.47 No waterbodies were identified within the boundaries of the Application Site. However, a single waterbody was identified circa 10m north of the Application Site (**P1**) whilst four additional waterbodies (**P2** - **P5**) were identified within the same ownership boundary, the closest of which lies circa 416m east (**P2**) of the Application Site. **P3** - **P5** are located within 500m of the study area and following confirmation of the red line boundary are considered to be within the zone of influence of the Application Site in respect of this species. In addition to the above, a desk study identified a further three (**P6** - **P8**) waterbodies within 500m of the Application Site, as illustrated at **Plan EDP 8**.

3.48 With respect to terrestrial habitats, managed/grazed improved grassland habitat is considered to be of limited suitability for a great crested newt population given its poor structural diversity and lack of suitable cover, whilst the ditch network is considered to be of limited suitability for a breeding population given its poor water quality, poaching by cattle and absent macrophyte assemblage. Nevertheless, the ditch and associated hedgerow network may facilitate dispersal of this species across the wider landscape.

3.49 The HSI assessment confirmed **P1** to be of good suitability to support great crested newt, with **P2** and **P3** to have below average suitability. Nevertheless, **P1** was notably turbid during all site visits as a consequence of surface water runoff into the pond and was, furthermore, relatively artificial in nature with a concrete base.

3.50 Water samples from **P1** and **P3** tested positive for great crested newt eDNA. Following further assessment of **P1** - **P3** using traditional survey techniques, one immature great crested newt was identified within pond **P3** on 10 May 2021. This is in addition to a peak count of four adults within **P3** identified on 03 June 2021 indicating presence of a low population. Pond **P3** is, however located greater than 500m from the Application Site such that potential impacts on this population are considered unlikely. Despite there being a positive eDNA result for **P1**, great crested newt was not identified during survey effort suggesting they are either present in such low numbers as to be undetectable by standard survey effort or otherwise limitations to survey effort reduced the probability of encountering this species.

3.51 Ponds **P2**, **P4** and **P5** remained dry throughout the surveys whilst there was no access to ponds **P6** - **P8**. Land surrounding **P6** is currently under construction whilst **P7** and **P8** are located on private land with no permitted access. **P6** was previously assessed by FPCR

however to inform a planning application for the adjacent development, with a low great crested newt population confirmed for this pond.

3.52 With respect to other amphibian species recorded, palmate and smooth newt was identified within pond **P3** with a peak count of one for both species.

Reptiles

3.53 BRERC/GCER returned records for adder and grass snake (*Natrix natrix*) in associated with Lower Woods to the east of the Application Site. Additional records for grass snake circa 1.3km south of the Application Site were returned.

3.54 Agricultural grassland habitat is considered largely sub-optimal for a common reptile population given its poor structural diversity and lack of suitable cover. Hedgerow boundaries and lightly grazed, poor semi-improved grassland habitat are, however, considered more suitable for common reptiles. It is therefore considered unlikely that the Application Site supports a significant reptile population, although low numbers could possibly be present, and likely confined to field margins. A common reptile population is thus considered to be of importance at the **Site Level** only.

Other Species Potentially Supported

3.55 A desk study returned several records of notable species within 2km of the Application Site predominantly associated with Lower Woods SSSI and Lower Woods and Wetmoor SNCI. These includes records for white-letter hairstreak (*Satyrium w-album*), marsh fritillary (*Euphydryas aurinia*), chalk hill blue (*Polyommatus coridon*) and purple emperor (*Apatura iris*), all listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This is in addition to records for several notable species including but not limited to the longhorn beetle (*Stenurella nigra*) and moth species dotted chestnut (*Conistra rubiginea*), light orange underwing (*Boudinotiana notha*) and red necked footman (*Atolmis rubricollis*). However agricultural grassland which dominates the Application Site is considered unlikely to support a notable assemblage.

3.56 Records of other mammal species within 2km of the Application Site were limited to brown hare (*Lepus europaeus*) in association with Lower Wood. Agricultural land onsite combined with woodland in the wider landscape provides suitable habitat for this species.

3.57 With respect to notable plants, a desk study returned several records for bluebell in association with woodland and hedgerow habitat across the wider landscape. Other notable species recorded within 2km of the Application Site include the near threatened greater butterfly orchid (*Platanthera chloranthera*), bird's-nest orchid (*Neottia nidus-avis*), meadow saffron (*Colchicum autumnale*) and nationally scarce pretty nodding moss (*Pholia lescuriana*), also associated with woodland habitat. No notable species were recorded during the Extended Phase 1 habitat survey, with habitats onsite typically botanically poor.

Summary of Key Issues Arising from Survey Findings

3.58 Based on the survey findings described above, the key ecological features/receptors pertinent to the development proposals are set out in **Table EDP 3.6**.

Table EDP 3.6: Key ecological features pertinent to the development proposals.

Important Ecological Feature	Key Attributes	Nature Conservation Value
Statutory/Non-statutory Designated Sites		
Bishop's Hill Woods SSSI and SNCI	This site consists of species-rich, ancient broadleaved woodland and steeply sloping, neutral-grassland habitats on damp and heavy soils in the north of Avon. Adder occur on some of the sunny and sheltered banks. Nightingale has been recorded from the denser thickets bordering the woodland.	County - National
Lower Woods SSSI and Wetmoor Complex SNCI and Lower Woods Avon Wildlife	Lower Woods are the most extensive ancient woodlands in Avon. The site supports large populations of passerine birds and has a rich invertebrate fauna.	County - National
Tributary of Ladden Brook SNCI	Flowing, open water and associated bank side vegetation.	County
Habitats		
Native Hedgerows	A Priority habitat and significant landscape feature.	Local
Species		
Breeding Bird Assemblage	Habitats likely to support an assemblage of common and widespread bird species utilising the Application Site for nesting and foraging with potential to support farmland specialists.	Local
Foraging/Commuting Bat Assemblage	Suitable habitat for a foraging and commuting bat assemblage.	Local
Badger	Suitable habitat for badger with setts identified within wider landscape.	Site
Great Crested Newt	Small-sized metapopulation confirmed onsite/in wider landscape but likely limited to field boundary habitats and ponds.	Local
Common reptiles	Field boundary habitats likely to support a low population of common reptiles.	Site

This page has been left blank intentionally

Section 4
Details of Proposed Development

4.1 Having reviewed the baseline conditions, this section of the Ecological Appraisal provides pertinent details of the proposed development, in particular those aspects which have potential implications for the ecological features/receptors identified in **Section 3**. Where relevant, reference is made to the influence that ecological considerations have had in the scheme's design and any inherent mitigation which avoids or reduces the severity of potential ecological impacts.

4.2 The proposed development will comprise up to 180 homes and associated infrastructure mixed-use development with all matters observed except from the main access.

Proposed Habitat Loss

4.3 Land take associated with built development will encompass a formal agricultural field comprising arable crop and improved/poor semi-improved grassland of limited ecological value with such losses equating to circa 5.01ha. This is in addition to the temporary loss/disturbance of a further circa 0.88ha of land to accommodate sustainable drainage features and Local Areas of Play (LAP)/Local Equipped Area of Play (LEAP) with areas or proposed open green space. Additional habitat loss proposed includes the following:

- Partial loss of hedgerows **H1**, **H2**, **H7** and **H10** amounting to circa 28m with associated culverting of ditch **D1** (dry) and **D2** (wet) and to accommodate construction of access roads and footpath links;

- Full loss of hedgerow **H14** amounting to circa 70m to accommodate residential units; and

- Potential loss of tree **T1** with low bat roost potential and **T3** with moderate bat roost potential given their proximity to the development footprint.

Proposed Habitat Retention, Creation and Enhancement

4.4 Inherent within development proposals is the inclusion of open green space along the full western boundary of the Application Site with such areas proposed to accommodate new landscape planting including flowering amenity grassland, wildflower meadow tree and shrubs to provide benefits to biodiversity, visual amenity and recreation. Of the total circa 7.91ha of arable land across which development is proposed, circa 0.88ha comprises suitable drainage features which will be integrated with proposed areas of open green space and landscape to delivering additional habitat for protected/notable species and biodiversity benefits in the long term. Additional proposals for habitat creation include:

- The retention of the majority of the existing hedgerow resource and associated wet/dry ditch network;

- The creation of new species-rich hedgerows along the northern, eastern and south-western extents of the Application Site amounting to circa 670m;

- The enhancement of the existing hedgerow resource through infill planting of gaps with a diverse native species mix;

- The provision of community allotments amounting to circa 0.09ha to deliver recreational and social benefits to new residents whilst also providing further potential opportunities for such species and common reptiles; and

- The provision of new tree, shrub and grassland planting across the built development footprint to soften the edges of development and provide multifunctional benefits to biodiversity, visual amenity and climate regulation.

4.5 Of further pertinence, the development footprint will be offset away from retained hedgerow boundaries adjacent through the provision of habitat buffers incorporating the full root protection areas of sensitive habitats adjacent, in addition to accommodating new tree, shrub and grassland planting.

4.6 In summary, EDP has provided input throughout the design process such that the Framework Masterplan provides measures to avoid, mitigate or compensate for ecological impacts. Additional measures proposed to avoid or mitigate potential impacts, and to provide long-term ecological enhancements are discussed further in **Section 5** of this report.

Section 5
Predicted Impacts and Mitigation

5.1 This section of the Ecological Appraisal considers the likely impacts of the proposed Framework Masterplan included as **Appendix EDP 1** on the existing ecological resource. Where impacts cannot be avoided by inherent mitigation alone, additional mitigation or enhancement measures are recommended which, if implemented, would as a minimum enable the proposed development to meet legislative and/or planning policy requirements.

5.2 EDP's overall summary and conclusions, based upon the above, are given in **Section 6**.

Designated Sites

Statutory Designations

5.3 Statutory designations receive legal protection under various international and national legislative instruments. This protection is also reflected in policies included within National Planning Policy Framework (NPPF) (July 2021), which are given material consideration during the planning application process.

5.4 At the local level, the South Gloucestershire Core Strategy was adopted on 11 December 2013 and sets out planning policy for the region. Policy CS9 (Managing the Environment and Heritage) requires development to protect and manage South Gloucestershire's environment and its resources in a sustainable way including the conservation and enhancement of the natural environment by avoiding or minimising impacts on biodiversity and geodiversity.

5.5 As described in **Section 3**, there are two statutory designations within the potential zone of influence of the Application Site: Bishop's Hill Woods SSSI and Lower Woods SSSI.

5.6 Both designations are considered sufficiently distant from the Application Site such that no direct impacts to either SSSI or their qualifying features are predicted. However, indirect effects associated with an increase in recreational pressure and subsequent degradation of habitats and/or disturbance of associated passerine birds following occupation of development may arise. Inherent within development proposals, however, is the inclusion of open green space along the full western boundary of the Application Site, proposed to accommodate semi-natural habitat features as well as formal play areas and community allotments which will provide alternative recreational opportunities for new residents and combined with footpath links to Public Rights of Way (PRoW) in the wider landscape, will serve to reduce footfall at statutory designated sites.

Non-Statutory Designations

5.7 Non-statutory designations do not receive any formal legal protection. However, they do receive planning policy protection, as reflected in the NPPF.

5.8 As described in Section 3, the Ladden Brook SNCI is within the potential zone of influence of the Application Site. With respect to anticipated impacts upon these designated sites, no direct effects such as habitat loss and/or physical degradation are anticipated due to its distance and spatial separation from the Application Site. With respect to indirect impacts, however, impacts may arise following a deterioration in water quality and increase in suspended solids during the construction and operation phase of development, as a result of the discharge of contaminated run-off following periods of heavy rainfall. Pollution incidents could also arise as a result of leaks and spills from construction activities, resulting in the introduction of hydrocarbons and other contaminants from demolition activities, site plant or of sediment loads arising from dust deposition or spoil movement. However, adverse impacts associated with site drainage, including surface water run-off and ground water contamination, are considered unlikely, subject to implementation of a sensitive drainage strategy in accordance with relevant planning policy. Indeed, an attenuation basin and swale is proposed to manage surface water runoff and will be integrated within areas of proposed open green space adjacent to the boundaries of built development.

5.9 Furthermore, it is recommended that appropriate pollution control measures will be employed in accordance with the relevant Pollution Prevention Guidelines (PPGs) published by the Environment Agency[17], namely PPG1 'General guide to the prevention of pollution', PPG5 'Works and maintenance in or near water', PPG6 'Pollution prevention guidance for working at construction and demolition sites' and PPG21 'Pollution incident response planning', to ensure that detrimental effects on nearby watercourse as a result of surface run-off, spillage and pollution arising throughout the construction phases are avoided.

5.10 Meanwhile, an increase in residential dwellings could lead to an increase in disturbance through recreational pressure on non-statutory designated site within the local area. As discussed in relation to statutory designated sites, however, such potential impacts will be mitigated through the inclusion of areas of open green space, play areas and allotments to provide alternative recreational opportunities within the Application Site.

Habitats

5.11 There are several mechanisms through which habitats receive protection with the statutory and non-statutory designated site frameworks. For instance, certain habitats are identified in policies within NPPF.

[17] PPGs were withdrawn in December 2015; however, they remain the main source of information on good practice in Wales with respect to guidance on pollution prevention. A replacement guidance series, comprising Guidance for Pollution Prevention (GPPs), are currently in development.

5.12 Additionally, the Environment Act 2021 was passed into law in November 2021. Its overall aims are to strengthen environmental protection and deliver the UK Government's 25-year environment plan following the UK's exit from the European Union. Of greatest relevance to ecology and biodiversity are provisions within the Act for biodiversity gain to be a condition of planning permission in England. When these provisions come into force, following secondary legislation expected to be issued by the Secretary of State (SoS) within approximately 2 years of the Act passing into law, the delivery of a net gain in biodiversity of 10% (as measured by a standard biodiversity metric) will become a legal requirement of planning permission for development.

5.13 With respect to local planning policy, Policy CS2 (Green Infrastructure) of the Core Strategy states:

'*the Council and its partners will ensure that existing and new Green Infrastructure (GI) is planned, delivered and managed as an integral part of creating sustainable communities and enhancing quality of life, considering the following GI objectives:*

- *Realising the potential of GI to assist with mitigation of, and adaption to climate change;*
- *Delivering high quality multi-functional and connected open spaces (including Green and Blue infrastructure);*
- *Protecting, creating and improving recreational, play, access and local food cultivation opportunities;*
- *Protecting and enhancing species and habitats, and creating new habitats and wildlife linkage between them;*
- *Conserving and enhancing landscape character, historical, natural, built and cultural heritage features;*
- *Securing ongoing management and maintenance and creation of GI assets; and*
- *Joint working with partners, including neighbouring local authorities.'*

5.14 Further details are provided within Green Infrastructure Supplementary Planning Document adopted April 2021 which seeks to ensure that green and blue infrastructure (GI) is adequately conserved and enhanced throughout the development process. It is targeted on supporting Core Strategy policies CS1, CS2 and CS24 and PSP policies PSP1, PSP2 and PSP3.

5.15 Habitats within and immediately adjacent to the Application Site have been assessed through an Extended Phase 1 survey. The Application Site is dominated by arable land and improved/poor semi-improved grassland of limited ecological intrinsic value. Hedgerow boundaries are, however, considered to be of greater ecological importance.

5.16 With respect to anticipated impacts, the proposals will result in the loss of circa 4.7ha of arable land and improved/poor semi-improved grassland of limited ecological importance. This is in addition to loss/disturbance of a further circa 5.01ha of land to accommodate sustainable drainage features within areas or proposed open green space. Impacts associated with such losses are thus considered minimal given the low distinctiveness of habitats present.

5.17 Nevertheless, in mitigation for such impacts, circa 2.9ha outwith the boundaries of built development is to be dedicated to areas of formal and informal open space, accommodating sustainable drainage features and new landscape planting. A detailed landscape design for open space, to be delivered as part of a future Reserved Matters application, should include provision of species-rich wildflower meadow as well as amenity grassland areas to provide benefits for both recreation and biodiversity. Such habitats should be subject to sensitive management over the long-term necessary to maximise the value of foraging, dispersal, breeding and hibernation resources for protected/notable species through, for example, the implementation of a sensitive hay cutting regime, promoting a structurally diverse and species-rich grassland sward. With respect to areas of wildflower grassland, the implementation of a mid-summer hay cut is recommended, with a first cut delayed till between late July and early August to maximise seed set necessary to promote a botanically diverse grassland field, whilst taking into account sensitivities of wildlife potentially present. Such measures will benefit the local bat assemblage, in addition to great crested newt, common reptiles, nesting birds and invertebrates whilst further providing foraging habitat for badger.

