URBAN EDGE ENVIRONMENTAL CONSULTING

NATURAL PROGRESSION

The Land north of Loxwood Road, Billingshurst, West Sussex

Results of Surveys for Flora and Fauna

June 2021

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Client:	Loxwood Clay Pits Limited	
Report No.:	UE0363_EcoSurveys_3_210628	
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CIEEM REGISTERED PRACTICE 2020-2021

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Abbreviations

ARS	Artificial Refuge Surveys
AWI	Ancient Woodland Indicator species
BAT	Broad Assemblage Type
BNG	Biodiversity Net Gain
BoCC	Birds of Conservation Concern
BPPH	Bat Passes Per Hour
CBC	Common Bird Census (CBC;
CIEEM	Chartered Institute of Ecology and Environmental Management
CMRF	Construction Materials Recycling Facility
CRoW	Countryside and Rights of Way Act 2000
DAFOR	Dominant, abundant, frequent, occasional, rare scale
EcIA	Ecological Impact Assessment
EPS	European Protected Species
GCN	Great crested newt *Triturus cristatus*
HIS	Habitat Suitability Index
HPI	Habitats of Principal Importance
LWS	Local Wildlife Sites
MAGIC	Multi-agency Geographic Information for the Countryside
NERC	Natural Environment and Rural Communities Act 2006
NPPF	The National Planning Policy Framework
NVC	National Vegetation Classification
PEA	Preliminary Ecological Appraisal
PGRA	Preliminary Ground-level (tree) Roost Assessment

PRF	Potential Roost Features
SAC	Special Areas of Conservation
SAT	Specific Assemblage Type
SBIC	Surrey Biodiversity Information Centre
SPA	Special Protection Areas
SPI	Species of Principal Importance
SR	Sunrise
SS	Sunset
SSSI	Special Scientific Interest
SxBRC	Sussex Biological Records Centre
VES	Visual Encounter Surveys

0 Executive Summary

0.1 Introduction

0.1.1 Surveys for flora and fauna were undertaken in relation to a proposed minerals and waste development at Land north of Loxwood Road, Billingshurst, West Sussex (Grid Reference: 505115, 132770). This report has been prepared as a technical appendix to an Ecological Impact Assessment (EcIA) of the effects of the Proposed Development on important ecological features.

0.2 Results

Desk study

0.2.1 No Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites are located within a 5km radius of the Proposed Development Site. No Sites of Special Scientific Interest (SSSI) are located within a 2km radius of the Site. No locally designated non-statutory sites are located within a 1km radius of the Site. However, the Site falls within a SSSI Impact Risk Zone for Chiddingfold Forest SSSI and The Mens SSSI which are located approximately 2.70km north-west and 6.50km south, respectively. Planning applications for minerals extraction within this zone will require the LPA to consult with Natural England prior to determination.

0.2.2 There are records of a range of protected or notable species in the locality, including birds, invertebrates, terrestrial mammals, flowering plants and terrestrial reptiles, together with three priority habitats and other habitats: Traditional Orchard, Deciduous Woodland, and Ancient Woodland.

Habitat and Vegetation Communities Evaluation Summary

0.2.3 A summary of the evaluation of habitats and vegetation communities present within and adjacent to the extraction site and access route is set out at Table 0.1 and Table 0.2.

Table 0.1: Summary of habitat evaluation - extraction site

Habitat	Importance	Rationale
Deciduous Woodland DW1, DW2, DW3, R1, R2 and R3	At least Local	All of the deciduous woodland areas surveyed are considered to represent relatively high quality Lowland Mixed Deciduous Woodland Priority Habitat (HPI), based on their structure and species composition.
Deciduous Plantation P3, P4 and P5	At least Local	The more recent plantations cannot currently be identified as Priority Habitat, largely because of the poorly developed canopy, although they are developing towards such habitat and could be viewed as temporary open areas or clearings within the wider woodland. Includes Ancient Replanted Woodland at P4 which is defined as an irreplaceable habitat under the NPPF.

Habitat	Importance	Rationale
Deciduous Plantation P1 and P2	Local	The established broadleaved plantations probably meet the Lowland Mixed Deciduous Woodland Priority Habitat (HPI) definition, though they are relatively species poor and structurally homogenous examples, and consequently of less importance.

Table 0.2: Summary of habitat evaluation - proposed access route

Habitat	Importance	Rationale
Deciduous Woodland DW4, DW5, R3 and R4	At least Local	All of the deciduous woodland areas surveyed are considered to represent relatively high quality Lowland Mixed Deciduous Woodland Priority Habitat (HPI), based on their structure and species composition. Includes Ancient Woodland in parts of DW4 which is defined as an irreplaceable habitat under the NPPF.
Deciduous Plantation P6 and P7	Local	The more recent plantations cannot currently be identified as Priority Habitat, largely because of the poorly developed canopy, although they are developing towards such habitat and could be viewed as temporary open areas or clearings within the wider woodland.
Stream at DW5	Local	Part of a relatively natural woodland watercourse.
Coniferous Plantation C1	Site	Closed canopy mature conifer plantation with scattered shrubs and extensive bare ground.
Species poor hedge H1/H2	Site	The double hedgerow H1/H2 located alongside the proposed access route between the two main woodland blocks (grid ref: 505560, 131965), although species-poor, qualifies as Hedgerow Priority Habitat (HPI) and is also Important under the Hedgerow Regulations 1997.
Ponds P13, P14, P14a, P15	Site	Small extent and limited richness in plant species and communities; unlikely to qualify as Priority Habitat; support populations of smooth and palmate newt which are partially protected under schedule 5 of the WCA.

Faunal Evaluation Summary

0.2.4 A summary of the evaluation of animal populations present within and adjacent to the extraction site and access route is set out at Table 0.3.

Table 0.3: Summary of faunal evaluation - extraction site & access route

Species	Importance	Rationale
Great crested newt	Site	The Site contains no aquatic habitat but a relatively large area of good quality terrestrial habitat. However, GCN is likely to be absent from the Site. Good quality terrestrial habitat is extensively available adjacent to the access route also but the track itself is of negligible value to the species due to the general absence of vegetation cover. Four ponds are present close to the access route (P13, P14, P14a and P15) but GCN was found to be absent from these ponds.

Species	Importance	Rationale
Breeding birds	At least Local	Quite a rich breeding assemblage of woodland bird species, including 22 of the 34 species used for the England woodland bird indicator, six Red and Amber List species of conservation concern, and four Species of Principal Importance (SPI) under the NERC Act.
Wintering birds	Local	Quite a rich assemblage of birds typical of the habitats present, including eight Red and Amber List species of conservation concern, four SPI and two species listed on schedule 1 of the WCA.
Invertebrates	County (medium)	A moderately diverse woodland invertebrate fauna is present and includes a high proportion (10.4%) of scarce species indicative of niche woodland features such as heartwood rot and woodland edge. Includes three SPI and several observations of wood white which is rare in Sussex and nationally and is partially protected under schedule 5 of the WCA.
Badger	Site	The Site contains a relatively large area of habitat suitable for foraging and sett creation. However, no active setts were identified.
Roosting bats	Site (provisional)	The Site contains no buildings but 38 mature trees exhibited potential roost features.
Foraging and commuting bats	Local to County	The survey area contains a relatively large area of good quality habitat for foraging and commuting bats. At least nine species were recorded, including at least four SPI and barbastelle which is rare in Sussex and nationally.
Hazel dormouse	Site	The Site contains a relatively large area of good quality habitat for hazel dormouse. However, hazel dormouse is likely to be absent from the Site.
Reptiles	Local	The Site contains a relatively large area of good quality habitat for reptiles. Low populations of common lizard and grass snake and an exceptional population of slow worm were recorded. All three are SPI.

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1 Introduction

1.1 Purpose of this Report

1.1.1 This report presents the result of surveys for flora and fauna undertaken in relation to a proposed minerals and waste development at Land north of Loxwood Road, Billingshurst, West Sussex (Grid Reference: 505115, 132770). The report has been prepared as a technical appendix to an Ecological Impact Assessment (EcIA) of the effects of the Proposed Development on important ecological features.

1.2 Objectives and Approach of the Study

1.2.1 The study was commissioned to fulfil the following objectives:

- To classify the vegetation communities present and record their distribution within the survey area;
- To determine the presence or likely absence of great crested newt *Triturus cristatus*, and if present establish population estimates for ponds within 500m of the survey area;
- To record the species of breeding and wintering birds present, establish their relative abundance, and to evaluate their conservation status and features of importance within the survey area;
- To undertake an Invertebrate Site Assessment to investigate the importance of habitats/features within the survey area to invertebrates and evaluates the site for its importance as an invertebrate resource, including specific surveys for the presence of stag beetle *Lucanus cervus;*
- To identify trees with the potential to support roosting bats;
- To record the species of foraging and commuting bats present, establish their relative abundance, and evaluate features of importance within the survey area; and
- To determine the presence or likely absence of badger *Meles meles*, hazel dormouse *Muscardinus avellanarius* and reptiles, and if present record their distribution within the survey area.

1.2.2 To meet these objectives the survey approach involved:

- A desk study involving a review of statutory and non-statutory nature conservation sites, and records of habitats and species from the local area;
- A review of information from the Preliminary Ecological Appraisal regarding the habitats present within the site boundary and wider area; and

- Field surveys using standard techniques to record the presence, distribution and relative abundance of target species within the survey area, with reference to current industry guidelines.

1.3 Survey Area

1.3.1 The survey area is located on the old Pallinghurst Estate approximately 1.5km to the east / north east of the village of Loxwood in the Chichester district of West Sussex. The survey area includes the Site of the Proposed Development and its proposed access from Loxwood Road as shown in red on Figure 1.1, and such adjacent land as was necessary to place the Site in its ecological context.

1.3.2 The Site comprises c.8.26ha of land currently dominated by woodland including semi-natural deciduous, and deciduous plantation woodland. The access route comprises an existing c.1.33km aggregate surfaced forest track with adjoining verges and ditches[1]. The survey area is adjoined by areas of semi-natural and ancient deciduous woodland, relatively recently planted deciduous plantation, mature coniferous plantation, scrub, hedgerows and improved grassland.

1.3.3 The wider landscape is characterised by a patchwork of woodland and arable and grassland fields, set within a network of hedgerows. There are scattered farms and houses as well as small settlements. Twelve ponds lie within 500m of the extraction site, with a further four lying alongside the proposed access route.

1.4 Proposed Construction Activities

1.4.1 Planning consent is sought for the extraction of approximately 400k tonnes of clay to be used in brick making and other construction/industrial applications. Following clay extraction, the Site will be sequentially restored with suitable treated imported materials which will be sourced from the proposed on-site construction materials recycling facility (CMRF). The restoration scheme has been designed for nature conservation with water bodies, wetland habitats and interim species rich seeded grassland to be replaced with plantation broadleaved woodland.

[1] An alternative access from Loxwood Road was also explored along a c.420m alignment of unsurfaced track passing through semi-natural deciduous woodland from approximately 505295,131768 before joining the primary route at approximately 505305,132137. This was investigated principally in relation to its use by foraging and commuting bats and forms part of the bat survey transect.