5.18 In addition to arable habitats, development proposals will require the partial loss of hedgerows **H1**, **H2**, **H7** and **H10** amounting to circa 28m with associated culverting of ditch **D1** (dry) and **D2** (wet) and to accommodate construction of access roads and footpath links. This is in addition to the full loss hedgerow **H14** amounting to circa 70m to accommodate residential units. Such losses may result in the fragmentation of wildlife corridors for dispersal of protected/notable species whilst reducing availability of habitat for nesting/breeding, foraging and refuge.

5.19 However, inherent within the Framework Masterplan is the retention of the majority of the hedgerow resource including key habitat corridors along the boundaries of the Application Site in addition to the proposed creation of circa 670m of new species-rich hedgerows. New tree and shrub planting is furthermore proposed to reinforce and enhance retained hedgerows along the boundaries of the Application Site. Combined, this will deliver a quantifiable net gain in respect of this habitat. Creation and enhancement of hedgerow habitat will further serve to strengthen wildlife links across the Application Site facilitating the dispersal of protected/notable species. New planting should be in keeping with existing species but with a focus on provision of native and or nectar/pollen rich varieties to promote and enhance biodiversity and provide an additional foraging resource for birds and invertebrates.

5.20 Additionally, the development footprint will be offset from retained and newly created hedgerow habitats adjacent through the provision of buffers. Such buffers will incorporate the full root protection areas of hedgerow habitat adjacent, in addition to accommodating

new tree, shrub and grassland planting. Such habitat corridors should then be subject to sensitive management over the long term and excluded from curtilage boundaries adjacent to minimise future mismanagement.

5.21 Such habitat creation and enhancement measures will deliver a net biodiversity gain and in so doing ensure compliance with planning policy whilst delivering benefits for nature. The results of a BNG assessment are provided within a separate document to be submitted with an outline planning application, In brief, however, the biodiversity impact habitat area score of the proposed development has been calculated as follows:

- Total net unit change = 4.15units (net gain); and
- Total net percentage change = 26.2% (net gain).

5.22 With respect to the biodiversity impact score of the proposed development for hedgerows specifically, this has been calculated as follows:

- Total net unit change = 5.42 units (net gain); and
- Total net percentage change = 35.25% (net gain).

5.23 There does, however, remain the potential for physical damage/degradation of retained habitat features during the construction phase of development. Protective fencing will be erected as recommended within *BS5837: 2012 Trees in relation to design, demolition and construction* to physically protect retained habitats on-site (namely hedgerows and associated mature trees) with establishment of Ecological Protection Zones (EPZs). Protective fencing will incorporate the full root protection area of the feature to be retained and will be protected and maintained throughout the duration of all site enabling and pre-construction activities.

5.24 No works (other than planting), including the storage of materials, plant and machinery, should be carried out within or immediately adjacent to all areas of protective fencing/areas marked for protection as described above, so as to ensure no detrimental impacts to sensitive features arising from physical damage and/or pollution. The digging of trenches and pits for new tree and scrub planting adjacent to areas of protective fencing, where this lies inside root protection areas, should be carried out by hand only, in accordance with best practice guidance as stipulated within BS 5837:2012.

5.25 Subject to implementation of the above, no significant negative impacts upon habitats within and adjacent to the Application Site are anticipated. However, some of the habitats present within the Application Site, including those of low or negligible intrinsic value, do require further consideration in relation to supporting protected species as discussed below.

Protected and/or Notable species

5.26 Certain species receive legal protection in the United Kingdom and are commonly known as 'protected species.' In reality, the level of protection for different species varies considerably, from protection solely against 'killing and injury' to full protection of the species and their places of refuge. Where pertinent, details of legal protection afforded to species/species-groups are provided below.

5.27 In addition to protected species, there are other species/species-groups that do not receive legal protection, but which are notable owing to their conservation status as priority species or other status. Details of any actual or potential notable species within the Application Site are identified below. With respect to planning policy, protected and notable species are afforded policy protection at a national level by the NPPF.

5.28 Baseline investigations have identified protected species implications for the Application Site relating to bats, breeding birds, badger, great crested newt, common reptile and notable mammal species; these are discussed in turn below.

Bats

5.29 All species of British bat are afforded it protection under the Conservation of Habitats and Species Regulations 2017 (as amended), making it an offence to:

(i) Deliberately capture, injure or kill a wild animal of an EPS;

(ii) Deliberately disturb wild animals of a EPS wherever they are occurring, in particular any disturbance which is likely to impair their ability to survive, to breed or reproduce, to affect significantly the local distribution or abundance of the species to which they belong, or in the case of hibernating or migratory species, to hibernate or migrate; or

(iii) Damage or destroy a breeding site or resting place of a wild animal of an EPS.

5.30 Additional protection for bats is also afforded under the Wildlife and Countryside Act 1981 (as amended), making it an offence to intentionally or recklessly disturb bats whilst they are occupying a structure or place which is used for shelter or protection, or to obstruct access to this structure or place. In addition, eight of the eighteen species of bat resident in the UK (greater horseshoe, lesser horseshoe, barbastelle , Bechstein's (*Myotis bechsteinii*), soprano pipistrelle, common pipistrelle, brown long-eared and noctule) are also listed as Priority species.

Roosting Bats

5.31 Several trees within the Application Site were identified as having potential to support roosting bats, including three trees identified as moderate potential and two tree identified as low potential. Of these, **T3** with moderate bat roost potential and **T1** with low bat roost potential will potentially be lost to facilitate construction given their proximity to

the proposed development footprint. To date, detailed aerial inspections of each tree has identified no evidence of bat presence such that no impacts to tree roosting bats are anticipated to arise as a result of their removal.

5.32 However, given the transitional nature of bats which can establish new roosts within a short space of time, prior to commencment of construction, all mature trees to be felled/impacted will be subject to an update ground-level inspection by a suitably qualified ecologist to determine their current potential to support roosting bats. Where trees are identified as having moderate or greater potential, then such trees will be subject to a further detailed aerial inspection whereby all suitable roosting features will be checked at height for the presence of bats. Aerial surveys will be undertaken by a suitably qualified and Natural England (NE) bat licensed ecologist, arboricultural contractor with a NE bat survey licence, or with experience of working with bats and under the supervision of an NE bat survey license holder.

5.33 If any bats are discovered during the aerial inspection, owing to the strict legal protection afforded to bats and their roosts, works are likely to require a Mitigation Licence from NE.

5.34 If no evidence of roosting bats is uncovered during the aerial inspection, works may proceed without a Mitigation Licence from NE. However, regarding those trees identified as having potential to support roosting bats, a 'soft felling' technique involving the sectional dismantling of the tree will be adopted, involving the following:

- Tree felling will avoid cutting through any cracks, cavities, limb/knot holes or any other potential roosting features – i.e. by cutting above and below the feature when removing sections with suitable features;

- Any sections to be cut supporting suitable roosting features are to be suitably harnessed and supported before cutting using industry-standard rigging equipment, and gently lowered to the ground once cut, to avoid violent shaking of potential roosting features; and

- Any cut sections with potential roosting features are to be retained onsite by one of the following methods:

    - Strapping to existing, retained mature trees and appropriately secured in position;

    - Retained onsite at ground level within an area of retained woodland; and

    - Retained onsite for minimum 48 hours, with potential entrances not blocked i.e. facing away from ground, before they are removed or chipped.

5.35 Should any bats be discovered during the felling of these or any other trees, then works will necessarily cease and an NE bat licence holder be contacted for further advice. It may be necessary to obtain an EPS mitigation licence before works can continue.

5.36 In addition to the above sensitive working methodologies proposed, roosting, biodiversity enhancements with respect to bats are recommended for inclusion within the Application Site. Schwegler bat boxes[18] are recommended for installation upon suitable, semi-mature trees retained along the peripheries of the Application Site. Bat boxes should be erected away from sources of artificial lighting and with a south-east/south-west facing aspect where possible. Bat box design to be installed across the Application Site should include 2F for smaller bats and 2FN for larger bats (or similar). Bat roost features (such as bat tubes/bricks and/or raised ridge/roof tiles), should also be incorporated into the exterior of new buildings (such as garages) where possible.

Foraging/Commuting Bats

5.37 Manual transect and automated bat activity surveys have confirmed that the Application Site supports relatively low levels of foraging and commuting activity dominated by common and widespread species considered to be of local importance.

5.38 The proposals will result in the loss of circa 5.01ha of arable land and improved/poor semi-improved grassland to accommodate built development, in addition to temporary loss/disturbance of a further circa 0.08ha of land to accommodate sustainable drainage features. Arable land and improved/poor-semi-improved grassland is, however, of limited value as a foraging resource to a local bat assemblage such that impacts to a foraging bat assemblage are considered negligible whilst proposed creation of species-rich grassland and tree/shrub planting in association with proposed open green space area considered likely to provide a positive benefit to an assemblage.

5.39 There remains the potential for degradation and/or loss of linear features (hedgerows and treelines), coupled with potential disturbance impacts associated with increased lighting during both the construction and operation phase of development, which are likely to disrupt a bat assemblage utilising such features for dispersal between their roosts and foraging habitat in the wider landscape. Loss of hedgerow habitat is, however considered minimal whilst the proposed creation and enhancement of native hedgerows combined with inclusion of habitat buffers to offset development from retained/newly created hedgerow boundaries will further serve to strengthen wildlife corridors and facilitate continue dispersal of a local bat assemblage.

5.40 Implementation of a sensitive lighting strategy is also advised so as to ensure no/limited light spill occurs within close vicinity of boundary hedgerows and proposed open green space. Where lighting is required along road/pedestrian routes adjacent, lighting columns should be sited within the development footprint itself and directed away from habitat edges to minimise disturbance and light spill. Lighting should include directional, timed

[18] http://www.nhbs.com/browse/search?title-type-facet%5B%5D=&term=bat+boxes

and/or low-lux lighting, utilising shields and/or hoods where required. Such measures could be secured via planning condition attached to any future consent.

5.41 In addition, construction should be limited to daylight hours as far as possible, with the use of temporary, artificial lighting avoided during the hours between dusk and dawn, to mitigate effects relating to increased use of artificial lighting during construction.

5.42 Subject to the implementation of those key mitigation measures detailed above with respect to bats and previously with respect to habitats, no significant detrimental impacts upon the foraging/commuting bat assemblage utilising the Application Site are considered likely to arise.

Breeding Birds

Legislation

5.43 All wild birds, their nests and eggs are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended). This makes it an offence to:

(i) intentionally kill, injure or take any wild bird;

(ii) take, damage or destroy the nest of any wild bird while it is in use or being built;

(iii) take, damage or destroy the egg of any wild bird; or

(iv) to have in one's possession or control any wild bird (dead or alive), or egg or any part of a wild bird or egg.

5.44 In addition, further protection is afforded to those wild bird species listed on Schedule 1, prohibiting any intentional or reckless disturbance to these species while it is nest building, or at a nest containing eggs or young, or to recklessly disturb the dependent young of such a bird. A number of species are also included as Priority species.

5.45 Those measures inherent within the Framework Masterplan and detailed above in relation to habitats and bats are considered sufficient to minimise impacts upon a breeding bird assemblage associated with the Application Site. Additionally, the provision of additional areas of open space across the Application Site, including proposed habitat buffers adjacent to retained habitats, sustainable drainage features, and areas designed for informal and formal use as public open space will further maintain and enhance habitat connectivity across the Application Site to the wider landscape.

5.46 It is further recommended that bird boxes be installed upon suitable retained trees across the Application Site, in addition to the inclusion of fruit-bearing and flowering native tree, shrub and grassland species within any future planting plan.

5.47 However, given the protection afforded to all breeding birds, their nests, eggs and young, sensitive vegetation clearance required during the pre-construction and construction

phases of development should be timed to avoid the main bird breeding season (i.e. March to August inclusive). Should this seasonal constraint prove impracticable, then vegetation clearance outside of this period should only commence following the advice and under supervision of a suitably qualified ecologist. Pre-commencement checks for active nests will be required prior to any vegetation clearance occurring during the main bird breeding season, with appropriate buffers marked out around active nests or nests under construction, until all eggs have hatched, and chicks fledged.

Badger

5.48 Badger and their setts receive protection under the Protection of Badgers Act 1992, which protects badgers from deliberate harm and injury. The protection afforded to badgers is primarily due to animal welfare issues and not due to concerns over their unfavourable nature conservation status. Restrictions under this act which apply to development include any killing, injuring, possession or cruel treatment to badgers, any interference to a sett through damage or destruction, any obstruction of access to any entrance of a sett, or any disturbance to a badger whilst it is occupying a sett.

5.49 No setts were recorded within the Application Site during baseline survey such that no impacts associated with disturbance and/or damage of active setts will arise. However, owing to the suitability of habitat for and to the mobility and widespread nature of this species, a badger survey of the Application Site by a suitably qualified ecologist prior to the commencement of development is recommended, to determine whether any setts have been established during the interim period.

5.50 If identified, development should avoid direct impacts to, and disturbance of, active badger setts through establishment of an appropriate working buffer (typically 10m-30m, as advised by a suitably qualified ecologist), in which no vegetation clearance of movement of machinery will be permitted. Where this is not possible, sett closure will be required with under licence from NE, with such works restricted to between the months July and November.

5.51 In addition to the above and in respect of the presence of badgers more generally, the following measures will apply throughout the construction phase of the development:

- All machinery will be operated by trained personnel only;
- There will be no working at night; and
- All trenches/excavations will be covered up overnight and a means of escape provided to avoid wildlife becoming trapped.

5.52 Land take associated with the development proposals will, furthermore, result in the permanent loss of agricultural land which provide a foraging resource to badger, whilst construction of built development may limit dispersal of this species across the Application Site. However, those measures for habitat retention, enhancement creation discussed in relation to habitats and bats above will serve to provide a more diverse

foraging resource for badger and other protected/notable species present/potentially present.

Great Crested Newt

5.53 Land take associated with the development proposals will result in the permanent loss of approximately 5.01ha, with habitat losses confined predominantly to the interiors of arable land and improved/poor semi-improved grassland. This is in addition to the partial loss of hedgerow boundary features equating to circa 28m and full removal of hedgerow **H4** (70m), to facilitate the construction of roads and residential plots. Arable land/agricultural grassland is considered to be of limited ecological value to a great crested newt population given its managed nature and/or poor structural and botanical diversity. Hedgerow boundaries and associated wet/dry ditches do, however, provide some opportunities for a great crested newt population with respect to foraging, refuge and dispersal, although the ditch network (where wet) is considered unsuitable as breeding habitat given its poor water quality.

5.54 Whilst no such losses are anticipated within 50m of ponds **P1** and **P3** supporting a low great crested newt population, and thus comprising their 'core territory', some losses are anticipated across 'intermediate habitats', (i.e. those habitats occurring between 50m and 250m of breeding ponds encompassing fields **F2**-**F4**. Such losses are, however, confirmed to arable land and improved/poor semi-improved grassland**,** of limited value to the local great crested newt population. With respect to hedgerow boundaries of value for dispersal and refuge, these have largely been retained throughout the development with losses limited to circa 98m.

5.55 With respect to aquatic habitats, no direct impacts upon ponds **P1** and **P3** supporting a low great crested newt population are anticipated given their location offsite. The wet ditch associated with hedgerow **H2** will likely be culverted to facilitate road access through each development parcel. Impacts associated with habitat loss are likely to be limited given the unsuitability of this ditch for breeding great crested newt (given its poor water quality and limited flora/fauna aquatic communities), although development may limit dispersal of this species east to west across the Application Site via this feature.

5.56 Indirect impacts upon offsite pond **P1** may also arise as a result of surface water runoff affecting water quality during the construction phase, given its close proximity to the development footprint. Additionally, increased levels of traffic movements by vehicles, machinery and plant throughout the construction phase could increase the potential risk of road casualties upon this species, particularly when constructing access roads and removing vegetation across which species disperse and forage.