Loxwood Clay Pits, West Sussex

Red line boundary

Ancient Semi-Natural Woodland

Plantation on Ancient Woodland

0 190 380 N

Meters

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-Site210521

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Figure 1.1: Site location plan

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2 Methodology

2.1 Desk Study

2.1.1 A desk-based study was undertaken to examine published information and biological records from within the search area. The desk study established the presence of designated sites of nature conservation interest, or records of protected/notable habitats/species within the site and its surrounding area. This information was collected from the following sources:

- The 'MAGIC' (Multi-agency Geographic Information for the Countryside) website: www.magic.gov.uk;
- Surrey Biodiversity Information Centre (SBIC); and
- Sussex Biological Records Centre (SxBRC).

2.1.2 The desk study was undertaken during a Preliminary Ecological Appraisal (PEA) of the extraction site (Middlemarch Environmental, 2019[2]) using the following search radii: statutory nature conservation sites of international importance within a 5km radius of the site (extended to 10km for any statutory site designated for bats); statutory sites of national importance within a 2km radius; and non-statutory sites and protected/notable species records within a 1km radius.

2.2 Habitats and Vegetation Communities

Habitats

2.2.1 The extraction site was subject to a PEA[2] on 15 August 2019, and the access route was subject to a PEA[3] on 18 March 2020, in order to ascertain the general ecological value of the land contained within the boundaries of the Site, to identify the main habitats and ecological features present, and to scope the need for further detailed surveys of flora and fauna.

2.2.2 The Preliminary Ecological Appraisals were based on an Extended Phase 1 Habitat Survey. Within the survey area every parcel of land was classified, recorded and mapped using standard colour codes, in accordance with a list of ninety habitat types specified within the methodology for Phase 1 habitat survey (Joint Nature Conservation Council, 2010). This basic methodology was extended to provide more detail in relation to habitats with potential to support rare or protected fauna, as described by the Chartered Institute of Ecology and Environmental Management's *Guidelines for Preliminary Ecological Appraisal* (CIEEM, 2017b). For further details on methods, limitations and personnel refer to the PEA reports.

2.2.3 The Phase 1 habitats plans are included for reference at Appendix I.

[2] Middlemarch Environmental (2019): *Woodland East of Loxwood, West Sussex: Preliminary Ecological Appraisal.*

[3] Urban Edge Environmental Consulting (2020): *Land east of Loxwood, West Sussex: Preliminary Ecological Appraisal Report.*

Vegetation communities

2.2.4 To further assess the quality of habitats present, detailed botanical surveys were undertaken in spring and summer 2020. The aim of the survey was to identify and evaluate (for their nature conservation importance) the plant species and communities present in the areas that could be affected by the Proposed Development.

2.2.5 The survey was based on current National Vegetation Classification guidelines (NVC; Rodwell, 2006) using quadrat sampling across a representative selection of potentially valuable habitats. The survey was carried out by Dr Richard Bickers BSc(Hons) PhD MCIEEM, a Senior Ecologist with more than ten years consultancy experience and a specialism in plant and vegetation surveys, including National Vegetation Classification. Five survey visits were conducted in suitable weather conditions during April to June 2020 (20 April, 23 April, 13 May, 8 June and 23 June), to coincide with, or cover, the flowering period of many of the species present, and particularly to capture vernal species, which can be inconspicuous or undetectable later in the season.

2.2.6 Different parts of the survey area were identified as comprising one of the following habitat types:

- Deciduous woodland- older/longer established deciduous woodland, including Ancient Woodland;
- Plantation – native broadleaved plantations of recent origin as well as mature coniferous plantation; and
- Ride – tracks and associated verges, ditches and banks.

2.2.7 These habitats were further divided into areas for survey because, for example, they formed discrete habitat parcels, differed in structure or floristic composition, were associated with particular features or because it was useful for presentation. The survey area, and the different habitats and areas surveyed within it, are illustrated in Appendix II. In each habitat area surveyed all species identified were recorded, with a broad indication of their frequency and abundance using the DAFOR (dominant, abundant, frequent, occasional, rare) scale. In addition, in some areas, to provide more detail, a quadrat of appropriate size was placed in homogenous and representative stands of vegetation, in accordance with guidelines set out in the NVC Handbook, and the species present within the quadrat, and their abundance, were recorded using the Domin scale. In quadrats within the deciduous woodland the canopy, understorey/shrub layer and field layer were recorded separately. In the more recent plantations quadrats were used to record the field layer only, which included patchy shrubs and young trees. Notes were also taken of the general features of the different habitats and areas, including their appearance and structure. Where possible the plant communities present have been referred to the most appropriate NVC community and sub-community.

Evaluation criteria

2.2.8 Habitats and communities were evaluated with reference to a number of different sources, including Ratcliffe's (1977) criteria of size, diversity, naturalness, rarity, geographical position, fragility and the potential for substituting the habitat. Other sources included: JNCC guidelines

for the selection of biological Sites of Special Scientific Interest (SSSI)[4]; criteria for the selection of Local Wildlife Sites in Sussex[5]; and the Natural Environment and Rural Communities (NERC) Act 2006, Section 41, list of Habitats of Principal Importance in England (or 'Priority Habitats'). Given the wooded nature of the survey area and the presence of areas of Ancient Woodland and Ancient Replanted Woodland, the number, distribution and abundance of vascular plant Ancient Woodland Indicator species (AWI)[6] was also considered during the evaluation process.

2.2.9 Species rarity was evaluated using the red data lists for vascular plant species for Britain and England[7], Scarce Plants in Britain[8] and the Sussex Rare Plant Register[9], as well as NEC Act Section 41 Species of Principal Importance.

Limitations

2.2.10 The full extent of the Proposed Development Site, as well as most of the proposed access route and adjoining habitats were surveyed. Survey of the rides, including the proposed access route, included the central track and adjoining verges and ditches, where present. Habitats adjoining the access route were surveyed in a strip of c.30m width either side of the bank forming the outer edge of the ditches on either side of the track.

2.2.11 The following features were not surveyed: hedgerows and grassland located beside the access route between the two main woodland blocks (grid ref: 505560, 131965); ponds; and the proposed access route within Pephurst Wood (grid ref: 505590, 131890), which was bare of vegetation and lacked accompanying verges or ditches. It was considered that the PEA[3] survey sufficiently characterised these features to enable their evaluation as well as assessment of possible impacts. There were no other limitations of consequence to the survey.

2.2.12 See Appendix XV for general Legal and Technical Limitations which apply to this document.

2.3 Great Crested Newt

2.3.1 A great crested newt survey was undertaken in line with standard industry techniques as recommended by English Nature (2001) and Froglife (2001), as well as Natural England's standing advice[11] for GCN, comprising:

- Habitat suitability assessment; and

[4] JNCC, Guidelines for selection of biological SSSIs https://jncc.gov.uk/our-work/guidelines-for-selection-of-sssis/

[5] Sussex Local Wildlife Sites Initiative (2017): *Sussex Local Wildlife Site Selection Criteria*.

[6] Rose, F (1999): Indicators of ancient woodland - the use of vascular plants in evaluating ancient woods for nature conservation. *British Wildlife*: **10** (4), 241 – 251.

[7] Cheffings, C.M. and Farrel, L. (eds.) (2005): *The Vascular Plants Red Data List for Great Britain*. JNCC.

P.A. Stroh et al (2014): *A Vascular Plant Red List for England*. BSBI

[8] Stewart, A., Pearman, D.A. and Preston, C.D (1994): *Scarce Plants in Britain*. JNCC

[9] Briggs, M, Harmes, P and Knapp, A (2001): *The Sussex Rare Plant Register of Scarce & Threatened Vascular Plants, Charophytes, Bryophytes and Lichens*. Sussex Wildlife Trust for the Sussex Botanical Recording Society and Sussex Biodiversity Record Centre.

[11] Natural England (2015): *Great crested newts: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/great-crested-newts-surveys-and-mitigation-for-development-projects

- Conventional surveys for the presence or likely absence of GCN in ponds.

Habitat suitability assessment

2.3.2 The Habitat Suitability Index (HSI; Oldham *et al*, 2000) is a tool used to assess ponds on the basis of their suitability to support breeding great crested newts. The HSI incorporates ten suitability indices which are considered to affect GCN distribution. These are:

- Location (in Britain);
- Pond area;
- Desiccation rate (years out of ten that pond dries);
- Water quality (subjective assessment);
- Percentage of pond shaded (% of pond margin shaded 1m from the bank);
- Number of waterfowl;
- Fish population (subjective assessment);
- Density of ponds within 1km;
- Terrestrial habitat quality; and
- Percentage macrophyte cover.

Evaluation criteria

2.3.3 The results of the HSI calculation can be compared to categorised HSI scores used by the National Amphibian and Reptile Recording Scheme (Oldham *et al*, 2000) to identify the probability of a pond supporting great crested newts. The five categories are summarised in Table 2.1.

Table 2.1: HSI categories

Habitat Quality	HSI Score
Poor	Below 0.5
Below Average	0.5 – 0.59
Average	0.6 – 0.69
Good	0.7 – 0.79
Exceptional	Above 0.8

2.3.4 The HSI gives an indication of whether a pond is suitable for breeding great crested newts, however, it should be noted that a low score does not preclude the possibility that GCN are using the pond. A survey of ponds carried out to test the HSI (ARG UK, 2010) found that 20% of ponds which were scored as 'below average' still contained great crested newts, although this increased to an occupation rate of 93% for those ponds scored as 'excellent'. Another important consideration when using the HSI is that pond scores can vary at different times of year, for example, if emergent vegetation is not present (and therefore under recorded) at the time of the HSI assessment.

Pond surveys

2.3.5 The objective of the survey was to establish the presence or likely absence of great crested newts within potentially suitable breeding ponds, using conventional survey techniques. This requires a minimum of four survey visits to establish presence/absence, with a further two carried out to establish a population estimate if GCN are found.

2.3.6 Survey methodology adhered to standard techniques and designs as recommended by English Nature (2001) and Froglife (2001) as follows:

- ***Egg searching***: for great crested newt eggs was conducted for approximately 20 minutes per water body whereby submerged vegetation was checked for folded leaves. Egg searches were undertaken during all survey visits, but halted for each pond once eggs were found in that pond.
- ***Bottle trapping***: whereby traps were placed around the pond edges at a density of approximately one trap per 2m of shoreline. Floating bottle traps were used in lined ponds (where applicable) at the density stated for static bottle traps (2m spacing). Traps were set in the evenings and checked the following mornings for great crested newts. Bottle trapping was undertaken during all survey visits.
- ***Torchlight surveys***: using one million candle-power torches were undertaken for approximately 20 minutes per water body on each occasion. Torchlight surveying was undertaken during all survey visits.
- ***Netting***: using a long handled dip-net to sample the perimeter for approximately 15 minutes per 50m of shoreline. Netting is considered to be a less effective means of detecting adult GCN and was only carried out when one of the other techniques could not be utilised (e.g. for lined ponds).