5.57 Given the protection afforded to great crested newt, the removal of habitat considered likely in use by great crested newt will be undertaken in accordance with the measures detailed within an approved NE EPS Mitigation Licence, or in accordance with conditions of a district licence scheme in operation across the County. Pre-commencement mitigation for great crested newt may include the following:

- Prior enhancement of an onsite receptor area through creation of hibernacula and refugia and sensitive interim habitat management prior to commencement of any vegetation clearance works so as to increase structural diversity and maximise existing carrying capacity for great crested newt;

- Installation of great crested newt exclusion fencing around the perimeter of each proposed development parcel within 250m of ponds, enclosing all habitats likely to support great crested newt to be lost/disturbed whilst maintaining connectivity for dispersal of a great crested newt populations across habitats to be retained;

- The installation of internal drift fencing within trapping compartments, followed by the trapping and translocation of the great crested newt population within 250m of ponds to the identified receptor site outside of the construction footprint; and

- Phased vegetation clearance of the Application Site under ecological watching brief during and upon completion of a translocation programme.

5.58 As discussed above in relation to habitats, bats and breeding bird, habitat loss will, be mitigated for through the provision of circa 2.9ha of green open space across undeveloped arable land, a minimum, 2.55ha of which will be designed to accommodate new habitats including wildflower meadow grassland and shrub planting which will be subject to long-term management for the local great crested newt population.

5.59 Of the total circa 5.01ha of arable land proposed for loss above, circa 0.88ha comprises suitable drainage features which will be integrated with proposed areas of open green space and landscape to delivering additional habitat for great crested newt. Additional proposals for habitat creation include:

- The creation of new species-rich hedgerows along the northern, eastern and south-western extents of the Application Site amounting to circa 670m; and

- The enhancement of the existing hedgerow resource through infill planting of gaps with a diverse native species mix.

5.60 Additionally, the design of road infrastructure should include the use of 'amphibian friendly' wildlife kerbs, in addition to locating gully pots no less than 10cm away from the kerb line necessary to minimise entrapment of great crested newt within gully pots whilst maintaining connectivity across the Application Site, thereby ensuring no harm/injury to a great crested newt population during the operational phase of development.

Common Reptiles and Other Notables Species

5.61 All species of common reptile (including common lizard (*Zooctoca vivipara*), slow-worm (*Anguis fragilis*), grass snake (*Natrix natrix*) and adder (*Vipera berus*) receive at least limited protection from harm under the Wildlife and Countryside Act 1981 (as amended), making it an offence to cause intentional killing and injuring of these species. In addition, these species are also listed as priority species.

5.62 Habitat losses are confined to former arable crop and agricultural grassland of limited quality and structural diversity. As such, habitats lost to the development footprint are considered to be of negligible value to common reptile species. Nevertheless, hedgerow boundaries and associated field margins where present provides some opportunities for a small common reptile population. As such, a precautionary approach to habitat clearance is recommended to ensure no harm to these species, as well as other priority species such as European hedgehog potentially present.

5.63 Prior to clearance, all potential refuges should be inspected, and wildlife allowed to move outside of the construction footprint towards retained vegetation. Clearance of any suitable vegetation should be undertaken in accordance with the following precautionary methods of working:

- Vegetation clearance should be undertaken during the spring, summer and autumn months so as to avoid key hibernation periods such as for common reptiles and European hedgehog (typically considered to be between October-March);

- With respect to grassland habitat, a first cut should aim to reduce vegetation height to no less than 200mm and should be undertaken through the use of a hand-held strimmer or brush cutter. The second cut should be undertaken thereafter and within 24 hours of the initial cut, during which the vegetation should be reduced to ground level;

- With respect to woody vegetation, trees, shrubs and scrub to be removed will be subject to pre-commencement checks for nesting birds as previously described above, before being cut down to heights of between 30cm and 50cm above ground level and in a direction towards retained vegetation. Thereafter, below ground vegetation including large root balls will be grubbed out in a sensitive manner to ensure no significant disturbance to soil and adjacent, retained planting. Any such excavations that occur within the root protection zone of retained vegetation will be undertaken by hand and backfilled as soon as possible or temporarily lined with polyethylene sheet to reduce evaporation;

- Both cuts should be undertaken in a direction towards retained habitats, i.e. towards the site's boundary features, so as to allow for any wildlife present to disperse safely towards this resource; and

- Any suitable refugia identified during clearance works will be subject to a finger-tip search by a suitably experience ecologist with any species identified re-located to areas of retained vegetation. Thereafter, refugia will be dismantled by hand.

Summary of Predicted Impacts and Principal Mitigation Measures

5.64 The potential impacts on valued ecological features (accounting for inherent mitigation), and recommended additional mitigation measures, in line with legislative and planning policy requirements, are summarised in **Table EDP 5.1**.

Table EDP 5.1: Summary of Ecological Impacts and Proposed Mitigation Measures

Feature	Impacts in Absence of Inherent Mitigation	Inherent mitigation	Additional mitigation and/or enhancement
Bishop's Hill Woods SSSI and SNCI	Degradation through increased recreational pressure following occupation.	Provision of open green space within development footprint to offset recreational impacts.	Habitat creation, enhancement and management of onsite habitats. Maintenance and management where necessary.
Lower Woods SSSI and Wetmoor Complex SNCI and Lower Woods Avon Wildlife	Degradation through increased recreational pressure following occupation.	Provision of open green space within development footprint to offset recreational impacts.	Habitat creation, enhancement and management of onsite habitats. Maintenance and management where necessary.
Tributary of Ladden Brook SNCI	Deterioration in water quality.	Implementation of a sustainable drainage strategy.	Implementation of pollution prevention measures during construction.
Native hedgerows	Loss of circa 98m. Potential damage of retained features and root protection zones during the construction phase. Continued degradation of habitats following occupation as a result of recreational disturbance.	Habitat retention and buffering.	Installation of protective fencing and signage along retained trees. Habitat creation, enhancement and management of onsite habitats. Maintenance and management where necessary.
Bats	Loss of potential foraging habitat. Loss of circa 98m hedgerows of value for commuting. Disturbance impacts arising from elevated lighting and noise during both the construction and operation phase.	New hedgerow/ tree/shrub planting to enhance retained boundary features. Provision of grassland habitat within the development will provide new foraging habitat.	Habitat creation, enhancement and management of onsite habitats. Maintenance and management where necessary. New planting will use native species preferably of local provenance. Implementation of a sensitive lighting strategy.

Feature	Impacts in Absence of Inherent Mitigation	Inherent mitigation	Additional mitigation and/or enhancement
Great Crested Newt	Killing/injury during the construction phase. Disturbance during both construction and operation. Disturbance impacts arising from elevated lighting and noise during both the construction and operation phase. Loss of habitat for foraging, dispersal and refugia.	Habitat retention, buffering and creation.	Adoption of precautionary working measures during construction in accordance with an EPS Mitigation Licence or District Licensing Scheme. Translocation of a great crested newt population to a receptor site (if required). Habitat creation, enhancement and management of onsite habitats. Maintenance and management where necessary.
Breeding birds, Badger, Common Reptiles & Notable Mammals	Killing/injury during the construction phase. Disturbance during both construction and operation. Disturbance impacts arising from elevated lighting and noise during both the construction and operation phase. Loss of foraging habitat.	Habitat retention, buffering and creation.	Adoption of precautionary working measures during construction. Habitat creation, enhancement and management of onsite habitats. Maintenance and management where necessary.

This page has been left blank intentionally

Section 6
Summary and Conclusions

6.1 This section of the Ecological Appraisal summarises the Ecology Strategy for the proposed development, in terms of inherent and recommended additional mitigation measures, and then provides the overall conclusions of the Appraisal.

Summary of Ecology Strategy

Inherent Avoidance, Mitigation and Enhancement Measures Proposed and Further Recommended Detailed Design Measures

6.2 Proposed inherent avoidance, mitigation and enhancement measures incorporated within the development proposals include the following:

- Retention of hedgerow boundaries as far as possible with a focus on maintaining connectivity throughout the Application Site for the continued dispersal of wildlife. Retained hedgerow habitat should be offset from development through the inclusion of habitat buffers incorporating new shrub and grassland habitat;
- The retention of trees **T2**, **T4-5**, **T7** and **T9** with low-moderate bat roost potential;
- The creation of new species-rich hedgerows along the northern, eastern and south-western extents of the Application Site amounting to circa 670m;
- The provision of community allotments amounting to circa 0.09ha to deliver recreational and social benefits to new residents whilst also providing further potential opportunities for such species and common reptiles;
- The provision of new tree, shrub and grassland planting across the built development footprint to soften the edges of development and provide multifunctional benefits to biodiversity, visual amenity and climate regulation; and
- The siting of proposed development across those habitats of predominantly limited ecological value, namely those improved grassland and arable fields subject to intensive agricultural management.

6.3 Additional detailed design measures proposed for incorporation within the detailed layout at the Reserved Matters stages include:

- The enhancement of the existing hedgerow network (where retained) through gap and infill planting utilising native hedgerow species of local provenance;

- The creation of species-rich wildflower grassland habitats subject to sensitive management within areas of informal green open space that compliments and connects with existing habitats in the local area;

- Provision of sustainable drainage features designed to benefit biodiversity through appropriate design, planting and management of surrounding green open spaces;

- Incorporation of a range of bat, bird boxes upon suitable trees and for integration within built form where appropriate so as to provide new roosting and nesting opportunities across the Application Site;

- Provision of a sufficient quantum of good-quality, well-connected and multifunctional green infrastructure in the form of informal and formal areas of greenspace available for recreational use and mitigation planting across the Application Site so as to minimise additional recreational pressure upon any nearby statutory and non-statutory designations; and

- The appropriate management of formal and informal access across areas of green open space onsite, particularly where traversing through sensitive habitats to be retained, restored or created specifically for biodiversity.

Construction Measures

6.4 Additionally, it is recommended that the following precautionary working measures are followed during the construction phase of the development:

- Installation of protective fencing and appropriate signage along/around trees to be retained prior to commencement of works, with no storage of material, plant or spoil adjacent to or within such protection zones;

- Measures to prevent adverse changes to water quality on and immediately adjacent to the Application Site during the pre-construction and construction period, with reference to the Environment Agency's Pollution Prevention Guidelines, including PPG1 'General guide to the prevention of pollution', PPG5 'Works and maintenance in or near water', PPG6 'Pollution prevention guidance for working at construction and demolition sites', and PPG21 'Pollution incident response planning';

- Given the protection afforded to all breeding birds, their nests, eggs and young, it is advised that any vegetation clearance required during the construction phases of development be timed to avoid the main bird breeding season as far as possible (i.e. March to August inclusive). Should this seasonal constraint prove impracticable; however, then a prior check for active bird nests should be undertaken by a suitably qualified ecologist with their advice followed thereafter with respect to the extent of clearance allowable; and

- Adherence to precautionary working measures with respect to badger, common reptiles and other mammals, with implementation of development in accordance with a NE mitigation Licence or District Licence Scheme, in respect of great crested newt.

Overall Conclusions

6.5 EDP's desk-based and field-based baseline investigations, have demonstrated that those habitats and species present within and around the Application Site do not pose a significant ecological constraint to the proposed development that is the subject of this Appraisal.

6.6 More specifically, development proposals will require the loss of arable land and grassland of negligible ecological value. Such losses are to be compensated for through the creation of new grassland habitat in addition to the planting of new hedgerows, trees and shrubs across the Application Site. As such, no significant adverse effects upon the ecological integrity of habitat features, are considered likely to arise.

6.7 Such habitats are, however, considered suitable for a local bat assemblage, breeding birds, badger, great crested newt, common reptiles and notable mammals. Accordingly, EDP has contributed to the design of the masterplan assessed by this report. Specific proposals for the avoidance, mitigation and compensation of any predicted impacts include, where possible, the retention, protection and enhancement of those features of greater ecological importance. This is in addition to the inclusion of open green space within the development to be managed for both biodiversity and recreation, and additional landscape planting. Further specifications regarding sensitive working methodologies and best working practices during the construction phase should also be incorporated to avoid impacts upon retained habitats and ensure the avoidance of harm/injury and disturbance to protected species present/potentially present.

6.8 Overall, therefore, and given the scope of those proposed mitigation measures, EDP considers that the scheme is capable of compliance with relevant planning policy for the conservation of the natural environment at all levels.

This page has been left blank intentionally

Appendix EDP 1
Framework Masterplan
(Turley, 3001 E, August 2021)

This page has been left blank intentionally

KEY

- Site Boundary (7.89 ha/19.49 ac)
- Residential Development (4.46 ha/11.02 ac)
- Area reserved for potential shop extents - to be confirmed (0.15 ha)
- Open Space including Informal Recreational and Natural & semi-natural urban green space (3.2 ha)
- Allotments (0.09 ha)
- PROW (public rights of way)
- Primary Roads
- Areas of boundary to be bolstered with additional Planting
- Existing Hedgerow
- Existing Trees
- Proposed Pumping Station
- 1 Proposed Access Points
- 2 Proposed LAP (local area of play)
- 3 Proposed LEAP (local equipped area of play)
- 4 Proposed attenuation basin
- 5 Proposed swale

c.180 homes @ 40dph net

CLIENT:
Bloor Homes

PROJECT:
Land at Wickwar

DRAWING:
Framework Masterplan

PROJECT NUMBER:
BLOA3039

DRAWING NUMBER: **3001**

CHECKED BY: **CD/LN**

REVISION: **H**

STATUS: **DRAFT**

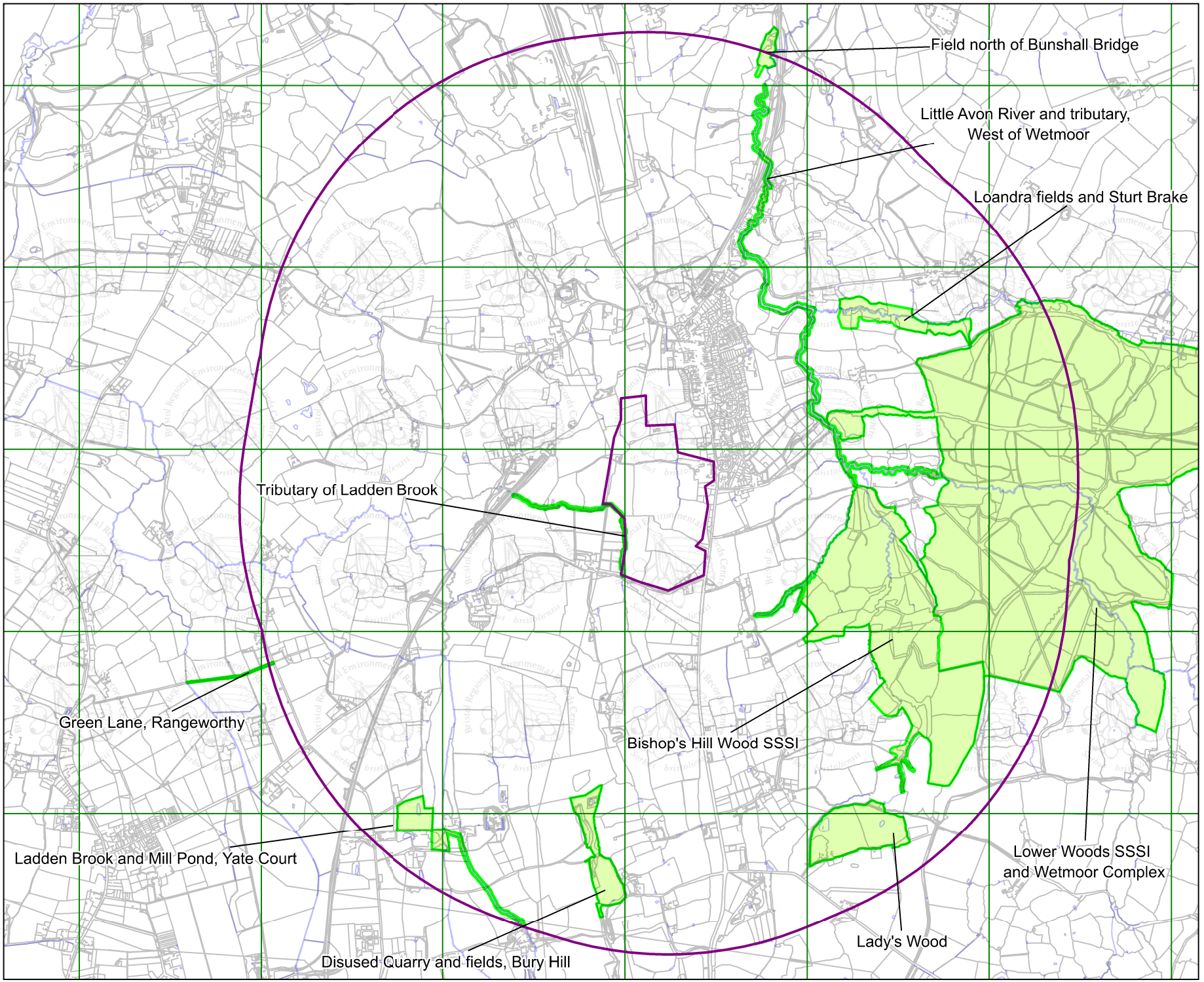
DATE: **07/09/2021**

SCALE: **1:2500 @ A3**

Turley

Appendix EDP 2
Non-statutory Designations

This page has been left blank intentionally



Enq 0289

South Farm

SNCI

2km buffer

N

Compiled by BRERC on 17/02/2020

BRERC
Blaise Castle House Museum
Henbury Rd
Bristol
BS10 7QS

Bristol Regional Environmental Records Centre
Sorbus bristoliensis

Appendix EDP 3
Habitat Descriptions

Methodology

A3.1 The principal habitats within the Application Site together with their dominant/characteristic plant species were identified during the Extended Phase 1 survey and hedgerow assessment.