2.3.7 Surveys were undertaken during suitable weather conditions (mild, with little or no rain and low winds). Surveys were carried out during the optimal survey season with at least 50% of the surveys being carried out during the peak great crested newt breeding season which runs from mid-April to mid-May (English Nature, 2001). The number of newts in each pond was recorded, together with sex (when distinguishable), maturity data, the presence of eggs/larvae, water temperature/turbidity, floating/emergent vegetation cover, numbers of traps set and percentage of shoreline surveyed. Other amphibian species observed during the surveys were also recorded (e.g. smooth newt *Lissotriton vulgaris*, palmate newt *L. helveticus*, common toad *Bufo bufo* and common frog *Rana temporaria*).

2.3.8 Prevailing weather conditions (air temperature, wind speed, precipitation and cloud cover) at the time of arrival for the evening visit for each survey were noted and are reported in Table 2.2.

Table 2.2: GCN survey dates and weather conditions

Date (2020)	Weather conditions
2 April	Air temp.: 12°; Cloud cover: 80%; Wind: light; Precipitation: none
9 April	Air temp.: 22°; Cloud cover: 0%; Wind: none; Precipitation: none
16 April	Air temp.: 17°; Cloud cover: 60%; Wind: none; Precipitation: none

Date (2020)	Weather conditions
23 April	Air temp.: 17°; Cloud cover: 0%; Wind: none; Precipitation: none
30 April	Air temp.: 13°; Cloud cover: 60%; Wind: moderate; Precipitation: none
7 May	Air temp.: 18°; Cloud cover: 0%; Wind: light; Precipitation: none

Evaluation criteria

2.3.9 Criteria for establishing a population size class assessment are given in English Nature (2001), as follows:

- Small for maximum counts up to 10;
- Medium for maximum counts between 11 and 100; and
- Large for maximum counts over 100.

2.3.10 The maximum count is calculated as the peak count by torch survey or bottle-trapping on any one night's survey. This is based on a spring survey of adult GCN numbers only, as egg, larval and juvenile counts can give a misleading indication of overall population size.

2.3.11 Evaluation of the potential impacts on GCN was undertaken with reference to Chapter 6 of English Nature (2001) and Natural England Standing Advice[12], with predicted impacts to each feature noted as of Low, Medium or High significance.

Limitations

2.3.12 The GCN presence/absence surveys reported herein were instructed on 2 March 2020 and carried out during April and May 2020. The surveys were hence undertaken in accordance with the recommended timings for presence/absence surveys using conventional techniques (English Nature, 2001) and mainly during the peak breeding season of mid-April to mid-May.

2.3.13 Table 2.3 lists the applicable access limitations for each of the 16 ponds initially targeted for survey; pond locations are shown on the plan at Appendix III. As a result of these limitations it was only possible to complete a four visit presence/absence survey for P1, P2, P4 and P5, rather than a six visit population estimate survey. Nevertheless, in the context of the survey results this is not considered to be a significant limitation.

Table 2.3: Pond access limitations

Pond	Limitations
P1	Access not granted until survey 3 due to landowner concerns regarding COVID-19
P2	Access not granted until survey 3 due to landowner concerns regarding COVID-19
P3	Access not granted until survey 3 due to landowner concerns regarding COVID-19; however P3 remained dry for the duration of surveys
P4	Access not granted until survey 3 due to landowner concerns regarding COVID-19

[12] Natural England (2015): *Great crested newts: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/great-crested-newts-surveys-and-mitigation-for-development-projects

Pond	Limitations
P5	Access not granted until survey 3 due to landowner concerns regarding COVID-19
P6	Access not granted until survey 3 due to landowner concerns regarding COVID-19; however P6 remained dry for the duration of surveys
P7	Access not granted until survey 3 due to landowner concerns regarding COVID-19; however P7 remained dry for the duration of surveys
P8	Access granted from outset; no limitations
P9	Access refused
P10	Access refused (attempted door-knock, no answer)
P11	Access refused (attempted door-knock, no answer)
P12	Access not granted until survey 3 due to landowner concerns regarding COVID-19; however P12 is actually an on-stream pool so survey not required
P13	Client owned; no limitations
P14	Client owned; no limitations
P14a	Client owned; no limitations
P15	Client owned; no limitations

2.4 Breeding and Wintering Birds

Breeding birds

2.4.1 Two approaches to breeding bird survey were utilised. To capture the majority of the breeding bird assemblage an adapted Common Bird Census (CBC; Gilbert *et al.*, 1998) methodology was used, with reference to Natural England's standing advice on wild birds[13]. Three survey visits were undertaken between April and early June. Surveys began within approximately 30mins of sunrise and continued for approximately 3hrs, with all species mapped using standard British Trust for Ornithology species codes and annotations.

2.4.2 The entire survey area including the Proposed Development Site and access route was covered on each visit using a repeatable transect (excluding survey 1 which was completed over two dates). Start points were varied to limit early morning bias. The transect was pre-plotted such that no part of the survey area fell further than 50m from the route, as shown on the plan at Appendix IV. During the surveys the transect was walked slowly and methodically and all bird activity observed by sight and sound was recorded on maps, with a particular focus on behaviour indicative of breeding (nests, song, display, carrying food or nest material, recently fledged young, etc.). Weather conditions were noted during the survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.4.

2.4.3 In addition, one crepuscular survey, with the objective of identifying the presence of nightjar *Caprimulgus europaeus*, was undertaken using an adapted version of the method set out for this

[13] Natural England (2015): *Wild birds: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/wild-birds-surveys-and-mitigation-for-development-projects

species in Gilbert *et al.* (1998). This was targeted at areas of potentially suitable habitat, comprising relatively open areas of recent broadleaved plantation located within the wider woodland, as shown on the plan at Appendix IV. The survey was carried out at dusk and for approximately 2.5hrs after sunset, and covered all areas of suitable habitat within the Proposed Development Site as well as adjoining the proposed access route.

Table 2.4: Breeding bird survey dates and weather conditions

Date (2020)	Area	Time / weather conditions
20 April	Site	Dawn; Air temp.: 6-12°; Cloud cover: 0%; Wind: 2-3; Precipitation: none
13 May	Site+Access	Dawn; Air temp.: 7-8°; Cloud cover: 0-100%; Wind: 2-3; Precipitation: none
26 May	Access	Dawn; Air temp.: 8-11°; Cloud cover: 0%; Wind: none; Precipitation: none
8 June	Site+Access	Dawn; Air temp.: 11-12°; Cloud: 100%; Wind: 1-3; Precipitation: none
22 June	Site+Access	Dusk; Air temp.: 16-13°; Cloud cover: 0%; Wind: 1; Precipitation: none

Wintering birds

2.4.4 A wintering bird survey was undertaken based on an adapted Common Bird Census (CBC; Gilbert *et al.*, 1998) methodology and with reference to Natural England's standing advice on wild birds[14]. Four survey visits were undertaken between November and February. Surveys were carried out during the morning and continued for approximately 3hrs, with all species mapped using standard British Trust for Ornithology species codes and annotations. The objective of the surveys was to make an assessment of the winter bird assemblage using the site, the relative abundance of each species, and the overall importance of the site as a foraging resource in the context of surrounding habitats which will continue to exist once the development is operational.

2.4.5 The entire survey area including the Proposed Development Site and access route was covered on each visit using the same repeatable transect used during the breeding bird survey. The transect was pre-plotted such that no part of the survey area fell further than 50m from the route, as shown on the plan at Appendix V. During the surveys the transect was walked slowly and methodically and all bird activity observed by sight and sound was recorded on maps. Weather conditions were noted during the survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.5.

Table 2.5: Wintering bird survey dates and weather conditions

Date	Weather conditions
16 November 2020	Air temp.: 10-11°; Cloud cover: 90-100%; Wind: 3-4; Precipitation: none
16 December 2021	Air temp.: 10-12°C; Cloud cover: 100%; Wind: 1; Precipitation: none
15 January 2021	Air temp.: 3-4°C; Cloud cover: 100-90%; Wind: 0-1; Precipitation: none
15 February 2021	Air temp.: 9-11°C; Cloud cover: 100-80%; Wind: 1; Precipitation: none

[14] Natural England (2015): *Wild birds: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/wild-birds-surveys-and-mitigation-for-development-projects

Evaluation criteria

2.4.6 At the end of the breeding bird survey, the field maps were analysed and collated to assess the number of territories for each species present. The number of breeding territories for each species was calculated from the species master map, normally based on a minimum of two registrations for each territory, although for late flying migrants, such as spotted flycatcher *Muscicapa striata*, for which fewer potential contacts are possible, only one registration is required to confirm a territory, an approach which can also be applied to inconspicuous species.

2.4.7 The significance of the results of breeding and wintering surveys was evaluated in a local and national context, with the importance of breeding bird populations and the overall assemblage considered in relation to:

- Annex I of EC Directive 2009/147/EC on the Conservation of Wild Birds (2009) ("Annex 1 species");
- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) ("Schedule 1 species");
- Birds of Conservation Concern Red, Amber and Green lists (Eaton *et al.*, 2015) ("BoCC Red, Amber and Green species");
- Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 ("Section 41 species");
- Guidelines for the selection of biological Sites of Special Scientific Interest in relation to birds (Drewitt *et al.*, 2015);
- Sussex Local Wildlife Site Selection Criteria (Sussex Local Wildlife Sites Initiative, 2017);
- Birds of Sussex 2014 (Sussex Ornithological Society and British Trust for Ornithology, 2014).

Limitations

2.4.8 The bird surveys were instructed in March 2020 and carried out during April to June 2020 and November 2020 to February 2021. The surveys were hence undertaken in accordance with the recommended timings for such surveys (Gilbert *et al.*, 1998), however, surveys along the access route started later such that two May visits were undertaken instead of an April and a May visit. There were no difficulties in gaining access to the site to carry out the survey. Weather conditions were generally good and within acceptable parameters. There were no other limitations of relevance to the methods applied.

2.5 Invertebrates

2.5.1 The methods used for the Invertebrate Site Assessment are those recommended in the Natural England guidance document *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation* (Drake *et al.*, 2007). In some instances, a bespoke method was created for the site assessment but still retains the overall approach to assessing features and habitats for conservation assessment. The bespoke methods relate to the extent of the free-ranging sampling. This prioritised features that showed obvious interest, such as the short sward and scrub fringe features.

Sweep netting

2.5.2 This method provides the main proportion of the survey element and is the most efficient method for cataloguing a site's invertebrate resource. Sweep netting involves the use of a long-handled sweep net being swept over vegetation such as stands of grasses or flowers, or along scrub fringes in order to gather invertebrate material.

Spot sampling

2.5.3 Spot sampling is employed to collect large, conspicuous invertebrates such as bees and wasps from flowering plants, and to supplement the sweep samples. Spot sampling is often the most effective method for recording species from high-fidelity niches.

Grubbing

2.5.4 Fallen deadwood, piles of rotting timber (for deadwood beetles), and short turf (for surface-running beetles) are fingertip-searched for any hiding or crawling invertebrates, principally beetles.

Pitfall traps

2.5.5 A series of pitfall traps were set out for the duration of the survey (May–August).

Flight interception traps

2.5.6 Three flight interception traps were set out for the duration of the survey. These were situated on trees that exhibited rot holes.

Species-specific surveys: stag beetle

2.5.7 Suitable surface contact or partially buried deadwood was overturned, and the surrounding soil dug to find evidence of eggs, larvae, pupal cocoons, and adult carcasses.

Dedicated adult searches

2.5.8 Adults were searched for using visual searches of deadwood, tree trunks, and leaf litter, for not only living beetles but also any beetle exoskeleton fragments that can persist in the environment. Baited traps were also laid out to attract any adults. Bait included ginger and mango, both noted as being attractants to adult stag beetles, with ginger being noted as the most effective.

2.5.9 The site was visited on five dates. Three visits were for invertebrate sampling and two for installing and removing stag beetle traps and undertaking a bespoke search for the species. Weather conditions were noted during the survey and are reported in Table 2.6.

Table 2.6: Invertebrate survey dates and weather conditions

Date (2020)	Weather conditions
6 May	Sunny, 18–22°C
15 June	Sunny, 18–22°C – pitfall trap setting and stag belle search

Date (2020)	Weather conditions
16 June	Sunny, 19–23°C
17 June	Sunny, 19–23°C – pitfall trap retrieval and supplementary search
21 July	Sunny, 19–24°C

Evaluation criteria

2.5.10 Analyses of site resource usage by invertebrates and Specific Assemblage Types (SAT) were generated using the Pantheon[15] software package. Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology (CEH) to assist invertebrate nature conservation in England. Site data in the form of species lists can be imported into Pantheon, which then analyses the species within the lists, assigning them to habitats and resources. Pantheon also consigns the most up-to-date national status to the species where it is available.

2.5.11 A SAT is characterised by stenotopic species (those that can withstand only a narrow range of environmental conditions). SATs are therefore more tightly defined than 'habitats' or 'resources' and sit within a parent habitat or Broad Assemblage Type (BAT). More than one SAT can sit within a parent BAT, for instance:

BAT: F2 – grassland and scrub matrix
SAT: F211 – herb-rich dense sward
F212 – dense scrub

2.5.12 The information obtained from Pantheon can then be used to assign quality to sites and their features, assist in management decisions, and facilitate requirement for further surveys, where required and appropriate. Pantheon was first made publicly accessible in April 2018 and is the primary analytical tool used by entomologists in site evaluation. It is also the tool recognised and preferred by Natural England. Not all species of importance are expressed in the Pantheon analysis tables, as they do not form part of the Pantheon analysis and/or their specific requirements are not yet fully understood.

Limitations

2.5.13 March to May 2020 was very dry and sunny, with May 2020 being the sunniest on record[16] and March to May having some of the lowest ever rainfalls. This resulted in an accelerated and curtailed spring season, bringing spring to a close much sooner than normal. Anecdotally, the dry weather appears to have reduced 2020 invertebrate numbers dramatically, particularly flies and beetles. It also impacted spring flowering plants, with many only flowering for a very short period of time, while plant growth also appeared to be inhibited during this period.

[15] For more information see: http://www.brc.ac.uk/pantheon/

[16] Madge, G. (2020) The Met Office. *May 2020 becomes the sunniest calendar month on record* [online]. Available at: https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2020/2020-spring-and-may-stats [Accessed on 07 September 2020].

2.6 Badger

2.6.1 There is no formal guidance currently in existence for badger survey, particularly with regards to establishing whether a sett is active, however common practice is for surveys to focus on a search for signs of badger activity (after Harris, Creswell & Jeffries, 1989) with reference to Natural England's standing advice[17] on badgers. Surveys comprised detailed site walkovers coupled with monitoring of potential badger sett entrances using camera traps.

Field sign surveys

2.6.2 Field sign surveys comprised a detailed investigation of all suitable areas of habitat for foraging and sett creation (subject to safe access) to record badger activity within the site, including:

- Dung pits: badgers usually deposit faeces in characteristic excavated pits, concentrations of which (latrine sites) are typically found at home range boundaries;
- Setts: comprising either single isolated holes or a series of holes, likely to be interconnected underground. Sett searches included the entire site plus a minimum buffer of 30m, subject to safe access;
- Runs/trails: paths between setts or leading to feeding areas;
- Scratching posts at the base of tree trunks;
- Snuffle holes: small scrapes where badgers have searched for insects, earthworms and plant tubers;
- Day nests: bundles of grass and other vegetation where badgers may sleep above ground;
- Hair traces; and
- Footprints.

2.6.3 The location, type and approximate extent of each sett or field sign was recorded using GPS coordinates and are shown on the plan at Appendix VI. The survey was initially undertaken on 24 July 2020 when a comprehensive site walkover was carried out to search for setts and field signs; approximately six hours of search effort was expended. Other observations were noted where applicable during subsequent site visits to reposition cameras or for other fauna. Weather conditions were noted during each survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.7.

Table 2.7: Badger survey dates and weather conditions

Date (2020)	Weather conditions
24 July	Air temp.: 22°; Cloud cover: 50%; Wind: light; Precipitation: none

Camera trap monitoring

2.6.4 Bushnell Trophy Cam HDmax movement-triggered infrared cameras were deployed on site, with the lens trained on individual or groups of potential sett entrances or other features considered

[17] Natural England (2015): *Badgers: surveys and mitigation for development projects.* Accessed online at: https://www.gov.uk/guidance/badgers-surveys-and-mitigation-for-development-projects

to be indicative of frequent badger activity such as latrines or mammal trails. The cameras record both still image and video footage, and were set to operate during night-time hours, capturing three images per trigger event. The objective was to record animal activity to determine whether potential setts were actively used by badgers and to assess the level of use. Signs of recent activity at sett entrances (e.g. fresh excavations, footprints, badger hairs or bedding) were also noted. The cameras were periodically moved within the site to ensure that all potential setts were monitored, and to focus on areas where the likelihood of recording badger activity was considered to be greatest based on the findings of the field sign surveys.

Evaluation criteria

2.6.5 Badger setts are usually classified into four types as follows:

- Main Sett: Large well-established setts normally in continuous use. The main sett will form the most likely location for the raising of cubs.
- Annex Sett: It is common for annex setts to be found in close association with the main sett and will often be linked to it by a well-worn path. Annex setts are often used to raise a second litter of cubs should a clan produce two litters within a season.
- Subsidiary Sett: Subsidiary setts often have only a few holes and are usually at least 50m from a main sett. They are not continuously active.
- Outlier Sett: These setts are used on an occasional basis and usually consist of only one to three entrance holes. Spoil heaps will generally be smaller than those found associated with the other sett types, indicating a smaller underground structure.

2.6.6 However, sett use varies over time as badgers respond to environmental factors such as food availability, competition with other social groups or sources of disturbance. In practice it is often difficult to distinguish between annex, subsidiary and outlier setts without extensive monitoring.

Limitations

2.6.7 There were no difficulties in gaining access to the site to carry out the survey. The location of trees assessed was recorded using GPS to an accuracy of approximately 5m. Weather conditions were generally good and within acceptable parameters. There were no other limitations of relevance to the methods applied.

2.7 Roosting Bats

2.7.1 Surveys for bats roosting in trees were based on standard industry guidelines (Collins (ed.), 2016) and Natural England's standing advice[18] for bats. A Preliminary Ground-level (tree) Roost Assessment (PGRA) was carried out as part of the PEA (UEEC, 2020). Trees lying within/adjacent to the survey area were subject to an external and where possible internal inspection for potential bat roost features (subject to safe access).

[18] Natural England (2015): Bats: surveys and mitigation for development projects. Accessed online at: https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects

2.7.2 The external inspection from ground-level focused on potential access points and roosting opportunities such as woodpecker holes, cavities, cracks or splits in major limbs (e.g. hazard beams, rot holes, frost cracks, knot holes, occlusions, flush cuts, tear-outs, cankers or butt-rots), loose platey bark, aerial deadwood and dense ivy or epicormic growth. Where low-level features were accessible from ground-level or ladder height, internal inspection included a search for live animals and other signs that give an indication of past or present occupancy. In the case of bats, typical indicators include droppings (which are characteristic and are often indicative of species), signs of fur oil staining, urine splashing, characteristic odours, and accumulations of discarded prey remains.

2.7.3 The location of each tree potentially suitable for roosting bats within the survey area was recorded using GPS as shown on the plans at Appendix I. The following standard data were collected: species, life stage, diameter at breast height, form and condition, types roost feature present, their aspect, stem orientation and approximate height above ground level.

2.7.4 Two experienced surveyors undertook the inspections over a combined period of approximately 22hrs with the aid of the following equipment: telescopic ladders to gain safe access; Wildlife Acoustics EchoMeter Touch full spectrum bat detector to record and identify the calls of any bats present; high-powered searchlight fitted with a red filter to search dark areas for signs of bats; telescopic mirror and 9mm digital endoscope camera to inspect hidden cavities; Hawke Sport Optics 10x42 close-focusing binoculars to view features higher up the stem or in the canopy; and digital camera with flash to record any evidence of bats or features suitable for use by bats.

Evaluation criteria

2.7.5 The overall suitability of each tree for roosting bats was classified with reference to Table 2.8 (Collins (ed.), 2016). The objective was to establish whether each feature was of negligible, low, moderate or high roosting bat suitability, or a confirmed roost based on the presence of bats or their droppings.

Table 2.8: Evaluation of structures/trees for roosting bats

Suitability	Roosting habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats
Low	A structure with one or more potential roost features (PRF) that could be used by individual bats opportunistically, but do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats A tree of sufficient size and age to contain PRFs but with none seen from the ground / using ladders or features seen with only very limited roosting potential
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (for roost type only)
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat

Suitability	Roosting habitats
Confirmed roost	Bats or unequivocal evidence of bats found, i.e. bat droppings

Limitations

2.7.6 There were no difficulties in gaining access to the site to carry out the survey, and the survey was initially completed in spring 2020 before the trees were in full leaf. The location of trees assessed was recorded using GPS to an accuracy of approximately 5m.

2.8 Foraging and Commuting Bats

2.8.1 Bat activity surveys were based on standard industry guidelines (Collins (ed.), 2016) and Natural England's standing advice[19] for bats, comprising:

- Transect surveys: walking through a representative sample of the survey area's habitats to a predetermined route, to listen for, observe and record bats in flight away from their roosts using handheld bat detectors, noting bat activity and behaviour; and
- Remote monitoring: installation of automated detectors for a five night period per deployment to remotely monitor bat activity in fixed locations within the survey area, with locations changing over the course of the season.

2.8.2 Current guidelines (Collins (ed.), 2016) recommend reasonable levels of bat activity survey effort, based on overall habitat suitability; see Table 2.9.

2.8.3 Considering the scale of development proposed and the area-linear relationship of different parts of the Site, the survey method was adapted from the standard approach for moderate suitability habitats, as follows:

- One survey visit per month (August to October) with two static detector locations per transect, including at least one dusk and pre-dawn survey.
- Two transects each to be walked by one surveyor on each occasion.