A3.2 The survey technique adopted for the initial habitat assessment was at a level intermediate between a standard Phase 1 survey technique[19], based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 survey. This level of survey does not aim to compile a complete floral and faunal inventory for the Application Site.

A3.3 The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present therein. Additionally, any actual or potential protected or priority species/habitats[20] are identified and scoped.

A3.4 The Extended Phase 1 survey was undertaken by a suitably experienced surveyor on 04, 12 and 13 March 2020 with a further update assessment undertaken on 22 January 2021.

A3.5 The principal habitat features within the Application Site (identified through site survey) are illustrated on **Plan EDP 1**, with illustrative photographs provided below.

Limitations

A3.6 March and January are considered to be within the sub-optimal period for undertaking an Extended Phase 1 survey. However, given the nature of habitats within the Application Site, being dominated by agricultural land, coupled with repeat visits to the site by suitably qualified ecologists throughout the summer months, this is not considered a constraint to this the outcome of this assessment.

A3.7 This survey was limited to recording plant species present in both vegetative and floristic forms at the time of survey. The lack of a species being recorded from this survey does not conclude absence from the site.

---

19 Joint Nature Conservation Council (2004) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit* (reprinted with minor corrections for original Nature Conservancy Council publication).

20 Priority species and habitats comprise those of Principal importance for the purpose of conserving biodiversity, as listed under Section 41 (England) of the NERC Act (2006).

Results

Arable

A3.8 Field **F1** comprising the Application Site is represented by arable crop which at the time of survey had been ploughed and re-seeded over autumn/winter. Field margins are typically narrow (less than 1m) and characterised by a species-poor grassland sward. Arable land is considered to be of negligible ecological importance, albeit provides a potential foraging resource for protected and notable species including a bird assemblage and badger.

Photo EDP 1: Field **F1** comprising arable land.

Improved Grassland

A3.9 Fields **F2-F4** are characterised by cattle grazed, improved grassland. A grassland sward is dominated by perennial rye-grass (*Lolium perenne*) and white clover (*Trifolium repens*) with occurrences of annual meadow grass (*Poa annua*), creeping buttercup (*Ranunculus repens*), false oat-grass (*Arrhenatherum elatius*), dandelion (*Taxacum officinalis*), spear thistle (*Cirsium vulgare*) and common bent (*Agrostis capillaris*). Common nettle (*Urticia dioecia*) and broadleaved dock (*Rumex obtusifolius*) were also recorded. Improved grassland habitat is considered to be of limited/negligible ecological value given its poor floristic and structural diversity and regular management.

Photo EDP 2: Field **F2**.

Photo EDP 3: Field **F4**.

Poor Semi-improved Grassland

A3.10 Field **F5** located in the far south-eastern corner of the Application Site is characterised by a relatively taller grassland sward subject to light grazing by goats and horses. Perennial rye-grass is less dominant, representing less than circa 25% of the grassland community. Here, false oat grass, cock's-foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lunatus*), red fescue (*Festuca rubra*), common bent, annual meadow grass, creeping buttercup and cow parsley (*Anthriscus slyvaticus*) are also present. Poor semi-improved grassland habitat is considered to be of limited/negligible ecological value given its poor floristic, structural diversity and limited extent.

Dense and Scattered Scrub

A3.11 Scrub habitat recorded onsite was largely limited to scattered patches of bramble around agricultural buildings associated with South Farm. Dense and scattered scrub is considered to be of negligible ecological importance given its limited extent, low distinctives and low diversity.

Native Hedgerows

A3.12 Field boundaries are delineated by native hedgerows, the vast majority of which are subject to regular management and measure approximately 2m high and 1.5-2m wide. Several of these are associated with a ditch and/or supporting mature trees. The vast majority of the hedgerow network is species-poor and dominated by hawthorn (*Crataegus monogynea*) and blackthorn (*Prunus spinosa*) with local occurrences of elm (*Ulmus sp.*), ash (*Fraxinus excelsior*), holly (*Ilex aquifolium*) and elder (*Sambuca nigra*).

A3.13 Hedgerows **H4** - **H6**, **H8** - **H9** and **H13** are comparatively species-rich supporting five or more woody species, again dominated by blackthorn, hawthorn and elm with occurrence of cherry (*Prunus avium*), dog-rose (*Rosa canina*), hazel (*Corylus avellana*), alder (*Alnus glutinosa*), and oak (*Quercus robur*) in addition to elder, holly and ash. A ground flora community is typically dominated by common ivy (*Hedera helix*), although woodland indicator species such as lords and ladies (*Arum maculatum*), dog's mercury (*Mercurialis perennis*), herb-Robert (*Geranium robertianum*) and bluebell (*Hyacinthoides non-scripta*) occur throughout the hedgerow network.

Photo EDP 4: Native hedgerow with mature trees.

A3.14 Hedgerows comprise priority habitats of principal importance, whilst the hedgerows onsite form a relatively strong and well-connected network both onsite and to the wider landscape. Such features are thus of ecological value and have potential to support a number of protected and notable species (as further detailed below).

Scattered Trees

A3.15 Scattered trees were frequently recorded across the Application Site, with the majority of standards associated with the hedgerow network. Species primarily comprise mature pedunculate oak (*Quercus robur*) with occasional standards of mature and semi-mature ash and alder. Mature trees standards are of an age to be ecologically valuable in themselves but also provide potential habitat for nesting birds and roosting bats.

Wet/Dry Ditches

A3.16 Several field boundaries are characterised by wet and dry ditches in association with the hedgerow network on site. Dry ditches (**D1** and **D7**) are typically 1m wide with vertical banks less than 1m high and likely only hold water during periods of heavy rain flow.

A3.17 **D2** and **D3** are permanently wet throughout the year. **D3** in particular is a relatively wide (2m wide) and deep (1m deep) ditch with a fast water flow and channel substrate dominated by silt. The water was turbid at the time of survey with the ditch accessible to cattle.

Photo EDP 5: Weet ditch **D3**.

A3.18 The ditch network onsite is considered to be of no more than Site level importance given its low distinctiveness with no diverse macrophyte assemblage or a distinct riparian buffer and poor water quality.

Appendix EDP 4
Hedgerow Survey

Methodology

A4.1 Hedgerows on site were assessed by an experienced ecologist on 22 January 2021 for their importance following the Wildlife and Landscape criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997.

A4.2 The aims of the hedgerow assessment were to:

- Identify hedgerows that are classified as 'important' under the Wildlife and Landscape criteria of the Hedgerows Regulations (1997); and

- Identify hedgerows that, although not deemed 'important' under the ecological criteria of the Hedgerow Regulations (1997) have ecological value in terms of species diversity or as potential wildlife corridors.

A4.3 A total of 15 hedgerows (**H1** - **H15**), as illustrated on **Plan EDP 1**) located within the Application Site were surveyed, these hedgerows qualifying for assessment by being assessed to be greater than 30 years of age, being located adjacent to land in agricultural/horticultural use and exceeding 20m in length or by being connected at both ends to another hedgerow of any length.

A4.4 The middle 30m of all hedgerows up to 100m in length were surveyed, whilst two 30m sections were surveyed for hedgerows up to 200m in length where access was possible. For hedgerows exceeding 200m in length, three 30m sections were surveyed.

A4.5 Hedgerows are considered important should the hedgerow be referred to in a record held by a biological records centre as containing protected plants (within 10 years) or birds and animals (within 5 years), contain species listed in Schedule 5 (animals) and 8 (plants) of the Wildlife and Countryside Act 1981 (as amended), birds categorised as declining breeders[21], or any species categorised as 'endangered', 'extinct', 'rare' or 'vulnerable' by any of the British Red Data Books, or contain one of the following per average 30m section surveyed:

- Seven Schedule 3 species;

- Six Schedule 3 species and three listed features (see below);

[21] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746. Available online at britishbirds. co.uk/wp-content/uploads/2014/07/BoCC4.pdf

- Six Schedule 3 species, including one of the following: Black poplar (*Populus nigra* subsp. *betulifolia*), large-leaved lime (*Tilia platyphyllos*), small-leaved lime (*Tilia cordata*) or wild service-tree (*Sorbus torminalis*);

- Five Schedule 3 species and four listed features; or

- Four Schedule 3 species, two listed features and lying adjacent to a bridleway or footpath.

A4.6 Listed features include:

- A bank or wall which supports the hedgerow along at least half of its length;

- Gaps which together do not exceed 10% of the length of the hedgerow;

- At least one standard tree per 50m of hedge;

- At least three Schedule 2 woodland species within the hedgerow;

- A ditch along at least one half of the length of the hedgerow;

- Connections scoring 4 points or more (1 point per connection of the hedgerow with another, 2 points per connection of the hedgerow to a pond or broad-leaved woodland; or

- A parallel hedge within 15m of the hedgerow.

A4.7 It is recognised that, with reference to the Hedgerow Regulations (1997), certain species of bird or animals listed in the Wildlife and Countryside Act or by the Joint Nature Conservation Committee (JNCC) that could result in a hedgerow being recognised as 'important', may have gone unrecorded due to the timing and nature of the survey. Indeed, the use of the hedgerow by such species may be seasonal or at particular periods during the day. Data gained through the relevant Phase 2 surveys have therefore been included within this assessment.

Limitations

A4.8 January is considered to be within a sub-optimal period for undertaking a hedgerow assessment, particularly in respect of identifying a ground flora community. However, this is not considered to have affected the results of an assessment given relatively species-poor nature of the hedgerow network and those physical features recorded.

Results

A4.9 Of the 15 hedgerows surveyed, only **H6** was considered to qualify as Important given its relative species richness. Overall, the majority of hedgerows recorded across the Application Site were species-poor and subject to frequent management.

Table EDP A4.1: Hedgerow Survey Results.

Criteria	Hedgerow ID									
	H1	**H2**		**H3**	**H4**		**H5**
Hedgerow length (approx.)	65	150		70	148		40
Hedgerow notes	Dense, managed hedgerow, 1m high, 1,5m wide.	Managed hedgerow 1.5m high, 2m wide.		Unmanaged hedgerow covered in bramble, 2.5m high, 1,5m wide.	Hedgerow marks boundary of residential curtilage with variable management regime.		Dense hedgerow with one side only managed, 3m high, 2m wide.
Schedule 3 woody species noted	Hawthorn, ash, blackthorn, cherry.	Hawthorn, blackthorn elm.	Hawthorn, cherry.	Hawthorn, blackthorn.	Hawthorn, blackthorn dog-rose elm, hornbeam.	Hawthorn, blackthorn dog-rose, elder, ash.	Hawthorn, blackthorn, hornbeam, cherry, alder.
Average number of Schedule 3 woody species	4	3		2	5		5
Black-poplar, wild service-tree, large-leaved lime or small-leaved lime?	N	N		N	N		N
Schedule 2 woodland species	Herb-Robert, lords-and ladies, dog's mercury, bluebell.	Herb-Robert, lords-and ladies, dog's mercury, bluebell.		Herb-Robert, lords-and ladies, dog's mercury, bluebell.	Herb-Robert, lords-and ladies, dog's mercury, bluebell.		Herb-Robert, lords-and ladies, bluebell.
3 woodland species?	Y	Y		Y	Y		Y
Other ground flora species present	Common ivy, bramble, ground ivy.	Common nettle, common ivy, dock, ground ivy.		Common nettle, common ivy, dock, cleaver, ground ivy.	Common ivy, cleavers, lesser celandine, bramble.		Common ivy, cleavers, bramble.
Supporting bank/wall along at least 50% of hedgerow?	N	N		N	N		N
Ditch along at least 50% of hedgerow?	Y	Y		N	N		N

Criteria	Hedgerow ID				
	H1	**H2**	**H3**	**H4**	**H5**
Total proportion of gaps in hedgerow less than 10% of hedgerow length?	Y	Y	Y	Y	Y
At least one standard tree per 50 of hedgerow?	Y	N	Y	N	Y
Parallel hedge present?	N	N	N	N	N
Hedgerow adjacent to a bridleway/ footpath/ byway?	N	N	N	N	N
Number of connection points?	2	3	2	1	2
Hedgerow 'Important'?	N	N	N	N	N

Criteria	Hedgerow ID				
	H6	**H7**	**H8**	**H9**	**H10**
Hedgerow length (approx.)	40	90	165	30	90
Hedgerow notes	Infrequently managed hedgerow with 2 mature trees, 2m high, 2m wide	Infrequently managed hedgerow with 2 mature trees, 2m high, 2m wide	Managed hedgerow 1.5m high, 1.5m wide	Managed hedgerow forming boundary with residential garden, 2m high, 1.5m wide	Managed hedgerow forming boundary with residential garden, 2m high, 1.5m wide
Schedule 3 woody species noted	Hawthorn, blackthorn, elm, alder, ash, holly.	Hawthorn, blackthorn, hazel.	Hawthorn, blackthorn elm, dog-rose, ash. / Hawthorn, blackthorn holly.	Hawthorn, blackthorn, ash, dog-rose, alder.	Hawthorn, blackthorn, dog-rose, ash.
Average number of Schedule 3 woody species	6	3	4	5	4
Black-poplar, wild service-tree, large-leaved lime or small-leaved lime?	N	N	N	N	N

Criteria	Hedgerow ID				
	H6	**H7**	**H8**	**H9**	**H10**
Schedule 2 woodland species	Herb-Robert, lords-and ladies, bluebell.	Herb-Robert, lords-and ladies, bluebell.	Lords-and ladies, bluebell.	Herb-Robert.	Herb-Robert.
3 woodland species?	Y	Y	N	N	N
Other ground flora species present	Common ivy, bramble, cleaver.	Common ivy, bramble, ground ivy.	Common nettle, common ivy, bramble, cleaver, ground ivy.	Common ivy, cleavers, dock.	Common ivy, cleavers, dock.
Supporting bank/wall along at least 50% of hedgerow?	Y	Y	N	N	N
Ditch along at least 50% of hedgerow?	N	N	N	N	N
Total proportion of gaps in hedgerow less than 10% of hedgerow length?	Y	Y	Y	Y	Y
At least one standard tree per 50 of hedgerow?	Y	Y	N	Y	Y
Parallel hedge present?	N	N	N	N	N
Hedgerow adjacent to a bridleway/ footpath/ byway?	N	N	N	N	N
Number of connection points?	3	4	4	3	2
Hedgerow 'Important'?	**Y**	N	N	N	N

Criteria	Hedgerow ID				
	H11	**H12**	**H13**	**H14**	**H15**
Hedgerow length (approx.)	70	200	295	70	173
Hedgerow notes	Non-native line of coniferous trees	Managed hedgerow 1.5m high, 1m wide	Managed hedgerow 1.5m high, 1.5m wide	Managed hedgerow 1.5m high, 1.5m wide	Managed hedgerow 1.5m high, 1.5m wide

Criteria	Hedgerow ID								
	H11	H12			H13			H14	H15	
Schedule 3 woody species noted		Hawthorn, blackthorn ash, dog-rose.	Hawthorn, blackthorn.	Hawthorn, blackthorn.	Hawthorn, blackthorn oak.	Hawthorn, blackthorn oak.	Hawthorn, blackthorn oak.	Hawthorn, blackthorn, elder.	Hawthorn blackthorn elder.	Hawthorn blackthorn elder.
Average number of Schedule 3 woody species		3			3			3	3	
Black-poplar, wild service-tree, large-leaved lime or small-leaved lime?		N			N			N	N	
Schedule 2 woodland species		Herb-Robert, lords-and ladies, dog's mercury, bluebell.			Herb-Robert, lords-and ladies.			Herb-Robert, lords-and ladies, dog's mercury.	Herb-Robert, lords-and-ladies.	
3 woodland species?		Y			N			Y	N	
Other ground flora species present		Bramble, ground ivy.			Bramble, ground ivy.			Common ivy, cleavers.	Common ivy, cleavers.	
Supporting bank/wall along at least 50% of hedgerow?		N			N			N	N	
Ditch along at least 50% of hedgerow?		Y			N			Y	Y	
Total proportion of gaps in hedgerow less than 10% of hedgerow length?		N			Y			Y	Y	
At least one standard tree per 50 of hedgerow?		Y			N			N	N	
Parallel hedge present?		N			N			N	N	
Hedgerow adjacent to a bridleway/ footpath/ byway?		N			N			N	N	
Number of connection points?		5			4			4	2	
Hedgerow 'Important'?		N			N			N	N	

This page has been left blank intentionally

Appendix EDP 5
Breeding Bird Surveys

Methodology

A5.1 The Application Site comprises areas of mixed farmland and therefore has the potential to support a notable assemblage of breeding birds including declining farmland species. A full breeding bird survey (BBS) was therefore undertaken with reference to standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach. This involves the completion of three visits to the Application Site, undertaken between April and July, i.e. at the height of the breeding bird season for lowland Britain.