Table 2.9: Recommended survey effort for bat activity surveys

Low suitability habitat	Moderate suitability habitat	High suitability habitat
One survey visit per season (spring/summer/autumn), and One static detector location per transect, monitored for five consecutive nights per season (30mins before sunset (SS) to 30mins after sunrise (SR) each night)	One survey visit per month (April to October), including at least one dusk & pre-dawn survey, and Two static detector locations per transect, each monitored for five consecutive nights per month (SS-30mins to SR+30mins)	Up to two survey visits per month (April to October), including at least one dusk and pre-dawn survey, and Three static detector locations per transect, each monitored for five consecutive nights per month (SS-30mins to SR+30mins)

[19] Natural England (2015): *Bats: surveys and mitigation for development projects.* Accessed online at: https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects

Transect surveys

2.8.4 Transect surveys of the site coincided with deployment and retrieval of the automated detectors. Two transect routes representative of the survey area's habitats and transitional zones were plotted and walked once during each survey. Start points were randomised and the direction of travel alternated to avoid crepuscular bias. One surveyor undertook each transect survey, and walked at a slow, consistent speed along the transect route, stopping for approximately 5 to 7 minutes at each transect point to listen for bats and record activity and behaviour (spot counts). Bat activity between transect points was also recorded where possible. The locations of transect points are shown in Appendix VIII, and these are referred to within the results.

2.8.5 Dusk activity surveys commenced at sunset and continued for approximately two hours. Two hours was considered to be a sufficient length of time in which to adequately cover the survey area and to account for the species likely to be present in these habitats in Sussex. Dawn activity surveys (where applicable) started approximately two hours before dawn and continued at least until sunrise.

2.8.6 Wildlife Acoustics Echometer Touch and Touch2 Pro time expansion detectors were used during the transect surveys. Bat recordings were analysed using Kaleidoscope Pro (v5.4) software which enables evaluation of a range of echolocation call parameters to identify bats to genus or species level. Weather conditions were noted during each survey (minimum/maximum air temperatures, wind speed/direction, precipitation and cloud cover) and are reported in Table 2.10 and alongside the results in Appendix IX. Sample call sonograms recorded during the surveys are given at Appendix X.

Remote monitoring

2.8.7 Four Wildlife Acoustics zero-crossing bat detectors (2x SM4BAT and 2x SMZC) were used for the automated monitoring. These were sited at a height of around 3–5m above ground level and left in-situ for at least 5 nights during each month of survey. Deployment locations were chosen systematically to achieve an even distribution across the survey area representative of its habitats where possible, and are shown in Appendix VIII; these locations are referred to within the results.

2.8.8 The bat detector was set to record passes from 30 minutes before sunset to 30 minutes after sunrise to capture early emerging and late returning bats and this was standard for all surveys. Data from the recorder were analysed using Kaleidoscope Pro (v5.4) software. Sample call sonograms recorded during the surveys are given at Appendix X.

2.8.9 Weather data for the survey period was obtained from the closest weather station and is presented in Appendix XI.

Table 2.10: Bat activity survey dates and weather conditions

Date (2020)	Time	Weather conditions
20 April	Dusk	Air temp.: 13—11°C; Cloud cover: 0%; Wind: B3; Precipitation: none
11 May	Dusk	Air temp.: 10—9°C; Cloud cover: 60%; Wind: B1; Precipitation: none
15June	Dusk	Air temp.: 17—15°C; Cloud cover: 20%; Wind: none; Precipitation: none

Date (2020)	Time	Weather conditions
23 July	Dusk	Air temp.: 18—17°C; Cloud cover: 80%; Wind: none; Precipitation: none
24 July	Dawn	Air temp.: 16—15°C; Cloud cover: 100%; Wind: none; Precipitation: none
27 August	Dusk	Air temp.: 15—15°C; Cloud cover: 100%; Wind: B3; Precipitation: none
16 September	Dusk	Air temp.: 22—19°C; Cloud cover: 0%; Wind: B2; Precipitation: none
17 September	Dawn	Air temp.: 14—13°C; Cloud cover: 0%; Wind: B1; Precipitation: none
7 October	Dusk	Air temp.: 13-12°C; Cloud cover: 60%; Wind: B1; Precipitation: light/mod

Evaluation criteria

2.8.10 Within this report, the potential suitability of foraging/commuting habitats is classified as negligible, low, moderate or high with reference to Table 4.1 in the *Good Practice Guidelines* (Collins (ed.), 2016). Levels of bat activity are also noted as low, moderate or high, however, these should be taken as relative terms applicable within the survey area only. In other words, they are intended to indicate which parts of the survey area are used more frequently by bats, and which may therefore be of importance to the conservation status of local bat populations. Interpretation of these terms and the accompanying data on species assemblage and abundance is, where appropriate, used to indicate areas of high and moderate value to bats. These again are relative terms applicable within the survey area only. The overall importance of the survey area to foraging and commuting bats is evaluated with reference to *Valuing bats in EcIA* (Wray, 2010)

2.8.11 It should be noted that bat passes recorded during automated static monitoring were split to a maximum duration of 60 seconds and do not equate to numbers of individual bats. Bats will often repeatedly pass a detector when hunting along a linear feature such as a hedgerow or tree line, and there is no way to determine numbers of individuals from this data. The number of bat passes should instead be taken as an index of relative bat activity at a particular location within the site.

Limitations

2.8.12 The activity surveys were instructed in March 2020 and undertaken throughout the active season (April to October). The surveys were undertaken in accordance with the BCT's recommended timings for activity surveys (Collins (ed.), 2016). There were no difficulties in gaining access to the site to carry out the surveys. Weather conditions were generally good during the surveys and within acceptable parameters.

2.8.13 One of the automated bat detectors used during passive monitoring in June 2020 is suspected to have malfunctioned; the detector recorded log data (i.e. system information) which showed it was switched on throughout the period but the data card was corrupted. This limitation is unfortunate but unlikely to significantly affect the overall conclusions of the survey given the volume of data collected by the other detectors and transect surveys. In addition two other detector deployments in July and October recorded noise files only; this could imply that there were no bats flying within the detectable range during the monitored period, but this seems unlikely given the abundance of bats. All three detectors were checked, re-deployed and subsequently worked as expected. There were no other limitations of relevance to the methods applied.

2.9 Hazel Dormouse

2.9.1 A presence/absence survey for hazel dormouse was carried out, based on standard industry guidelines (Bright *et al.*, 2006) and Natural England's standing advice[20] for dormouse, comprising:

- Nest tube surveys: installation of artificial nest tubes within areas of suitable habitat which were subsequently checked for occupancy; and
- Nut searches: ground searches for hazel nuts which have been opened/gnawed by dormice.

Nest tube survey

2.9.2 Nest tube surveys utilise a minimum of 50 tubes deployed at c.15-20m intervals in suitable habitat within and bordering the survey area, installed in spring and left in situ at least until September. Each tube is checked for dormice or their nests during the survey. The survey is required to achieve a minimum score of 20 against the index of detection probability outlined in Table 2.11.

Table 2.11: Index of detection probability for hazel dormice (if using 50 nest tubes)

Month	Index of probability
April	1
May	4
June	2
July	2
August	5
September	7
October	2
November	2

2.9.3 The index is based on a deployment of 50 nest tubes as standard. Where a survey deploys nest tubes in greater or lesser numbers the weighting score is amended accordingly, because this will affect the detectability of dormice. The current survey used 90 nest tubes, installed within c.4.2ha of deciduous semi-natural and plantation woodland on 26 March 2020, meaning that the weighting score can be multiplied by 1.8 times that shown in the index. Nest tube checks were carried out in May, June, August, September and October thereby achieving a total score of 24 (4+2+5+7+2=20*1.8=36) which gives a good degree of confidence in the survey findings.

2.9.4 Nest tubes were positioned in all areas of suitable habitat within the survey area, as shown at Appendix XII. The location of each nest tube was marked with survey tape to ensure that all tubes could be re-located during subsequent survey visits. The location of occupied tubes containing dormice or their nests was recorded using GPS coordinates, together with the number of individuals and sex, weight and maturity data. Weather conditions were noted during each survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.12.

[20] Natural England (2015): *Hazel or common dormice: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects

Table 2.12: Hazel dormouse survey dates and weather conditions

Date (2020)	Weather conditions
19 May	Air temp.: 18°; Cloud cover: 0%; Wind: moderate; Precipitation: none
12 June	Air temp.: 16°; Cloud cover: 100%; Wind: moderate; Precipitation: light
27 August	Air temp.: 17°; Cloud cover: 50%; Wind: light; Precipitation: none
16 September	Air temp.: 18°; Cloud cover: 0%; Wind: moderate; Precipitation: none
7 October	Air temp.: 12°; Cloud cover: 30%; Wind: moderate; Precipitation: none

Nut searches

2.9.5 The simplest way to establish dormouse presence at a site is to look for gnawed hazel nuts. Dormice leave a smooth round hole with few toothmarks on the surface; mice and voles may also leave a round hole, but with transverse toothmarks on the cut edge. Hazelnut searches comprise systematic surveys of five 10x10m quadrats for gnawed nuts. Searching is carried out for 20 minutes within each quadrat before moving on to the next. There is an 80% probability that, if dormice are present, gnawed nuts will be found by the time three such squares have been searched (Bright *et al.*, 1994, cited in Bright *et al.*, 2006). Alternatively for smaller areas at least 100 nuts are checked. However, nut searching can only be used as a supplementary technique, and between September and December in areas dominated by fruiting hazel trees.

2.9.6 Hazel was dominant to abundant in the south-western quadrant of semi-natural deciduous woodland and nut searches were carried out during the September and October surveys.

Evaluation criteria

2.9.7 Population size is very difficult to evaluate as dormice live at low densities, even in the best habitats. In early summer there are typically only 3 to 5 (but sometimes up to 10) adults per hectare in deciduous and conifer woodland habitats. Results from the National Dormouse Monitoring Programme suggests an average of between 1.75 and 2.5 adults per hectare based on 83 sites in various habitats, with the lowest densities in the north of England (1993 to 2000 inclusive; Bright & Sanderson, pers. comm., cited in Bright *et al.*, 2006). Across the country, including sub-optimal habitats, the average population density is estimated to be around 2.2 adults per hectare.

Limitations

2.9.8 The dormouse surveys were instructed in March 2020 and carried out during May, June, August, September and October 2020. The surveys were hence undertaken in accordance with recommended survey timings (Bright *et al.*, 2006). There were no difficulties in gaining access to the site to carry out the surveys. GPS records were collected to an accuracy of approximately 5m. There were no other limitations of relevance to the methods applied.

2.10 Reptiles

2.10.1 A presence/absence survey for reptiles was carried out, based on standard industry guidelines (Hill *et al.*, 2005; Froglife, 1999; Gent and Gibson (eds.), 2003) and Natural England's standing advice[21] for reptiles, combining habitat suitability assessments, Visual Encounter Surveys (VES) and Artificial Refuge Surveys (ARS). A minimum of seven survey visits during suitable weather (principally an air temperature between 9 and 18 ℃, and in the absence of rain and strong wind) are required to establish the presence or likely absence of reptiles within the survey area.