A5.2 Breeding bird surveys were completed on three occasions during the main bird breeding season, on 20 April, 27 May and 18 June 2021. Following best practice guidelines, survey visits were spaced approximately 3-4 weeks apart and timed to start around first light to coincide with the period of peak activity for birds, most particularly passerine songbird species.

A5.3 The survey methodology involved walking to within c.50m of all parts of the Application Site and recording all birds listed within the Birds of Conservation Concern 4 report[22] and their activity status, with a particular emphasis placed upon those elements considered to relate to, or be indicative of, breeding. This ensured that the survey identified all birds using the margins of the site, as well as those in the interior.

A5.4 To provide further detail with regard to the total assemblage of bird species present within the Application Site, a list of all other bird species recorded (i.e. those that are not considered to be of conservation concern) was made for each survey visit.

A5.5 The dates and timings of the survey visits and the weather conditions encountered are summarised in **Table EDP A5.1**.

Table EDP A5.1: Date, Timing and Weather Conditions during the Breeding Bird Survey Visits.

Visit No.	Date	Cloud (%)	Rain	Wind	Temp (°C)	Visibility
1	20.04.2021	30-60	None	Light	11.0	Good
2	27.05.2021	30-60	None	Light	10.0	Good
3	18.06.2021	100	None	Light	13.0	Good

A5.6 Following the completion of the breeding surveys, the breeding status of each bird species identified was determined according to the nature and frequency of the elements recorded, as set out in **Table EDP A5.2**.

[22] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds, Vol. 108, 708-746.

Table EDP A5.2: Summary of Field Evidence used to Determine Breeding Bird Status.

Status	European Bird Census Council (EBCC) Criteria for Categorisation of Breeding Status
Confirmed	• Distraction-display or injury feigning; • Used nest or eggshells found (occupied or laid within period of survey); • Recently fledged young (nidicolous species) or downy young (nidifugous species); • Adults entering or leaving nest-site in circumstances indicating occupied nest (including high nest or nest-holes, the contents of which cannot be seen) or adult seen incubating; • Adult carrying faecal sac or food for young; • Nest containing eggs; and • Nest with young seen or heard.
Probable	• Pair observed in suitable nesting habitat in breeding season; • Permanent territory presumed through registration of territorial behaviour (song, etc.) on at least two different days a week or more apart at the same place; • Courtship and display; • Visiting a probable nest site; • Agitated behaviour or anxiety calls from adults; • Brood patch on adult examined in the hand; and • Nest building or excavating nest-hole.
Possible	• Species observed in breeding season in possible nesting habitat; and • Singing male(s) present (or breeding calls heard) in breeding season.
Non-breeder	• Feeding birds only; • Birds flying over only; and • Lack of suitable breeding habitat.

A5.7 An assessment of the individual bird species recorded within the Application Site, as well as the overall assemblage, has been made with reference to the national conservation status of the different breeding species according to the following key lists/criteria:

- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) – affords greater protection to certain breeding species that are considered appropriately at risk nationally and are listed additional protection under Schedule 1 accordingly;

- Birds of Conservation Concern 5 (BoCC5) - Under this approach UK bird populations are assessed, using quantitative criteria, to determine the population status of each species and then placed on one of three lists; Red, Amber or Green:

    - Red list species are of high conservation concern, being either globally threatened, having historical UK population declines between 1800 and 1995 or a rapid population decline, or breeding range contraction by 50% or more in the last 25 years;

    - Amber list species are of medium conservation concern due to a number of factors, for example having suffered between 25% and 49% contraction of UK breeding range or a 25-49% reduction in breeding or non-breeding populations

over the last 25 years. Species which have a five year mean of 1-300 breeding pairs in the UK, or an unfavourable European conservation status, or for which the breeding population in the UK represents 20%, or more of the European breeding populations are also listed on the Amber list; and

- Green list species have a favourable conservation status.

- Priority Species.

Limitations

A5.8 The survey visits were carried out at an appropriate time of year for the locality, and in suitable weather conditions. It is therefore considered that the results provide a representative overview of the breeding bird interest within and adjacent to the Application Site.

A5.9 Surveys were also undertaken during suitable weather conditions, i.e. days/periods with strong winds and heavy or persistent rain were generally avoided. It is therefore considered that the results are not significantly limited by seasonal or climatic factors.

A5.10 It is considered that the level of survey undertaken provides a detailed account of the breeding bird community within the Application Site ea, together with an indication of the breeding abundances of each species. However, it should be noted that this level of survey will typically not provide exact breeding population figures for each species.

A5.11 Due to the relatively low number of survey visits compared to the relatively detailed field evidence required to confirm breeding, the results may offer a range in the breeding population of certain species that is relatively large. This can be particularly true for cryptic or skulking species, or species that inhabit areas that are difficult to access, such as dunnock (*Prunella modularis*) breeding within dense scrub.

Results

Species Richness

A5.12 A total of 30 species of bird, representing 21 families, were recorded during the breeding bird survey visits undertaken of the Application Site during 2021. Of those, 13 (i.e. 43%) are regarded to be of conservation concern within the UK[23] or benefit from legal protection in some way. Six of those species are listed on the Birds of Conservation Concern (BoCC4) Red list and seven on the Amber list. Furthermore, five of those BoCC4-listed species also comprise Priority species. Of these species, two are confirmed to be

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

breeding, three are considered to probably be breeding on-site, two is possibly breeding, and one is considered non-breeder.

A5.13 A summary of all species of conservation concern and Schedule 1 species recorded across the Application Site and their population within the Application Site is provided in **Table EDP A5.3**. The table should be read with reference to **Plans EDP 3a** - **3c** which have been provided to illustrate areas of activity but do not include breeding behaviour.

Table EDP A5.3: A Summary of the Bird Species of Conservation Concern and Schedule 1 Birds Recorded Within the Application Site.

Family	Species	Protection/ UK Status	Application Site Status	Population within the Application Site
Alaudiidae	Skylark (Alauda arvensis)	Red List Section 41	Possible Breeding offsite	Recorded offsite in association with wider land ownership boundary.
Fringillidae	Linnet (*Linaria cannabina*)	Red List Section 41	Confirmed Breeding	Two birds recorded carrying nesting material within southern extents of the Application Site during April 2021. Another two individuals observed along northern boundary of field **F1**. Several individuals recorded across field **F1** in May and June.
Laridae	Lesser Black-Backed Gull (*Larus fuscus*)	Amber List	Non-breeder	Three birds observed in field **F3** and two birds in field **F2** during the first visit in April 2021.
Passeridae	House Sparrow (*Passer domestic's*)	Red List Section 41	Probable Breeding	Two main colonies identified south of South Farm and in association with residential garden adjacent to eastern boundary of Application Site during April 2021 with further occurrences of this species during May and June 2021.
Prunellidae	Dunnock (*Prunella modularis*)	Amber List	Possible Breeding	A max count of between 4-5 singing individuals was recorded throughout the Application Site during the first and second survey.

Family	Species	Protection/ UK Status	Application Site Status	Population within the Application Site
Sturnidae	Starling (*Sturnus vulgaris*)	Red List Section 41	Confirmed Breeding	Nine individuals recorded on first survey visit, south of South Farm. Two sightings of birds with food during the second survey visit across field **F2**.
Turdidae	Mistle Thrush (*Turdus viscivorus*)	Red List Section 41	Probable Breeding	Single mistle thrush recorded within field **F4**.
Columbidae	Woodpigeon (Columba palumbus)	Amber List	Non-breeder	Fly over.
Corvidae	Rook (*Corvus frugilegus*)	Amber List	Non-breeder	Fly over.
Fringillidae	Greenfinch (*Chloris chloris*)	Red List	Non-breeder	Fly over.
Muscicapidae	Wheatear (Oenanthe Oenanthe)	Amber List	Non-breeder	Fly over.
Sylviidae	Whitethroat (*Sylvia communis*)	Amber List	Possible Breeding	Recorded in hedgerow adjacent to Application Site in field on 2 occasions and in association with South Farm on one.
Troglodytidae	Wren (*Troglodytes troglodytes*)	Amber List	Probable Breeding	Evenly distributed across Application Site in association with boundary hedgerows.

A5.14 All species recorded during breeding bird surveys that are not considered to be of conservation concern, along with their level of legal protection and breeding status within the survey area, are listed in **Table EDP A5.4**.

Table EDP A5.4: All non-Schedule 1 and non-BoCC4-listed Birds Recorded During BBS, their Status within the Application Site and their Legal Protection.

Family	Species	Protection/ UK Status	Application Site Status
Accipitridae	Buzzard (*Buteo buteo*)	Green List	Non-breeder
Aegithalidae	Long-tailed tit (*Aegithalos caudatus*)	Green List	Non-breeder
Anatidae	Canada goose (*Branta canadensis*)	Green List	Non-breeder
Corvidae	Carrion crow (*Corvus corone*)	Green List	Non-breeder
	Jackdaw (*Corvus monedula*)	Green List	Non-breeder
	Magpie (*Pica pica*)	Green List	Non-breeder
Fringillidae	Chaffinch (*Fringilla coelebs*)	Green List	Possible Breeding
	Goldfinch (*Carduelis carduelis*)	Green List	Possible Breeding
Hirundinidae	Swallow (*Hirundo rustica*)	Green List	Non-breeder
Motacillidae	Pied wagtail (*Motacilla alba*)	Green List	Non-breeder

Family	Species	Protection/ UK Status	Application Site Status
Muscicapidae	Robin (*Erithacus rubecula)*	Green List	Probable Breeding
Paridae	Blue tit (*Cyanistes caeruleus*)	Green List	Possible Breeding
	Great tit (*Parus major*)	Green List	Possible Breeding
Phasianidae	Pheasant (*Phasianus colchicus*)	Green List	Non-breeder
Phylloscopidae	Chiffchaff (*Phylloscopus collybita*)	Green List	Probable Breeding
Picidae	Great spotted woodpecker (*Dendrocopos major*)	Green List	Non-breeder
Turdidae	Blackbird (*Turdus merula*)	Green List	Non-breeder

Abundance and distribution

A5.15 The majority of birds recorded during the three survey visits are Green-list species[24], mostly common resident and migrant passerines. However, populations of some species of conservation concern do exist within the Application Site, with linnet and starling confirmed breeding onsite.

A5.16 Improved grassland and arable land subject to intensive agricultural management dominates the Application Site. Such areas could offer foraging opportunities to many bird species; however, disturbance from existing management regimes, including grazing by livestock and harvesting of silage and other crops, likely prevents nesting within the fields. Skylark, a ground nesting species was, however, recorded onsite whilst evidence of possible breeding behaviour was identified offsite to the west.

A5.17 Dense scrub, native hedgerows and semi-mature/mature tree standards delineating field boundaries provides a suitable foraging and nesting resource for an assemblage of farmland and more common and widespread garden birds buildings associated with South Farm also provide suitable nesting opportunities for some species. Linnet was confirmed breeding in across the southern extent of the Application Site whilst nesting behaviour was starling nesting behaviour was recorded in the north in the vicinity of South Farm. No schedule 1 species was recorded during survey effort.

Overall Assemblage

A5.18 The assemblage of breeding bird species recorded on-site is considered to be typical for the range and quality of habitats present, and for its geographic and topographic location. From the survey data, a greater assemblage and diversity of birds is present around the hedgerows within and adjacent to the Application Site. Such habitats offer greater opportunities for nesting and foraging birds and for a wider range of species in comparison to the open pasture which dominates the Application Site. Although areas of

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

open, grazed pasture do offer foraging opportunities for many species, disturbance from existing agricultural management regimes prevent nesting within the fields.

A5.19 The overall abundance of birds recorded is not regarded as being important or exceptional for any species. The breeding bird assemblage supported by the Application Site is, therefore, assessed as being of **Local** Importance.

This page has been left blank intentionally

Appendix EDP 6
Bat Surveys

Methodology

A6.1 During the Extended Phase 1 survey, a number of mature trees present within, or immediately adjacent to the Application Site were considered to have the potential to support roosting bats. In addition, a number of habitats present within the Application Site, including mature trees, scattered scrub and hedgerows were identified as having the potential to support foraging and commuting bats whilst habitats within the wider landscape, including Bishop's Hill Wood SSSI 670m east of the Application Site were recognised for their importance in support roosts of Annex II bat species.

A6.2 The following surveys for bats were therefore undertaken with reference to national best practice guidelines[25]:

3. Bat Roosting:

c) Visual assessments of mature trees for bat roosting potential; and

d) Subsequent aerial inspections of mature trees with moderate-high bat roost potential to confirm presence/infer absence of roosting bats.

4. Bat Foraging/Commuting Activity:

c) Manual transect surveys; and

d) Automated detector surveys.

Investigations of Bat Roosting – Trees

A6.3 To determine the potential impacts of the future development upon bats potentially roosting within trees across the Application Site, all suitable trees identified were subject to a ground level visual assessment with reference to current best practice guidance[26].

A6.4 The tree survey involved a ground-based visual assessment of trees for the presence of, or potential to support, roosting bats. The survey was undertaken on 12 and 13 March 2020 by a suitably qualified and NE licensed ecologist. The trees were searched as thoroughly as possible from ground level, with all elevations covered where accessibility allowed.

[25] Collins, J. (ed.) (2016). *Bat Surveys: for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London

A6.5 Suitable features for roosting bats sought for during the assessment included:

- Loss/peeling/fissured bark;
- Natural holes e.g. rot holes and holes from fallen limbs;
- Woodpecker holes;
- Cracks/splits or hollow tree trunks/limbs; and
- Thick-stemmed ivy.

A6.6 Signs of roosting bats sought for included:

- Bat/s roosting *in-situ*;
- Bat droppings within or beneath a feature;
- Staining around or beneath a feature;
- Oily marks (staining) around roost access points;
- Audible squeaking from the roost;
- Large/regularly used roosts or regularly used Sites may produce an odour; and
- Flies around the roost, attracted by the smell of guano.

A6.7 Based upon the results of the visual assessment and features/evidence identified, the following ratings for trees were used during the assessment:

- Known or confirmed roost - European Protected Species Mitigation Licence required for works to tree to be completed lawfully;
- High potential - Tree supports one or more features that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time;
- Moderate potential - Tree supports one or more features that could be used by bats but are unlikely to support a roost type of high conservation status;
- Low potential - Tree supports one or more features that could be used by individual bats opportunistically, or is of sufficient size and age to contain such features; and
- Negligible potential - Negligible features likely to support roosting bats.

Limitations

A6.8 Visual assessments for roosting bats can be undertaken at any time of year. As such these investigations were not limited by seasonal or climatic factors.

A6.9 Bats are mobile animals and will move between a series of different roost sites, frequently establishing and occupying new roost sites depending on seasonal requirements and resources available locally. This survey, therefore, only provides a snapshot of the conditions present at the Application Site at the time of survey.