2.10.2 Within the extraction site, 80 artificial refuges were used within the survey area distributed across approximately 2.7ha focusing on the areas of most suitable habitat, as shown on the plan at Appendix XIII. Guidelines recommend that at least 10 refuges are used per hectare of land surveyed (refuge density during this survey = c.30/ha). To give reptiles time to locate and habituate to new refuges in their environment they were placed on 26 March 2020, 22 days prior to the start of the main survey period. Surveys along the access route started later. Forty-five artificial refuges were deployed on 12 May 2020 along c.1.1km of trackside habitat, with surveys starting 14 days later on 26 May 2020. Refuges were periodically replenished in some locations after being 'tidied away' by passers-by.

2.10.3 The location of reptiles (including sloughed skins or eggs) was recorded using GPS coordinates, together with species counts, sex (when distinguishable) and maturity data. Weather conditions were noted during each survey (air temperature, cloud cover wind speed, precipitation and ground conditions) and are reported in Table 2.13.

Table 2.13: Reptile survey dates and weather conditions

Date (2020)	Area	Weather conditions
16 April	Site	Air temp.: 17°; Cloud cover: 60%; Wind: none; Precipitation: none; Ground conditions: dry
17 April	Site	Air temp.: 12°; Cloud cover: 100%; Wind: light; Precipitation: none; Ground conditions: dry
20 April	Site	Air temp.: 14°; Cloud cover: 0%; Wind: moderate; Precipitation: none; Ground conditions: dry
24 April	Site	Air temp.: 17°; Cloud cover: 0%; Wind: light; Precipitation: none; Ground conditions: dry
26 May	Site+Access	Air temp.: 18°; Cloud cover: 0%; Wind: light; Precipitation: none; Ground conditions: damp
8 June	Access	Air temp.: 16°; Cloud cover: 80%; Wind: moderate; Precipitation: none; Ground conditions: dry
12 June	Access	Air temp.: 16°; Cloud cover: 100%; Wind: moderate; Precipitation: light; Ground conditions: damp
19 June	Access	Air temp.: 14°; Cloud cover: 70%; Wind: light; Precipitation: none; Ground conditions: dry

[21] Natural England (2015): *Reptiles: surveys and mitigation for development projects.* Accessed online at: https://www.gov.uk/guidance/reptiles-protection-surveys-and-licences

Date (2020)	Area	Weather conditions
22 June	Access	Air temp.: 19°; Cloud cover: 10%; Wind: moderate; Precipitation: none; Ground conditions: dry
15 July	Site+Access	Air temp.: 18°; Cloud cover: 60%; Wind: light; Precipitation: none; Ground conditions: dry
8 Sept	Site+Access	Air temp.: 17°; Cloud cover: 60%; Wind: moderate; Precipitation: none; Ground conditions: dry

Evaluation criteria

2.10.4 Criteria for establishing a population size class assessment based on a refuge density of 10/ha are given in Froglife (1999), as shown in Table 2.14, but it should be noted that this is intended to be used in conjunction with a higher number of survey visits than normally undertaken for a presence/absence survey. Site scores can be compared to the Key Reptile Site selection criteria (Froglife, 1999) to establish the overall importance of a site for reptiles.

Table 2.14: Population size class assessment and Key Reptile Site criteria (Froglife, 1999)

Species	Low Population Score =1	Good Population Score =2	Exceptional Population Score =3
Adder	<5	5 - 10	>10
Grass snake	<5	5 - 10	>10
Common lizard	<5	5 - 20	>20
Slow-worm	<5	5 - 20	>20
To qualify as a Key Reptile Site, the survey site must meet at least one of the following criteria:			
1. Supports three or more reptile species			
2. Supports two snake species			
3. Supports an exceptional population of one species (see above)			
4. Supports an assemblage of species with a combined score of at least 4 (see above)			
5. Does not satisfy 1 - 4 but is of particular regional importance due to local rarity			

Limitations

2.10.5 There were no difficulties in gaining access to the site to carry out the surveys and the entire site was accessible throughout the survey. Refuge density within areas of favourable habitat exceeded that recommended by current guidelines. All survey visits were undertaken during suitable weather conditions and at an appropriate time of year. GPS records were collected to an accuracy of approximately 5m. There were no other limitations.

2.11 Personnel

2.11.1 The personnel deployed on the surveys are listed in Table 2.15.

Table 2.15: Survey personnel and qualifications

Feature / Task	**Personnel**
NVC survey	Richard Bickers
Great crested newt survey	Nick Pincombe, Richard Bickers, Anna Douglas
Breeding/wintering bird survey	Richard Bickers
Invertebrate survey	Andy Jukes
Badger survey	Anna Douglas, Jeff Turton
Ground-level roost assessment	Nick Pincombe, Anna Douglas
Bat activity surveys	Nick Pincombe, Anna Douglas, Jeff Turton
Hazel dormouse survey	Becci Bond, Anna Douglas, Alex Weeks
Reptile surveys	Richard Bickers, Anna Douglas
Personnel	**Qualifications**
Nick Pincombe BA(Hons) MSc CEnv MIEMA MCIEEM	Director with fifteen years' experience leading survey and impact assessment teams for a wide range of ecology and environmental planning projects. Natural England Class Licences to survey for bats (WML-CL18) and great crested newt (WML-CL08).
Andy Jukes BSc (Hons) MCIEEM FRES	Invertebrate Ecologist with over 20 years' applied experience in undertaking invertebrate surveys and site assessment.
Dr Richard Bickers BSc(Hons) PhD MCIEEM	Senior Ecologist with ten years' professional consultancy experience. Botanical specialist and keen birder with a licence to survey for great crested newt (WML-CL09).
Becci Bond BSc(Hons) MCIEEM	Senior Ecologist with nine years' professional consultancy experience. Licences to survey for bats (WML-CL17), great crested newt (WML-CL09) and hazel dormouse (WML-CL10a).
Anna Douglas BSc(Hons) MSc GradCIEEM	Ecologist with four years' professional consultancy experience. Licences to survey for bats (WML-CL17) and great crested newt (WML-CL09).
Jeff Turton BSc(Hons) GradCIEEM	Ecologist with four years' professional consultancy experience. Licence to survey for great crested newt (WML-CL09).
Alexandra Weeks BSc(Hons) MRes	Assistant with two seasons' survey experience.

3 Habitats and Vegetation Communities

3.1 Desk Study Records

Statutory and non-statutory site designations

3.1.1 No Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites are located within a 5km radius of the Proposed Development Site; see Figure 4.1. No Sites of Special Scientific Interest (SSSI) are located within a 2km radius of the Site. No locally designated non-statutory sites are located within a 1km radius of the Site.

3.1.2 The Site falls within a SSSI Impact Risk Zone for Chiddingfold Forest SSSI and The Mens SSSI which are located approximately 2.70km north-west and 6.50km south, respectively. Planning applications for minerals extraction within this zone will require the LPA to consult with Natural England prior to determination.

Priority habitats

3.1.3 Priority habitats include those listed on local Biodiversity Action Plans and habitats of principal importance listed under section 41 of the Natural Environment and Rural Communities Act 2006. SxBRC and a search of the MAGIC database returned the following data on priority and other habitats within the desk study search area: Traditional Orchard, Deciduous Woodland, and Ancient Woodland. Deciduous Woodland, and Ancient Woodland are present within and adjacent to the survey area.

Protected, rare and notable species of flora

3.1.4 Biological records were obtained for the 1km search area and are summarised in Table 3.1.

Table 3.1: Records of protected, rare & notable flora within the desk study search area

Group	Species	Designation
Plants	Bluebell *Hyacinthoides non-scripta*	WCA Sch.8
	Eyebright *Euphrasia pseudokernerl*	NERC s41
	Greater Butterfly-orchid *Platanthera chlorantha*	RL-GB near threatened
	Tormentil *Potentilla erecta*	RL-ENG near threatened
	Lesser Spearwort *Ranunculus flammula*	RL-ENG vulnerable
	Great Yellow-cress *Rorippa amphibia*	Sussex rare
	Sanicle *Sanicula europaea*	RL-ENG near threatened
	Rock Stonecrop *Sedum forsterianum*	Nationally scarce
	Ragged-Robin *Silene flos-cuculi*	RL-ENG near threatened
	Goldenrod *Solidago virgaurea*	RL-ENG near threatened

Group	Species	Designation
	Devil's-bit Scabious *Succisa pratensis*	RL-ENG near threatened
	Common Valerian *Valeriana officinalis*	RL-ENG near threatened
	Heath Speedwell *Veronica officinalis*	RL-ENG near threatened

WCA s1/Sch.1,5,8 Wildlife and Countryside Act 1981 Section 1 / Schedules 1, 5 (fully or partially protected), or 8
NERC s41 Natural Environment & Rural Communities Act 2006 Section 41 Species of Principal Importance
RL-GB/ENG Vascular Plants Red Data List for Great Britain (JNCC, 2005) / for England (BSBI, 2014)

3.2 Phase 1 Habitats

3.2.1 The following Phase 1 habitats were identified in the PEAs[2,3] (see Appendix I):

Clay extraction site

- Broadleaved semi-natural woodland
- Broadleaved plantation woodland
- Mixed plantation woodland
- Scattered trees

Access route

- Broadleaved semi-natural woodland
- Broadleaved plantation
- Coniferous plantation
- Scattered broadleaved and coniferous trees
- Dense scrub
- Species poor hedgerow
- Species poor hedgerow with trees
- Poor semi-improved grassland
- Improved grassland
- Standing water (ponds)
- Running water (stream)

3.3 Vegetation Communities

Context

3.3.1 The survey area lies within two larger blocks of woodland and plantation, including areas of Ancient Woodland and Ancient Replanted Woodland. The western block covers approximately 90ha and the eastern block is approximately 35ha. The western block also adjoins further areas of woodland to the north.

3.3.2 Survey locations within the deciduous woodland, plantation and rides are shown on the plans in Appendix II, together with photos of each subdivision. Table AII.0.1 to Table AII.0.3 in Appendix II summarise the results of the botanical survey for deciduous woodland, plantation and rides, respectively.

Deciduous woodland

3.3.3 This was present in the south western quarter and centre of the main development site (Appendix II map reference DW1), along the northern boundary of the main development site (DW2), in the eastern part of the main development site (DW3), to the south and west of the site and beside large sections of the access track (DW4 and DW5). Most of these woodland areas included boundary or internal banks and ditches.

3.3.4 In general, with some degree of variation and with one or two exceptions, this was relatively homogenous in structure and species composition. It comprised mature woodland with a canopy dominated by oak, including both sessile and pedunculate oak *Quercus petraea* and *Q. robur*, as well as probable hybrids between the two species. Ash *Fraxinus excelsior* was also occasional and locally frequent, and a range of other species were also present and could be locally frequent, including field maple *Acer campestre* and silver birch *Betula pendula*. In addition to sessile oak and field maple ancient woodland indicators (AWI) included aspen *Populus tremula*, wild service tree *Sorbus torminalis*, wild cherry *Prunus avium* and hornbeam *Carpinus betulus*. There was a continuous canopy of mixed aged and sized trees, but mature trees were frequent more or less throughout.

3.3.5 The understorey/shrub layer was variable in density but dominated by hazel *Corylus avellana*, although a range of other shrub species and young trees, including hawthorn *Crataegus monogyna*, holly *Ilex aquifolium* and silver and downy birch *Betula pubescens*, were also present and were locally frequent.

3.3.6 Honeysuckle *Lonicera periclymenum* was frequent and locally abundant and ivy *Hedera helix* occasional, both as climbers and in the field layer.

3.3.7 The field layer was variable but quite rich, with a good number of AWIs, of which the more frequent and abundant were bluebell *Hyacinthoides non-scripta*, wood anemone *Anemone nemerosa*, primrose *Primula vulgaris*, wood speedwell *Veronica montana*, barren strawberry *Potentilla sterilis*, wood melick *Melica uniflora*, and wood and pendulous sedges *Carex sylvatica* and *C. pendula*. Other AWIs included tutsan *Hypericum androseanum*, slender St John's wort *Hypericum pulchrum*, three nerved sandwort *Moerhingia trinervis*, early purple orchid *Orchis mascula*, wood sorrel *Oxalis acetosa*, goldilocks buttercup *Ranunculus auricomis*, sanicle *Sanicula europaea*, black bryony *Tamus communis* and bush vetch *Vicia sepium*. Other prominent species included bramble *Rubus fruticosus*, dog's mercury *Mercurialis perennis*, wild strawberry *Fragraria vesca*, wood false brome *Brachypodium sylvaticum* and male and broad buckler ferns *Dryopteris felix-mas* and *D. dilatata*.

3.3.8 Much local variation in species composition appears likely to reflect variations in the base status, or acidity or alkalinity, of the soils, as well as their hydrology. For example, somewhat more base rich areas are likely to correspond to increased abundance of ash and particularly field maple in

the woody component of the vegetation, and where species such as dog's mercury, sanicle, lesser celandine *Ficaria verna* and wood false brome are more frequent or abundant in the field layer. In contrast, areas where these species are absent or rare and where, for example, silver birch is more prominent and honeysuckle and bracken are frequent or abundant, probably reflect the presence of somewhat base poorer soils.

3.3.9 Most of this woodland can be best identified as belonging to the NVC W10 *Quercus robur – Pteridium Aquilinum – Rubus fruticosus*/pedunculate oak – bracken – bramble woodland community, of which the typical sub community is most widespread, with possible stands of the *Anemone nemerosa* wood anemone sub-community. However, where ash, field maple and dog's mercury are more frequent it approaches the W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis*/ash – field maple – dog's mercury woodland community. W10 and W8 are the two most widespread woodland communities in lowland Britain.

DW1

3.3.10 This formed the south western quadrant and part of the centre of the main development site. The main south western section of this area broadly matched the general description given above. Hazel appeared to have been planted in parts of the area. Three quadrats were recorded in this section and illustrate some of the range of variation present.

3.3.11 Quadrat DWQ1 was located in an area with a dense canopy and especially shrub layer in the west of this quadrant. The field layer was less rich than much of the area, with honeysuckle the most abundant species. There was a relatively high cover of bare ground, probably reflecting its relatively shady nature. DWQ2 was located near the centre of the south western section in an area with abundant honeysuckle and some bracken. DWQ3 was richer, with several species, such as wood anemone, absent from the other quadrats. The additional presence of field maple, combined with the lower abundance of honeysuckle, suggests that this was likely to have been a somewhat more base-rich area than those in which the other quadrats were located.

3.3.12 The northern section of DW1 differed somewhat from the main south western section. The western part had a very sparse or absent shrub layer, except around its edges, with scattered mature canopy trees over a quite grassy field layer, with velvet bent *Agrostis canina*, Yorkshire fog *Holcus lanatus* and sweet vernal grass *Anthoxanthusm odoratum*. Species characteristic of the more open conditions, such as foxglove *Digitalis purpurea* and heath groundsel *Senecio sylvaticus* were also present, although a range of woodland species were also frequent.

3.3.13 The eastern part of this northern section included an area with locally frequent mature conifers, but also an area of wet woodland, with aspen, goat and grey willows *Salix caprea* and *S. cinerea*, as well as ash. The ground was largely bare and based on its appearance it a seemed likely to support seasonal standing water.

3.3.14 Twenty-two AWIs were recorded in DW1.

DW2

3.3.15 This relatively long and narrow area was located on the northern edge of the main development site alongside a Public Right of Way. It was located between and on roughly parallel banks,

although the overall width of the woodland area varied a little. It was moderately rich, with relatively frequent field maple, ash and dog's mercury. Some small depressions appear likely to support seasonal standing water, and this is reflected in elements of the flora, such as locally frequent remote sedge *Carex remota* and marsh bedstraw *Galium palustre*. Eighteen AWIs were recorded in this area.

DW3

3.3.16 This area was located in the east of the main development site. The western part was located alongside and within two parallel banks running roughly south west to north east. The woodland extended further to the east at its southern end. The section alongside the banks was relatively typical in character but the south eastern section comprised scattered mature oaks and conifers with a generally sparse, but patchily abundant, shrub layer of hazel with young silver birch and oak. The field layer was lush but less species rich, with fewer AWIs, and similar to that found in the adjoining plantation P2 (see below), with abundant bramble, wood false brome, wood sage *Teucrium scorodonia*, rough meadow grass *Poa trivialis* and wood sedge. Fifteen AWIs were recorded in this area, with many confined to the area within and adjacent to the parallel banks.

DW4

3.3.17 This comprised the bulk of the woodland to the south and west of the main development site, as well as either side of the proposed access route. Strips of variable width, but in some cases up to several metres wide either side of the banks at the top of the ditches forming the edge of the access track ride (R4) included only occasional trees and shrubs and it appeared as if the vegetation, with the exception of trees and some shrubs, is periodically cut. These areas were more open in character, with species such as foxglove and marsh thistle frequent.

3.3.18 Most of the rest of the habitat was fairly typical in character, and quadrats DWQ4 and DWQ5 reflect this. The woodland at the far south eastern end, comprising part of Pephurst Wood, was punctuated by several ponds and generally this area had a somewhat 'wetter' and more base-rich and eutrophic aspect than the rest of the woodland. For example, DWQ6 included aspen, goat willow and sycamore in the canopy and a relatively high cover of dog's mercury in the field layer. Nettle *Urtica dioica* and broadleaved dock *Rumex obtusifolius*, both relatively scarce in the woodland as a whole, were also patchily present. Hornbeam *Carpinus betulus*, although scarce in the surveyed woodland as a whole, was also patchily abundant in this area. Thirty AWIs were recorded in this area.

DW5

3.3.19 This comprised a distinctive area forming a narrow strip at the base of banks either side of a small woodland stream which crosses the proposed access route. Ash and alder formed the majority of the canopy, with occasional pedunculate oak. In the field layer celandine and sanicle were distinctively abundant or frequent, with wood anemone more abundant than elsewhere, patchily abundant dog's mercury and rough meadow grass and occasional pignut *Conopodium majus*. Pendulous and remote sedges were frequent on the banks of the stream. Twelve AWIs were recorded in this area.

3.3.20 This woodland can be identified as belonging to the W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis* / ash – field maple – dog's mercury community, tending towards the *Anemone nemerosa* wood anemone sub-community, though it also has some affinities to the *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemorum* / alder – ash – yellow pimpernel woodland community.

Ancient and non-ancient woodland

3.3.21 Interestingly, it was not possible to identify clear floristic (in terms of species composition, richness, or presence or abundance of AWIs) or structural differences between the areas of Ancient Woodland (such as Pephurst and Hurst Woods and Caddick Copse) and the other areas of woodland. For example, stands of wood anemone, a species often considered to be particularly closely associated with Ancient Woodlands or other habitats or features with a long ecological continuity[22], were present in areas of non-Ancient Woodland such as DW1, DW2, non-Ancient Woodland parts of DW4 and DW5. The non-Ancient eastern parts of Caddick Copse, forming part of DW4, were not noticeably less rich in AWIs than were the Ancient Woodland parts to the west with, for example, large stands of bluebell, as well as guelder rose *Viburnum opulus*, primrose, sanicle, barren strawberry, wood speedwell, wood sorrel *Oxalis acetosa*, black bryony, wood melick, hairy wood rush *Luzula pilosa* and wood sedge.

Plantation

3.3.22 These comprised areas that had been obviously planted with trees. They can be divided into established and recent broadleaved plantations, and coniferous plantations.

Established broadleaved plantation

3.3.23 These were areas planted with native broadleaved trees where canopy closure had occurred.

P1 and P2

3.3.24 These two areas were located in the east of the main development site and were broadly similar in structure and species composition. The bulk of the canopy was formed of planted, even aged, developing pedunculate oak and ash, although both silver birch and wild cherry were present, and in P1 were frequent and occasional respectively.

3.3.25 In P2 the shrub layer was sparse or absent, but it was somewhat better developed in P1, with frequent hazel, hawthorn and young silver birch, as well as occasional dog rose and grey willow.

3.3.26 The field layer was relatively species poor, for example in comparison with both the deciduous woodland and more recent plantations. In both cases bramble was the most frequent and abundant component. Wood sage, wild strawberry, primrose, wood false brome and wood sedge were also relatively frequent components in both areas. P1 was somewhat richer overall than P2 with AWIs such as bluebell and slender St John's wort, which were not recorded in P2. Six AWIs were recorded in P1 and three in P2.

[22] Peterken, G. (2000): Identifying ancient woodland using vascular plant indicators. *British Wildlife*: **11** (3) 153 – 158.

3.3.27 Both could be considered to be examples of the W10 *Quercus robur – Pteridium Aquilinum – Rubus fruticosus* / pedunculate oak – bracken – bramble woodland community, *Holcus lanatus* sub-community, a generally quite species poor sub-community characteristic of such plantations.

Recent broadleaved plantation

3.3.28 These were areas planted with native broadleaved trees where canopy closure had not occurred and which, in general, had a relatively open character. Again, they were broadly similar in structure and species composition. They appeared to have been planted, largely with pedunculate oak, but also with cherry and lime, within the last ten years. In addition to the planted trees, there were self-sown trees and shrubs, especially birch and willows, which were frequent and locally abundant, and hazel, gorse *Ulex europaeus* and alder buckthorn *Frangula alnus* were at least occasional and could be locally frequent. Bramble was frequent and locally abundant. Some mature or semi-mature trees, including oak, ash and silver birch had also been retained within these areas. Brash and logs, as probable relics of previous clearance work, were frequent.