Investigations of Bat Roosting – Further Detailed Aerial Tree Surveys

A6.10 Following the initial visual assessment for the potential of trees to support roosting bats, further detailed aerial inspections of all trees identified as high and medium potential to support roosting bats were undertaken on 16 June 2021.

A6.11 The aerial tree surveys were completed by a suitably qualified bat licensed ecologist and assistant utilising recognised arboricultural tree climbing techniques facilitated by use of a rope, harness and ladder to allow inspection of potential bat roost features. To inspect hollows and cavities an endoscope (RIDGID CA 300) was used to ensure a full inspection of those features considered suitable to roosting bats.

A6.12 Details of each potential roosting feature were recorded including: the type of feature; location within the tree; height and orientation of feature (north, south, east or west); notes relating to the feature including any evidence of bats; and the potential of each feature to support roosting bats (confirmed roost, high, moderate, low or negligible potential).

Investigations of Bat Foraging/Commuting Activity

Manual Transect Surveys

A6.13 Manual transect surveys were undertaken across the Application Site to identify areas of bat foraging activity and commuting routes used by bats on 7 occasions between April and September 2021. With reference to best practice guidelines, surveys were spread over the course of the active bat season and completed within the optimal survey months of April and September. In accordance with best practice guidelines, surveys were spread over the course of the active bat season and completed within the optimal survey months of April to September inclusive,

A6.14 Full details including the survey type, date, timing, and weather conditions during each of the transect surveys undertaken during 2021 is given in **Table EDP A6.1**.

Table EDP A6.1: Date, timing and weather conditions of bat activity surveys.

Survey date	Dusk/ dawn	Survey time	Sunrise/ sunset time	Weather conditions			
				Temp (°C)	Cloud (%)	Rain	Wind (Beaufort scale)
28.04.21	Dusk	20:28-22:28	20:28	6.0-9.0	95-100	Nil	0-1
21.05.21	Dusk	21:04-22:20	21:04	10.0	100	Heavy	4-5
11.06.21	Dusk	21:26-23:26	21:26	16.0	80-100	Nil	2-4
12.06.21	Dawn	02:52-04:52	04:52	12.0-13.0	20	Nil	1-2
14.07.21	Dusk	21:21-23:21	21:21	18.0-21.1	20	Nil	2
17.08.21	Dusk	20:27-22:27	20:27	17.0	50-100	Nil	1-2
17.09.21	Dusk	19:19-21:19	19:19	17.0-18.0	20-60	Nil	1

A6.15 Manual transect surveys were completed by an experienced bat surveyors across a single transect survey route designed to provide a representative cover of potential foraging or commuting habitats on site; hedgerows, trees and grassland. The transect route was walked at a slow and steady pace with twelve 'listening stops'. All bats were recorded and their behaviour marked on survey maps in order characterise the value of the site and its component habitats to foraging and commuting bats.

A6.16 Activity surveys were conducted using Elekon Batlogger or Anabat SD2 detectors. Observations of the time, location, and activity of all bats seen or heard were noted. Bats were identified on the basis of their characteristic echolocation calls. Species of myotid bat and long-eared bat are difficult to tell apart solely from their echolocation calls and were therefore grouped as such.

Automated Detector Surveys

A6.17 To supplement the bat transect survey data and to provide a more robust assessment of activity by horseshoe bat species (which are often under-recorded by transect surveys), bat activity within the Application Site was also sampled using static bat detectors which automatically trigger and record bat echolocation calls. Anabat SD2 (hereafter referred to as 'Anabats') were deployed in two locations throughout the Application Site.

A6.18 Anabats were deployed for five nights each during April/May, June, July, August and September 2021. The Anabats were fixed in secure locations, with an external microphone attached approximately 1.0-2.5m above ground where possible, and directed away from any trees/branches to maximise detection sensitivity. Minimum night-time air temperatures were recorded by a nearby weather station. **Table EDP A6.2** gives the sampling dates and microphone details for the Anabats deployed during the sampling periods.

Table EDP A6.2: Anabat sampling dates.

Sampling Period	Location Number
28.04.21 – 04.04.21	1
	2
21.05.21 – 26.05.21	1
	2

Sampling Period	Location Number
11.06.21 – 17.06.21	1
	2
14.07.21 – 19.07.21	1
	2
26.07.21 – 31.07.21	2
17.08.21 – 22.08.21	1
	2
15.09.21 – 20.09.21	1
	2

A6.19 The sound files recorded by the Anabats were filtered for each of the UK's bat species/species groups using Analook software's filter function. The parameters for the species filters are based on those proposed by Chris Corben and Kim Livengood[27] and have been fine-tuned using known call parameters for each of the species. All files passing the various filters were checked manually using sonogram analysis in accordance with published guides[28] to confirm the species identification of each bat call.

Limitations

A6.20 Due to climatic and environmental factors in the immediate vicinity of each of the Anabat locations, the sensitivity of each Anabat had to be adjusted and was therefore not consistent across all locations. This can affect the number of bat calls recorded by each detector and has been taken into account when describing bat activity levels in the results section.

A6.21 In addition, the identification of calls and species using Analook software is dependent upon the quality of the recording made which can be influenced by the following factors, which may limit levels of activity and species recorded:

- Weather conditions – rainfall and wind;
- Distance of bat from Anabat;
- Presence of obstructions through which the noise must pass i.e. trees; and
- Proximity of other noise sources such as roads.

A6.22 Night-time temperatures during the manual transect survey in April 2021 were unseasonably cold which will have suppressed bat activity. Indeed, no bat activity was recorded during the survey. Poor weather was recorded during manual transect survey in May 2021 such that the survey was aborted.

[27] Taken from Analook W training course and workshop, September 2013
[28] Russ (2012). *British Bat Calls, a guide to species identification*. Pelagic Publishing, Exeter

A6.23 The Anabat at location 2 failed during the July deployment. As such this Anabat was redeployed on a second occasion during July 2021.

Results

Investigations of Bat Roosting – Trees

A6.24 With respect to mature trees present across the Application Site, including within the hedgerow network and in association with the Application Site's boundaries, an initial ground level inspection for features with bat roosting potential confirm the presence of trees with low, moderate and high bat roost potential.

A6.25 One tree is considered to have high potential to support roosting bats (**T4**), whilst five trees are considered to have moderate potential (**T1** - **T3** and **T6** - **T8**) and two trees considered to have low potential (**T5** and **T9**). All trees are associated with the Application Site's hedgerow boundaries.

Investigations of Bat Roosting –Detailed Aerial Tree Surveys

A6.26 Following further detailed aerial inspections of those trees with moderate-high potential on 16 June 2021, no bats or evidence of bats were seen during the visual inspections. Tree **T2** and **T3** were reconfirmed to be of moderate potential to support roosting bats, whilst **T4** was downgraded from high to moderate potential, **T1** and **T7** downgraded from moderate to low potential, and **T6** and **T8** downgraded from moderate to negligible. The findings of the tree assessment are summarised within **Table EDP A6.3** and illustrated at **Plan EDP 1**.

Table EDP A6.3: Summary of the findings of the bat tree assessment.

Tree ID	Species	Potential Roosting Features (PRFs) Identified/Inspected	Bat Roosting Potential
T1	Oak (*Quercus robus)*	Hazard beam in limb circa 6.5m high on south-west elevation. Cobwebs recorded within PRF during aerial inspection.	Low
T2	Oak (*Quercus robus)*	Several features identified including butt rot at 0.5m on main stem; knot hole in main stem at 4.5m; and lifting bark plate recorded on a limb at 5.5m. Inspection recorded rotting heartwood but could not be fully inspected due to presence of chambers.	Moderate
T3	Ash (*Fraxinus excelsior*)	Wound on main stem and limb. Bird nesting material recorded within stem.	Moderate
T4	Ash (*Fraxinus excelsior*)	Cavity in main stem utilized by squirrel. This is in addition to several wounds on tree limbs predominantly of negligible potential to support roosting bats.	Moderate
T5	Ash (*Fraxinus excelsior*)	Broken limb with potential crevice for low numbers of bats and dense ivy.	Low

Tree ID	Species	Potential Roosting Features (PRFs) Identified/Inspected	Bat Roosting Potential
T6	Ash (*Fraxinus excelsior*)	Single wound in limb at 9m.	Negligible
T7	Ash (*Fraxinus excelsior*)	Wound on main stem at 3m with a knot hole in main stem at 2.8m.	Low
T8	Ash (*Fraxinus excelsior*)	Single wound recorded at 9m, creating shallow cavity exposed to elements.	Negligible
T9	Ash (*Fraxinus excelsior*)	Mature tree with dense ivy cover.	Low

Investigations of Bat Foraging/Commuting Activity

A6.27 Bat foraging and commuting activity recorded during the transect and automated detector surveys undertaken between April 2021 and September 2021 is summarised by species/genus below and illustrated on **Plans EDP 4a-4f**. The following should be read in conjunction with these plans and automated detector survey results in **Tables EDP A6.4-A6.9**.

A6.28 A minimum of 8 bat species/species groups (myotid bat species were not identified to species level), were confirmed to be present foraging and/or commuting within the Application Site during the course of the automated detector surveys. During the automated detector surveys, the vast majority of this behaviour (average 53.2% of Anabat recordings) related to common pipistrelle bat. *Myotis* sp. accounted for 33.6% of all Anabat recordings whilst soprano pipistrelle accounted 6%. Noctule accounted for 1.8% and serotine for 5% of all Anabat recordings. Other species representing less than 1% of Anabat recordings include greater horseshoe, lesser horseshoe, long-eared and serotine bat species, accounting for 0.4% of all Anabat calls recorded in total during 2021.

A6.29 No bats were recorded at Anabat location during April 2021 whilst only low numbers of common pipistrelle and noctule bats were recorded at location 1 during April 2021 and both locations during May 2021. Unseasonably cold night time temperatures were recorded during April and May this year which may have suppressed bat activity to some extent. Moderate levels of activity were recorded across the Application Site for the remainder of the year which a peak in activity recorded at location 2 during September 2021 dominated by common pipistrelle and *Myotis* sp. bats.

A6.30 Only 4 species of bat (*Myotis* species were not always identified to species level) were confirmed to be foraging and/or commuting within the Application Site during the course of manual transect surveys undertaken between April and September 2021. The vast majority of this behaviour was attributed to common pipistrelle bat. Occurrences of noctule bat were identified during August 2021 whilst noctule, serotine and *Myotis* sp. were recorded during September 2021. Bat activity was largely concentrated across the southern extents of the Application Site. Overall, relatively low levels of bat activity were recorded in association with hedgerow boundaries across the Application Site during the course of manual transect surveys.

Evaluation

A6.31 An evaluation of the bat assemblage at the Application Site identified during manual transect and automated detector surveys is provided below, with reference to the relative abundance and distribution of each bat species (with reference to the most up-to-date information on local and national species distribution[29] and population trends[30] available at the time of writing). This will be supplemented with the results of automated bat detector surveys following analysis.

Common Pipistrelle

A6.32 Common pipistrelle bats are common and widespread across the UK, representing the most and second most abundant species in the UK respectively. Whilst having suffered significant historic declines, national population monitoring indicates that common pipistrelle bats are increasing nationally.

A6.33 Soprano pipistrelle bats are widely distributed across the UK, and whilst populations declined dramatically in the twentieth century, population trends for this species are considered to be stable.

A6.34 Common pipistrelle recordings were the most frequent and most widely distributed across the Application Site during the transect surveys with activity evenly distributed across the Application Site. Soprano pipistrelle, in contrast were only occasionally recorded by automated bat detectors between June and September 2021. Common pipistrelle bat using the Application Site is considered to be of **Local** importance whilst soprano pipistrelle is considered to be of **Site** importance.

Myotid Bat Species

A6.35 Myotid bat species occur throughout most of the UK, their populations considered to be either stable or increasing with the exception of Bechstein's bat (*Myotis bechsteinii*), which is listed in Annex II of the EC Habitats Directive, and considerably rarer.

A6.36 Myotid bat species were recorded during manual transect surveys undertaken in August and September 2021 only. During the transect surveys, myotid bats were recorded in association with the southern boundary of the Application Site. However, relatively low-moderate activity levels of this species were recorded by automated bat detectors with a peak in activity recorded at location 2 in September 2021, perhaps associated with species moving between their summer and transitional roosts. The use of the Application Site by myotid bat species is considered to be of **Local** Importance.

[29] Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) *UK Mammals Species Status and Population Trends*. First Report by the Tracking Mammals Partnership. JNCC/Tracking Mammals Partnership, Peterborough

[30] Bat Conservation Trust, 2019. The National Bat Monitoring Programme Annual Report 2018. Bat Conservation Trust, London. Available at http://www.bats.org.uk/pages/nbmp_annual_report.html

Noctule

A6.37 Noctule bat is widespread across the UK with the exception of northern Scotland, with its population and range considered to remain stable in the UK.

A6.38 Only low number of noctule bats were recorded during the August and September 2021 manual transect surveys, commuting across the southern extents of the Application Site. Low numbers of this species were otherwise recorded by automated bat detectors throughout the year. The population recorded commuting over the Application Site is considered to be of **Site** Importance.

Serotine

A6.39 Serotine bats are restricted to southern England and Wales where they are widespread, but scarce, albeit populations are stable nationally. Serotine bat was only recorded on one occasion during the manual transect survey in September 2021. Low numbers of this species were, however, consistently recorded by automated bat detectors between June and September 2021 with comparably higher numbers recorded during September 2021, suggesting hedgerow boundaries along the boundaries of the Application Site may be of some importance for commuting bats between their summer and transitional/winter roosts in the autumn. Given their rarity, serotine bats using the Application Site are likely to be of **Local** Importance.

Greater and Lesser Horseshoe

A6.40 Greater and lesser horseshoe bats are listed in Annex II of the EC Habitats Directive and are considered to be rare nationally, with a range restricted to south Wales and south-west England, although populations of these species are considered to have increased in the UK since 1999.

A6.41 Greater and lesser horseshoe bats were recorded only occasionally during the automated detector surveys, between June and September 2021. Habitats onsite are considered to offer some foraging opportunities for both species, albeit limited to grazed improved/poor semi-improved grassland and hedgerows. Hedgerow boundaries in particular likely facilitate dispersal of these species across the wider landscape. The Application Site is considered to be of **Local** Importance to greater and lesser horseshoe bats.

Long-eared Bats

A6.42 Brown long-eared bats are considered to be widespread and common across the UK with national populations considered stable. In contrast, populations of grey-long eared bat are largely limited to the south coast of England although this species is under recorded.

A6.43 Long-eared bats were rarely recorded during the automated bat detectors surveys and are likely to be brown long-eared given their wider distribution and geographical location of the Application Site. The population of long-eared bat species supported by the Application Site is therefore considered to be of **Site** importance.

A6.44 Based on results of the manual bat transect and automated detector surveys the overall bat population supported by the Application Site is likely to be of **Local** Importance.

Table EDP A6.4: Automated Detector Survey Results April/early May 2021. (*Less than 1%).

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		28 Apr	29 Apr	30 Apr	01 May	02 May		
1	Common pipistrelle	0	10	53	5	22	**90**	**98**
	Noctule	0	0	0	1	1	**2**	**2**
	Total	**0**	**10**	**53**	**6**	**23**	**92**	**100**
2	No bats							
	Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Table EDP A6.5: Automated Detector Survey Results May 2021. (*Less than 1%).

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		21 Apr	22 Apr	23 Apr	24 Apr	25 Apr		
1	Common pipistrelle	1	3	0	11	10	**25**	**86**
	Noctule	2	2	0	0	0	**4**	**14**
	Total	**3**	**5**	**0**	**11**	**10**	**29**	**100**
2	Common pipistrelle	0	1	0	0	0	**1**	**100**
	Total	**0**	**1**	**0**	**0**	**0**	**1**	**100**

Table EDP A6.6: Automated Detector Survey Results June 2021. (*Less than 1%).

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		11 Jun	12 Jun	13 Jun	14 Jun	15 Jun		
1	Common pipistrelle	0	149	110	24	68	**351**	**87.5**
	Lesser Horseshoe	0	1	0	0	0	**1**	*
	Myotis sp.	0	9	4	0	7	**20**	**5**
	Noctule	0	1	1	1	2	**5**	**1**
	Soprano pipistrelle	0	6	3	0	1	**20**	**5**
	Serotine	0	1	3	0	0	**4**	**1**
	Total	**0**	**167**	**121**	**25**	**80**	**401**	**100**

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
2	Common pipistrelle	17	72	170	3	128	**390**	**75**
	Myotis sp	0	10	15	0	11	**22**	**4**
	Noctule	0	2	10	1	5	**18**	**3**
	Soprano pipistrelle	1	2	47	2	26	**78**	**15**
	Serotine	1	2	6	3	3	**15**	**3**
	Total	**19**	**88**	**248**	**9**	**173**	**523**	**100**

Table EDP A6.7: Automated Detector Survey Results July 2021. (*Less than 1%).

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		14 Jul	**15 Jul**	**16 Jul**	**17 Jul**	**18 Jul**		
1	Brown Long-eared	0	0	0	2	0	**2**	**1.5**
	Common pipistrelle	7	1	12	33	36	**89**	**62.5**
	Lesser Horseshoe	0	0	0	1	0	**1**	*
	Myotis sp.	0	1	8	3	3	**15**	**10.5**
	Noctule	1	4	4	4	2	**15**	**10.5**
	Soprano pipistrelle	0	1	0	0	5	**6**	**4**
	Serotine	2	2	3	4	4	**15**	**10.5**
	Total	**10**	**9**	**27**	**47**	**49**	**143**	**100**
	Bat Species	**Number of Bat Passes Recorded per Night**					**Total**	**% of Total**
		26 Jul	**27 Jul**	**28 Jul**	**29 Jul**	**30 Jul**		
2	Common pipistrelle	569	314	654	157	531	**2225**	**76**
	Greater Horseshoe	0	0	0	0	1	**1**	*
	Myotis sp.	21	7	338	71	39	**476**	**16**
	Noctule	5	6	1	2	1	**15**	*
	Soprano pipistrelle	66	26	3	40	5	**140**	**5**
	Serotine	11	12	22	6	2	**53**	**2**
	Total	**672**	**365**	**1018**	**276**	**579**	**2910**	**100**

Table EDP A6.8: Automated Detector Survey Results August 2021. (*Less than 1%).

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		17 Aug	18 Aug	19 Aug	20 Aug	21 Aug		
1	Common pipistrelle	736	344	0	0	252	**1332**	**75.5**
	Long eared	1	0	0	0	1	**2**	*
	Lesser Horseshoe	1	0	0	0	0	**1**	*
	Myotis sp.	91	58	0	0	49	**198**	**11**
	Noctule	2	6	0	0	28	**36**	**2**
	Soprano pipistrelle	37	6	0	0	11	**54**	**3**
	Serotine	56	34	0	0	50	**140**	**8**
	Total	**924**	**448**	**0**	**0**	**391**	**1763**	**100**
Position	**Bat Species**	**Number of Bat Passes Recorded per Night**					**Total**	**% of Total**
		23 Aug	**24 Aug**	**25 Aug**	**26 Aug**	**27 Aug**		
2	Common pipistrelle	17	6	19	6	13	**61**	**55.5**
	Myotis sp.	2	3	6	3	0	**14**	**12**
	Noctule	2	0	7	1	2	**12**	**11**
	Soprano pipistrelle	1	2	0	2	0	**5**	**4.5**
	Serotine	7	4	6	0	2	**19**	**17**
	Total	**29**	**15**	**38**	**12**	**17**	**111**	**100**

Table EDP A6.9: Automated Detector Survey Results September 2021. (*Less than 1%).

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		17 Sep	18 Sep	19 Sep	20 Sep	21 Sep		
1	Common pipistrelle	10	202	56	12	21	**301**	**43**
	Greater horseshoe	0	1	0	0	0	**1**	*
	Myotis sp.	15	35	24	15	17	**106**	**15**
	Noctule	7	7	20	5	2	**41**	**6**
	Soprano pipistrelle	0	9	4	1	0	**14**	**2**
	Serotine	18	111	52	7	46	**234**	**34**
	Total	**50**	**365**	**156**	**40**	**86**	**697**	**100**

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		17 Sep	18 Sep	19 Sep	20 Sep	21 Sep		
2	Common pipistrelle	645	2263	105	72	715	**3843**	**40**
	Long-eared	1	3	3	1	0	**8**	*
	Myotis sp.	1103	2595	195	149	601	**4644**	**48**
	Noctule	18	108	11	1	15	**155**	**2**
	Soprano pipistrelle	84	495	12	9	78	**678**	**7**
	Serotine	67	230	5	9	39	**351**	**3**
	Total	**1918**	**5694**	**331**	**241**	**1448**	**9679**	**100**

This page has been left blank intentionally

Appendix EDP 7
Dormouse Survey

Methodology

A7.1 Generally, hedgerow habitat within the Application Site is considered to provide some potential foraging, dispersal and nesting opportunities for dormouse. The quality of the hedgerow network is limited however due to agricultural management resulting in poor structure with relatively poor species diversity also.

A7.2 Given the presence of a known dormouse population present in association with Bishop's Hill and Lower Wood circa 900m east of the Application Site, together with the presence of some suitable habitat onsite, a nest tube survey to determine the presence/likely absence of dormouse from habitats within the Application Site was therefore completed during 2020 and 2021 in accordance with best practice guidelines[31].

A7.3 A total of 71 standard nest tubes, each comprising a wooden tray and nesting tube made from plastic tree guard material, were deployed throughout the Application Site at approximately 20m intervals on 27 March 2020, as illustrated at **Plan EDP 5**. Nest tubes were erected at approximately 1.5m to 2m above ground and tied to suitable horizontal branches located within the hedgerows or lower branches of trees. Tubes were left *in situ* and checked monthly for evidence of use by dormice on six separate occasions, in suitable weather conditions. Due to the Covid pandemic, however, checks did not commence until October 2020 with subsequent checks undertaken in November 2020 and between April 2021 and August 2021.

A7.4 As shown on **Plan EDP 5** the survey area comprised a representative area of hedgerows, within, or immediately adjacent to, the Application Site.

A7.5 In accordance with best practice guidance whereby the index of probability in detecting dormice presence within nest tubes is calculated according to set scores given for each of the different months (for a minimum deployment of fifty nest tubes), the total survey effort score employed is considered to be sufficient to assume presence or absence, far exceeding the minimum survey effort score of 20 as recommended by Chanin & Woods (2003), as illustrated in **Table EDP A7.1**.

Table EDP A7.1: Index of probability of finding dormice present in nest tubes in any one month, as extracted from Bright *et al.* (2006).

Month	Index of Probability	Nest tubes checked	Survey Date
March	-	*Nest tubes deployed*	27.03.20
October	2	✔	26.10.20

[31] Bright, P., Morris, P. and Mitchell-Jones, T., 2019. The *dormouse conservation handbook*

Month	Index of Probability	Nest tubes checked	Survey Date
November	2	✔	23.11.21
March	-	Nest tubes inspected for damage and redeployed	03.03.21
April	1	✔	20.04.21
May	4	✔	26.05.21
June	2	✔	25.06.21
July	2	-	-
August	5	✔	26.08.21
Total survey effort score	**18x (71/50) = 25.56**		

A7.6 Evidence such as the presence of individuals, nests and/or food caches was recorded during each of the surveys. Incidental sightings or evidence of wood mice (*Apodemus sylvaticus*), or other small mammals, were also recorded during the surveys, during which all tubes were emptied of wood mouse nests and individuals, cleaned and re-hung.

Results

A7.7 No evidence of dormouse was recorded during any of the survey visits undertaken across 2020 and 2021. A small number of wood mice and their evidence, namely wood mouse nests, were recorded across the Application Site during the nest tube surveys, as illustrated on **Plan EDP 5.**

Appendix EDP 8
Badger Survey

Methodology

A8.1 Badger activity within the Application Site and wider survey area was initially recorded during the Extended Phase 1 survey and formally assessed on 12 and 13 March 2020, with a further update assessment undertaken on 22 January 2021. During the survey, any signs of badger activity such as holes, latrines, trails, snuffle holes and hairs on fencing or vegetation were recorded. Where holes of a size and shape consistent with badgers were identified, the following signs of badger activity were searched for in order to determine whether they were currently in active use:

- Fresh spoil outside entrances;
- Old bedding material (typically dried grass) outside entrances;
- Holes being cleared of leaf litter;
- Badger guard hairs; and
- Fresh tracks leading to/from the holes.

A8.2 Each badger sett found was examined and has been assigned to one of four categories[32], which have been used in the various National Badger Surveys[33], as detailed in **Table EDP A8.1** below. The number of holes comprising each sett is recorded and each is classified as disused, partially used or well used by badgers as described in **Table EDP A8.2**.

Table EDP A8.1: Sett Descriptions and Categories.

Sett Descriptions
Main Setts: These usually have a large number of holes with large spoil heaps, and the sett generally looks well used. There will be well-used paths to and from the sett and between sett entrances. Although normally the breeding sett is in continuous use, it is possible to find a main sett that has become disused due to excessive digging or some other reason; it should be recorded as a disused main sett. The British National Badger Survey found that the average size of an active main sett is twelve holes (including all categories of use).
Annexe Setts: These are often close to the main sett, usually less than 150m away, and are usually connected to the main sett by one or more obvious, well-worn paths. They usually have several holes but may not be in use all the time even if the main sett is very active. The British National Badger Survey found that the average size of an annexe sett is five holes (including all categories of use).

[32] Harris, S.; Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers.* Mammal Society, No. 9, London.
[33] Wilson, G.; Harris, S. and McLaren, G. (1997) *Changes in the British Badger Population – 1998 to 1997*. People's Trust for Endangered Species, London; and Cresswell, P.; Harris, S. and Jefferies, D. (1990) *The History, Distribution, Status and Habitat Requirements of the Badger in Britain*. Nature Conservancy Council, Peterborough.

Sett Descriptions
Subsidiary Setts: These often only have a few holes (averaging four), are usually at least 50m from a main sett, and do not have an obvious path connecting with another sett. They are not continuously active.
Outlying Setts: These usually have only one or two holes, often have little spoil outside the hole, have no obvious path connecting with another sett and are only used sporadically. When not in use by badgers, they are often taken over by foxes or even rabbits. However, they can still be recognised as badger setts by the shape of the tunnel (not the actual entrance hole), which is usually at least 250mm in diameter, and is rounded or a flattened oval shape. Fox and rabbit tunnels are smaller and often taller than broad.

Table EDP A8.2: Categories of Use.

Categories of Use
Well-used Holes: These are clear of any debris or vegetation, are obviously in regular use, and may or may not have been excavated recently.
Partially-used Holes: These are not in regular use and have debris such as leaves and twigs in the entrance or have moss and/or other plants growing in or around the entrance. Partially used holes could be in regular use after a minimal amount of clearance.
Disused Holes: These have not been in use for some time, are partially or completely blocked and could not be used without a considerable amount of clearance. If the hole has been disused for some time, all that may be visible is a depression in the ground where the hole used to be, and the remains of the spoil heap, which may be covered in moss or plants.

Limitations

A8.3 Badger surveys can be undertaken at any time of year and are, therefore, not limited by seasonal or climatic factors.

A8.4 Dense vegetation precluded a thorough search of site boundaries. Evidence of badger may have been missed, therefore. However, such limitations have been reduced by undertaking additional badger surveys during the winter months when vegetation had died back.

Results

A8.5 Hedgerow boundaries provide suitable cover for badger setts whilst arable land and improved grassland within and adjacent to the Application Site provides suitable foraging habitat. No active setts were identified within the Application Site, although four setts were identified within the wider survey area including three active subsidiary setts (**S1**, **S2** and **S4**) and a single outlier sett (**S3**). This is in addition to several latrines located along field boundaries.

A8.6 A full description and classification of each sett is provided within **Table EDP A8.3** with locations illustrated at **Plan EDP 6**.

Table EDP A8.3: Badger Survey Results.

Sett Number	Description	Status and Classification
S1	Excavated from the base of a hedgerow and comprises three holes characterised by fresh spoil and bedding.	Active, subsidiary sett
S2	Active sett comprising a single entrance recorded within woodland habitat along an agricultural field boundary within the north-west corner of the wider survey area.	Active, outlier sett
S3	Within the north-west corner of the wider survey area and comprises 5 holes with large spoil heaps and fresh badger activity.	Subsidiary, outlier sett
S4	Comprises 4 entrances excavated along the banks of the Ladden Brook tributary. Of these, 2 entrances were characterised by fresh soil and badger prints whilst a third hole was collapsed.	Active, subsidiary sett

This page has been left blank intentionally

Appendix EDP 9
Otter and Water Vole Survey

Methodology

A9.1 Several wet ditches were recorded within the Application Site and wider survey area boundary, whilst Ladden Brook delineates the south-western boundary of the wider survey area. An initial assessment of the suitability of each ditch to support otter and water vole was initially undertaken during the Extended Phase 1 Habitat survey on the 12 and 13 March 2021. Following the initial habitat assessment, a detailed survey of each suitable watercourse/waterbody for signs of otter and water vole activity was subsequently undertaken by an experienced surveyor on two occasions: 26 May 2021 and 28 July 2021. Any additional notes regarding the suitability of the wet ditch system were recorded on this date. (Refer to **Plan EDP 7** for survey area).

A9.2 Each survey was undertaken in accordance with best practice guidelines for otter[34] and water vole[35] during which all signs of otter and water vole activity were recorded. The otter survey involved a visual inspection for characteristic signs of otter, including evidence of feeding remains, prints, tracks, spraints and resting sites including lay-ups and holts. Features considered to have the potential to be used as holts were also documented during the survey. In the case of water vole, the survey involved a search for feeding stations (including feeding stations and grazed lawns), faeces (latrines and droppings), footprints, burrows and possible runs.

Limitations

A9.3 Dense vegetation along the banksides and the very steep nature of the banks prevented a thorough inspection of the water's edge for otter and water vole field signs, whilst soft silt substrate prevented survey from within the water channel. As such, survey was limited to the bank tops.

Results

Habitat Suitability

A9.4 Field boundaries associated with the Application Site and wider survey area are largely delineated by a series of wet and dry ditches. Several of these ditches are dry including **D1**, **D4**, **D6** and **D7** which are typically 1m wide with vertical banks less than 1m high and likely only hold water during periods of heavy rain flow. Such features are of limited value to a water vole population while frequent drying renders the ditches unsuitable for a

[34] Chanin P (2003). *Monitoring the Otter* Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.

[35] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) *The Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series)* Mammal Society, London

significant fish population and, therefore, limited as a foraging resource for otter. Such features are, however, likely to provide suitable cover for either species dispersing across the Application Site and wider landscape.

A9.5 **D2** and **D3** within the Application Site and **D5** within the wider survey area are likely permanently wet throughout the year. **D3** in particular is a relatively wide (2m wide) and deep (1m deep) ditch with a fast water flow and channel substrate dominated by silt. The water was turbid at the time of survey with the ditch accessible to cattle. **D5**, in contrast is 1m wide and 0.5m deep at its southern extent but holds no/limited water at its northern extent. The banks are again relatively shallow with limited vegetation cover represented by grass species and no significant riparian margin. Such features are of negligible importance to water vole with no macrophyte cover as value as foraging resource whilst the banks are subject to some disturbance by cattle. As above, such features are, however, likely to provides a suitable linear feature for otter dispersing across the Application Site and wider landscape.

A9.6 The western boundary of the wider survey area is characterised by a fast-flowing watercourse, a tributary of Ladden Brook. The watercourse is circa 2m wide with a channel substrate characterised by gravel with occasional cobbles. The banks are circa 1m high and steeply sloping/vertical. Bankside vegetation is largely characterised scattered hedgerow shrubs and mature/semi mature tree standards including hawthorn, blackthorn, alder, ash, oak, elder and bramble. The watercourse is considered unsuitable for water vole given the absence of a diverse macrophyte assemblage and lack of suitable bankside habitats for burrowing.

A9.7 Such habitat is, however, likely to support a fish community of value to foraging otter. Whilst the adjacent tree line and scrub provides suitable cover for laying-up and dispersal.

Presence/Absence Survey

A9.8 During the first survey on 26 May 2021, a single otter spraint was identified along Ladden Brook. A mammal feeding station was also identified along this stretch of water course although it could not be determined whether this was attributed to water vole or another similar mammal. No other evidence of water vole was identified along the watercourse. No signs or otter nor water vole were identified in association with the ditch network within the Application Site or wider survey area. At the time of survey, **D5**, previously recorded as wet was found to be dry.

A9.9 During the second survey on 28 July 2021 no evidence of otter and water vole was recorded during the survey. All waterbodies surveyed including sections of the Ladden Brook were dry with the exception of **D3**.

A9.10 Overall, the ditch network recorded across the Application Site is considered to be of negligible importance to water vole given the poor water quality, absence of a foraging resource and shallow banks subject to cattle poaching. Similarly, the Ladden Brook tributary located within the wider landownership boundary is considered largely

unsuitable given its fast flow and shallow banks, with limited burrowing opportunities and limited foraging resources.

A9.11 The wet ditch network is similarly considered of negligible importance to otter given its poor water quality and absence of a notable fish population of value as a foraging resource. The ditch network may, however, facilitate dispersal of otter across the wider landscape whilst associated hedgerows provide some cover to this species. Ladden Brook is considered of greater suitability for this species however, and likely to of value for both dispersal and foraging.

This page has been left blank intentionally

Appendix EDP 10
Great Crested Newt Survey

Methodology

A10.1 No waterbodies were identified within the boundaries of the Application Site. However, a single waterbody was identified circa 10m north of the Application Site (**P1**) whilst four additional waterbodies (**P2** - **P5**) were identified within the same ownership boundary, the closest being circa 416m east (**P2**) of the Application Site. **P3** - **P5** are located within 500m of the study area and following confirmation of the red line boundary are considered to be within the zone of influence of the Application Site in respect of great crested newt. In addition to the above, a desk study identified a further three (**P6** - **P8**) waterbodies within 500m of the Application Site, as illustrated at **Plan EDP 8**.

Habitat Suitability Index Assessment

A10.2 A Habitat Suitability Index (HSI) assessment, as developed by Oldham *et al*. (2000)[36], of **P1** and **P2** was initially undertaken on 27 March 2020 and further updated on 16 April 2021 alongside a HSI of **P3** - **P5** by a suitably qualified ecologist to assess their suitability to support great crested newt. There was no access no waterbodies **P6** - **P8**.

A10.3 The HSI assessment follows a standardised assessment criteria using habitat features such as water quality, fish/waterfowl presence and surrounding terrestrial habitat quality to derive a suitability score, or 'index'. Water bodies with high scores are considered more likely to support great crested newt compared to those with lower scores. HSI scores and the inferred suitability of the ponds assessed to support great crested newt are described within **Table EDP A10.1**.

Table EDP A10.1: HSI Scores and Inferred Pond Suitability.

HSI Score	Pond Suitability to Support Great Crested Newts
<0.5	Poor suitability
0.5–0.59	Below average suitability
0.6–0.69	Average suitability
0.7–0.79	Good suitability
>0.8	Excellent suitability

Limitations

A10.4 **P4** and **P5** were dry at the time of the HSI survey such that no assessment was undertaken. There was no land access to **P6-P8** located within 500m of the Application

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

Site. Land surrounding **P6** is currently under construction whilst **P7** and **P8** are located on private land with no permitted access.

Environmental DNA Sampling

A10.5 Environmental DNA (eDNA) is DNA that is collected from the environment in which an organism lives. In aquatic environments, animals including amphibians shed cellular material into the water via their saliva, urine, faeces, skin cells, etc. This eDNA may persist for several weeks, and can be collected through a water sample, and analysed to determine if the target species of interest (great crested newt) is/has been present in the water body.

A10.6 To confirm the presence/absence of great crested newt onsite, **P1** and **P3** were subject to water sampling for eDNA on 16 April 2021. **P2**, **P4** and **P5** were dry at the time of the eDNA survey.

A10.7 Each sample was undertaken by two EDP ecologists accredited on a Natural England great crested newt survey licence in accordance with those methodologies set out by the Freshwater Habitats Trust[37] and using separate sterile equipment packs for the collection of eDNA samples. Briefly, the protocol involves:

- Collecting 20 water samples from selected areas evenly spread around the accessible perimeter pond including both open water and vegetated areas;
- Collecting a ladle of water at each sampling location, stirring the water column without stirring up sediment, shaking the bag thoroughly once all 20 ladles are collected; and
- Extracting 15ml of this mixed sample into six conical tubes per pond containing preserving fluid, shaken thoroughly to homogenize the sample.

A10.8 Subjecting each tube to real-time polymerase chain reaction (PCR) analysis as detailed within Biggs *et al*. (2014)[38].

Limitations

A10.9 **P2**, **P4** and **P5** were dry at the time of the HSI survey such that no assessment was undertaken. There was no land access to **P6**-**P8** located within 500m of the Application Site. Land surrounding **P6** is currently under construction whilst **P7** and **P8** are located on private land with no permitted access.

[37] GCN eDNA protocol, P. Williams, Freshwater Habitats Trust. August 2013

[38] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Presence/Absence Surveys and Population Size Assessment

A10.10 Ponds **P1** - **P5** were also subject to initial, traditional presence/absence surveys to confirm the presence or likely absence of great crested newt until such time as the results of the eDNA surveys were made available following laboratory analysis.

A10.11 Due to the confirmation of great crested newt presence recorded for ponds **P1** and **P3** with positive eDNA results returned, detailed surveys continued to allow for a total of six visits necessary to determine population size. Visits to ponds **P2**, **P4** and **P5** were also continued to confirm whether they remained dry during the survey period.

A10.12 Survey visits were undertaken with reference to the survey methodology set out in the English Nature Guidelines[39] by a holder of a Natural England great crested newt survey licence and assistant. In accordance with the guidelines, the following three preferred survey techniques were employed to determine the presence/absence of great crested newt onsite:

- Torching: This involves searching water bodies by torchlight between dusk and midnight and is an effective means of detecting adult newts. Each surveyor used a 1,000,000 candle power torch during this part of the survey;

- Bottle Trapping: This involves the use of funnel traps (made from 2-litre plastic bottles) that are inserted into the water along the margin of the water bodies during the evening and checked the following morning. Access permitting, the traps are spaced at roughly 2m intervals around the margins of the ponds; and

- Egg Searching: A search of any suitable aquatic vegetation to check for great crested newt eggs.

A10.13 A fourth method (daytime visual count, in place of netting) was also used where the other survey techniques were unsuitable due to the nature of the waterbodies and the unnecessary disturbance it could potentially cause to these ecosystems.

A10.14 The standard survey procedure involved a minimum of four survey visits to each pond to confirm the presence/likely absence of great crested newt, with a further two visits completed should evidence be confirmed, necessary to allow for an estimation of population size.

A10.15 The dates of the survey visits and the conditions during the surveys are summarised in **Table EDP A10.2**.

[39] English Nature (2001). Great Crested Newt Mitigation Guidelines, English Nature, Peterborough

Table EDP A10.2: Dates, timings and conditions for the great crested newt surveys.

Visit	Dates	Min Overnight Air Temp. (°C)	Ponds Surveyed
1	30 & 31 March 2021	6.0	**P2**
2	27 & 28 April 2021	5.0	**P1**, **P2**, **P3**
3	10 & 11 May 2021	4.0	**P1**, **P2**, **P3**
4	13 & 14 May 2021	6.0	**P1**, **P2**, **P3**
5	25 & 26 May 2021	6.0	**P1**, **P2**, **P3**
6	03 & 04 June 2021	12.0	**P1**, **P2**, **P3**
7	10 & 11 June 2021	15.0	**P1**, **P2**, **P3**

Limitations

A10.16 The timing and conditions during the surveys are generally in line with those set out in the English Nature Great Crested Newt Mitigation Guidelines and as such, it is not considered that they were limited by seasonal or climatic factors.

A10.17 Night time temperatures during April and May were unseasonably cold, dropping to a minimum 4°C on 10 and 11 May. This is not, however, considered to have affected an assessment with water temperature within the pond remaining stable and above 10°C with great crested newt presence recorded.

A10.18 It was not possible to bottle trap or net pond **P1** in March such that only two of the three recommended survey methods were used. As such a 7th site visit was scheduled. High turbidity was recorded within **P1** during the second site visit such that netting was used as alternative methodology to torching. Although turbidity remained high during subsequent site visits, a drop in water level combined with steep banks and dense vegetation precluded safe access for continued netting such that torching was used on these occasions.

A10.19 **P2** was dry during the 2nd, 3rd, 4th, 6th and 7th site visit such that no surveys could be undertaken. Water within the pond during the 5th survey visit was too shallow to bottle trap such that netting was used instead of bottle traps.

A10.20 Pond **P3** was dry during its first survey visit on 27 April 2021. Dense vegetation was recorded within the waterbody during survey visits. Due to difficulty in netting, however, torching was still considered a more effective means of detecting great crested newt.

A10.21 Pond **P4** was dry during its 1st, 2nd, 3rd, 5th and 6th survey visit. Pond **P5** was dry during all survey visits.

A10.22 There was no land access to **P6-P8** located within 500m of the Application Site. Land surrounding **P6** is currently under construction whilst **P7** and **P8** are located on private land with no permitted access.

Results

Habitat Suitability Assessment

A10.23 A description of those ponds surveyed is provided within **Table EDP A10.3** with the detailed results of the habitat suitability assessment provided within **Table EDP A10.4**.

A10.24 The habitat suitability assessment confirmed **P1** to be of good suitability to support great crested newt, with **P2** and **P3** to have below average suitability. Nevertheless, **P1** was notably turbid during all site visits as a consequence of surface water runoff into the pond and was, furthermore, relatively artificial in nature with a concrete base.

Table EDP A10.3: Habitat Suitability of Ponds **P1– P5** to Support Great Crested Newt.

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
P1	 Agricultural pond adjacent to farm track bordered by dense scrub and a hedgerow. Bulrush is present in the margins whilst non filamentous algae is present across the water surface. Pond is notably turbid.	0.70 (Good)

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
P2	 Small ephemeral pond holds 5-10cm of water in the centre during winter/spring months. Largely supports terrestrial vegetation with no discernible banks.	0.50 (Below Average)
P3	 Small shallow pond in hollow fed by a dry ditch. Floating sweet-grass (*glyceria fluitans*) abundant with no other macrophytes recorded. Waterbody is turbid from surface water runoff. Waterbody is surrounded by hedgerows and trees and grassy field margins, fenced off from livestock.	0.57 (Below Average)

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
P4	 Dry waterbody at based of hedgerow surrounded by dense bramble scrub.	Dry
P5	 Dry waterbody overgrown with dense bramble scrub.	Dry

Table EDP A10.4: Pond Habitat Suitability Assessment of waterbodies.

Suitability Index	Criteria	Definition	Possible Score	P1	P2	P3	P4	P5
SI_1	Geographic Location	Zone A - optimal	1	1	1	1		
		Zone B - marginal	0.5					
		Zone C - unsuitable	0.01					
SI_2	Pond Area	Pond surface area to the nearest 50m^2	*	0.2	0.2	0.3		
SI_3	Permanence	Never Dries	0.9	0.9	0.1	0.1		
		Rarely dries (Dries no more than 2/10 years or in drought only)	1					
		Sometimes dries (Dries between 3/10 years to most years)	0.5					
		Dries annually	0.1					
SI_4	Water Quality	Good (abundant & diverse invertebrate community)	1	0.67	0.33	0.33		
		Moderate (moderate invertebrate community)	0.67					
		Poor (low invertebrate diversity, few submerged plants)	0.33					
		Bad (clearly polluted, pollutant tolerant invertebrates present, no submerged plants)	0.01					
SI_5	Shade	% shade of pond perimeter to at least 1m from the shore	*	1	0.6	1		
SI_6	Waterfowl	Absent (no evidence of waterfowl, excluding moorhen)	1	1	1	0.67		
		Minor (waterfowl present, though little impact)	0.67					
		Major (severe impact of waterfowl)	0.01					
SI_7	Fish	Absent (no records of fish stocking and no fish seen during survey)	1	1	1	1		
		Possible (no evidence of fish, but conditions suggest presence)	0.67					
		Minor (small numbers of crucian carp, goldfish or stickleback)	0.33					
		Major (dense	0.01					

Suitability Index	Criteria	Definition	Possible Score	P1	P2	P3	P4	P5
		populations of fish present)						
SI_8	Pond Count	No. ponds within 1 km of survey pond not separated by major barriers and divided by 3.14	*	1	1	1		
SI_9	Terrestrial	Good (extensive habitat offering good opportunities for foraging and shelter surrounding pond)	1	0.67	0.67	0.67		
		Moderate (habitat offering opportunities for foraging and shelter, but not extensive and does not completely surround pond)	0.67					
		Poor (habitat with poor structure, offering limited opportunities for foraging and shelter)	0.33					
		None (No suitable habitat around pond)	0.01					
SI_{10}	Macrophytes	% pond surface area occupied by macrophyte cover (excluding duckweed) and submerged plants reaching the surface	*	0.35	0.35	0.85		
HSI Score = $(SI_1*SI_2*SI_3*SI_4*SI_5*SI_6*SI_7*SI_8*SI_9*SI_{10})^{1/10}$				0.70	0.50	0.57		
Pond Suitability (<0.5 = poor; 0.5-0.59 = below average; 0.6-0.69 = average; 0.7-0.79 = good; >0.8 = excellent)				Good	Below Average	Below Average	Dry	Dry

Environmental eDNA Sampling

A10.25 Water samples from **P1** and **P3** tested positive for great crested newt eDNA. Analysis was conducted in the presence of the following controls: extraction blank; and appropriate positive and negative PCR controls for each of the TaqMan assays (great crested newt, inhibition, and degradation). All controls were noted to have performed as expected. A summary of the results is provided in **Table EDP A10.5** below.

Table EDP A10.5: Summary of eDNA Results.

Pond No.	Detection of *Triturus cristatus*	No. of positive repetitions	Inhibition	Degradation
P1	Positive	5	No	No
P3	Positive	4	No	No

Presence/Absence Surveys and Population Size Assessment

A10.26 Full details of the great crested newt survey are provided within **Tables EDP A10.6**.

A10.27 One immature great crested newt was identified within pond **P3** on 10 May 2021. This is in addition to a peak count of four adults within **P3** identified on 03 June 2021 indicating presence of a low population. Pond **P3** is, however located greater than 500m from the Application Site such that potential impacts on this population are considered unlikely. Despite there being a positive eDNA result for **P1**, great crested newt was not identified during traditional survey effort suggesting they are either present in such low numbers as to be undetectable by standard survey effort or otherwise limitations to survey effort reduced the probability of encountering this species.

A10.28 There was no access to ponds **P6** - **P8**. Nevertheless, **P6** was previously assessed by FPCR to inform a planning application for adjacent development, with a low great crested newt population confirmed.

A10.29 With respect to other amphibian species recorded, palmate and smooth newt was identified within pond **P3** with a peak count of one for both species.

Plans

Plan EDP 1	Phase 1 Habitat Plan (edp6190_d012a 15 October 2021 RB/EWi)
Plan EDP 2	Statutory Designations (edp6190_d007b 13 December 2021 GY/EM)
Plan EDP 3a	Breeding Bird Survey Results – April 2021 (edp6190_d023 09 December 2021 VMS/EWi)
Plan EDP 3b	Breeding Bird Survey Results – May 2021 (edp6190_d024 09 December 2021 VMS/EWi)
Plan EDP 3c	Breeding Bird Survey Results – June 2021 (edp6190_d025 09 December 2021 VMS/EWi)
Plan EDP 4a	Automated Detector Locations and Transect Route (edp6190_d017 18 October 2021 DJ/EWi)
Plan EDP 4b	Bat Transect Results – June (Dusk) (edp6190_d018 26 November 2021 MJC/EWi)
Plan EDP 4c	Bat Transect Results – June (Dawn) (edp6190_d019 26 November 2021 MJC/EWi)
Plan EDP 4d	Bat Transect Results – July (edp6190_d020 26 November 2021 MJC/EWi)
Plan EDP 4e	Bat Transect Results – August (edp6190_d021 26 November 2021 MJC/EWi)
Plan EDP 4f	Bat Transect Results – September (edp6190_d022 26 November 2021 MJC/EW)
Plan EDP 5	Dormouse Nest Tube Locations and Survey Results (edp6190_d013a 15 October 2021 PD/EWi)
Plan EDP 6	Badger Survey Results (Confidential) (edp6190_d015a 15 October 2021 DJ/EW)
Plan EDP 7	Otter and Water Vole Survey Results (edp6190_d016a 15 October 2021 DJ/EW)
Plan EDP 8	Great Crested Newt Survey Results (edp6190_d014a 15 October 2021 GY/EWi)

This page has been left blank intentionally