3.3.29 The field layer was variable but moderately rich and included a range of woodland (including AWIs), grassland and ruderal species. Between the scrubby elements, grasses and especially velvet bent, but also Yorkshire fog, sweet vernal grass, tufted hair grass *Deschampsia cespitosa* and common bent, were prominent. Among this were species characteristic of more natural or less 'improved' grasslands and other open habitats, that are increasingly scarce in the wider landscape, such as betony *Stachys officinalis*, devils bit scabious *Succisa pratensis*, tormentil *Potentilla erecta*, heath bedstraw *Galium saxatile*, glaucus sedge *Carex flacca* and heath woodrush *Luzula multiflora*. AWIs included occasional stands of bluebell and wood anemone, as well as frequent primrose and wood sedge. Foxglove and marsh thistle, which are characteristic of the open conditions and possibly of the disturbance associated with clearance and replanting, were frequent and locally abundant. Other frequent species included wood sage and honeysuckle. The ground was uneven and small depressions, which are probably wet in the winter, supported their own distinctive vegetation with, for example, rushes *Juncus spp*. and marsh bedstraw.

3.3.30 With the exception of areas of dense scrub, the more open parts of this vegetation can probably be best identified as belonging to the W25 *Pteridium aquilinum – Rubus fruticosus* / bracken - bramble underscrub community, *Teucrium scorodonia* / wood sage sub-community, though where bluebell and/or wood anemone are locally frequent or abundant it at least approaches the *Hyacinthoides non-scripta* / bluebell sub-community. Distinctively, though present and locally abundant, bracken was less frequent and abundant here than is often the case in this community. This community has much in common with the field layer of W10 pedunculate oak – bracken – bramble woodland community which forms the bulk of the adjoining deciduous woodland. It is characteristic of, or frequently derived from, heavily disturbed W10 type woodland, as is likely to have been the case here.

P3

3.3.31 This area comprised most of the north western quadrant of the main development site and in character conformed broadly to the description above. In the north of the area there were scattered mature non-native turkey oak *Quercus cerris* as well as locally dense thickets of birch

and willow. Three quadrats were recorded which, despite some small differences, were very similar, with silver birch, grey willow, bramble, velvet bent, Yorkshire fog and marsh thistle forming the bulk of the vegetation. However, PQ2 included a depression and the presence of marsh bedstraw and greater birds foot trefoil *Lotus pedunculatus* reflected this. Thirteen AWIs were recorded in this area.

P4

3.3.32 This comprised the north western corner of the main development site and is contiguous with P3. It is identified as an area of Ancient Replanted Woodland. The bank and ditch which separates this area from the larger and adjoining P3 is present and visible on the ground and supports stands of bluebell. The area as a whole was very similar in species composition to the rest of the wider area of recent plantation of which it now appears to form a part, i.e. P3 and P4 combined. As with the northern part of P3, there were one or two mature turkey oak trees, as well as other locally dense self-sown trees and scrub. There was a particular abundance of common gorse. However, none of these features are distinctive of Ancient Woodland. Seven AWIs were recorded in this area, most of them the same species that were also present in P3.

P5

3.3.33 This area lay in the south eastern part of the main development site. It was broadly similar to the general description given above but included locally frequent ash trees on its western and northern fringe. One quadrat was recorded in this area, which was very similar to those recorded in P3, and seven AWIs.

P6

3.3.34 This area lay either side of the proposed access route (R4) and was again broadly similar to the general description given above. Dense stands of birch and willow partly lay within the southern part of the surveyed area. Two quadrats and eleven AWIs were recorded in this area.

P7

3.3.35 This area also lay either side of the proposed access route (R4), immediately to the west of Hurst Wood. It included stands of bluebell and wood anemone and 16 AWIs were recorded.

Coniferous plantation

3.3.36 This comprised an area in the west of Hurst Wood (C1), either side of the proposed access route, in which mature conifers formed the majority of the canopy. There were scattered native broadleaved trees, including oak and cherry, as well as scattered shrubs. The field layer contained a range of species present in the other areas of woodland and plantation but there was extensive bare ground, probably due to the shading caused by the conifers.

Rides

3.3.37 With the exception of R1 the rides shared the same broad structure, comprising an aggregate surfaced track approximately three metres wide bordered on both sides by vegetated verges

approximately two metres wide, as well as ditches and banks, which are approximately three to four metres in width in total. The full width of track, verges, ditches and banks was therefore approximately 12-15m.

3.3.38 The vegetation included a mix of woodland, grassland, ruderal and wetland species, and although variable was locally quite rich. Vegetation cover on the tracks themselves was variable with extensive areas of sparse vegetation cover, but with some areas where it was more extensive. Characteristic species included grasses, especially annual meadow grass *Poa annua*, common daisy *Bellis perennis* and toad rush *Juncus bufonis*.

3.3.39 The verges and ditch banks were quite rich. Woodland species included a range of AWIs, including bluebell, wood anemone, *Hypericum spp.*, barren strawberry, primrose, wood speedwell and wood and pendulous sedges, but also dog's mercury, enchanter's nightshade *Circaea lutetiana* and common dog violet. Grassland species included a number typical of less improved grasslands, such as betony, devils bit scabious, birds foot trefoil and greater birds foot trefoil *Lotus corniculatus* and *L. pedunculatus*, meadow vetchling *Lathyrus* pratensis, tormentil and glaucus sedge. Many of the ditches were dry at the time of the surveys but some contained water during a visit in early spring 2020. Some ditch sections supported stands of wetland species, such as reed sweet-grass *Glyceria maxima*, lesser spearwort *Ranunculus flammula* and lesser skullcap *Scutellaria minor*. Other wetland species included angelica *Angelica sylvestris*, common figwort *Scrophularia nodosa*, rushes *Juncus spp*. and remote sedge *Carex remota*.

R1

3.3.40 This comprised a track in the east of the main development Site. It formed a relatively open strip between areas of woodland and plantation but lacked the clear structure, including verges, ditches and banks described above for the other rides, and was narrower overall. Eight AWIs were recorded.

R2

3.3.41 This comprised the track forming most of the southern boundary of the main development site. As it lay more or less east to west, and was bordered to the south by mature woodland, the south side tended to be more heavily shaded than the north side. It included stands of bluebell and wood anemone and 13 AWIs were recorded.

R3

3.3.42 This formed the western boundary of the main development site. Pendulous sedge was prominent and 15 AWIs were recorded.

R4

3.3.43 This comprised most of the proposed access route, apart from its south eastern approach. Most of this was fairly typical in character but a section adjacent to P7 was particularly rich, including the species listed below (grasses excluded). Twenty-four AWIs were recorded.

Common spotted orchid	*Dactylorrhiza fuchsii*	Common dog violet	*Viola riviniana*
Early purple orchid	*Orchis mascula*	Bluebell	*Hyacinthoides non-scripta*

Tormentil	*Potentilla erecta*	Wood anemone	*Anemone nemerosa*
Betony	*Stachys officinalis*	Wood avens	*Geum urbanum*
Hedge woundwort	*Stachys sylvestris*	Wild strawberry	*Fragraria vesca*
Germander speedwell	*Veronica chamaedrys*	Barren strawberry	*Potentilla sterilis*
Angelica	*Angelica sylvestris*	Common milkwort	*Polygala vulgaris*
Common figwort	*Scrophularia nodosa*	Square-stemmed StJohn's	*Hypericum tetrapterum*
Devils-bit scabious	*Succisa pratensis*	Creeping buttercup	*Ranunculus repens*
Primrose	*Primula vulgaris*	Marsh thistle	*Cirsium palustre*
Wood sage	*Teucrium scorodonia*	Fleabane	*Pulicaria dysenterica*
Lesser stitchwort	*Stellaria graminea*	Common knapweed	*Centaurea nigra*
Red clover	*Trifolium pratense*	Cuckoo flower	*Cardamine pratensis*
Greater birds foot trefoil	*Lotus pedunculatus*	Heath woodrush	*Luzula multiflora*
Birds foot trefoil	*Lotus corniculatus*	Hairy woodrush	*Luzula pilosa*
Bush vetch	*Vicia sepium*	Glaucus sedge	*Carex flacca*
Tufted vetch	*Vicia cracca*	Hairy sedge	*Carex hirta*
Common vetch	*Vivia sativa*	Grey sedge	*Carex divulsa*
Meadow vetchling	*Lathyrus pratensis*	Wood sedge	*Carex sylvatica*
Bugle	*Ajuga reptans*		

3.4 Evaluation

Priority Habitats

3.4.1 All of the deciduous woodland areas surveyed are considered to represent relatively high quality Lowland Mixed Deciduous Woodland Priority Habitat (Habitat of Principal Importance), based on their structure and species composition. The established broadleaved plantations (P1 and P2) would also probably meet the definition of this Priority Habitat, though they are relatively species poor and structurally homogenous examples, and consequently of less importance.

3.4.2 Whilst the more recent plantations probably cannot currently be identified as this Priority Habitat, largely because of the poorly developed canopy, they are developing towards, and in places approach, such habitat. Indeed, they could be viewed as temporary open areas or clearings within the wider woodland, and the presence of both the planted and self-sown woody component demonstrate that they are in the process of developing a more 'wooded' character. Ordnance Survey maps of c.1870 indicate that several of these areas (e.g. P3, P4, part of P5 and P7) were wooded at that time, and their current condition probably reflects the processes of perhaps more than one cycle of clearance and replanting, including of conifers and more recently native broadleaves. P6 is shown as wooded by the 1890s and its vegetation appears likely to have developed following conversion to woodland/plantation and as with the other areas will have been affected by the recent process of clearance and replanting.

3.4.3 Rides are a common, and in some cases, historic feature of woodlands, and often support important elements of their diversity. They could be viewed as an integral part of wider areas of woodland Priority Habitat.

Replaceability

3.4.4 The deciduous woodland needing to be removed for the Proposed Development (primarily DW1 and DW3) would be the most difficult to replace, due to the presence of frequent mature trees and their associated features, as well as the distinctive character and richness of the field layer such woodlands support, including the relatively high number, frequency and abundance of

AWIs. This makes such woodland difficult to reproduce, even in the relatively long term, and increases its importance.

3.4.5 Some of the woodland surveyed is identified as Ancient Woodland and hence is irreplaceable; these areas are proposed to be retained. However, as noted, the other areas of deciduous woodland could not be easily distinguished from the Ancient Woodland in terms of structure or species composition and contained many species and features characteristic of Ancient Woodland.

Ancient Woodland Indicator species

3.4.6 The number of AWIs recorded, as with most species, tends to increase with the area of woodland surveyed[23]. A total of 40 AWIs (full list provided at Appendix II, Table AII.0.4) were recorded in the survey area of c.19.55ha. This compares very favourably with counts of such species within other areas of known Ancient Woodland. For example, in a study of 89 Ancient Woodlands in Lincolnshire[24] the mean number of AWIs in woods of between five and 20ha was 22.3, with a range of seven to 43. This would place the survey area within the upper part of this range. It also compares favourably with some of the smaller Sussex woodlands listed by Rose in his list of woodlands[25] rich in AWIs, where there are three woodlands of between 25 and 32ha with 37 – 41 AWIs.

3.4.7 Twenty-two and 15 AWIs were recorded in DW1 and DW3, respectively, the areas of deciduous woodland within the main development site, which measure c.2.97ha and c.1.13ha respectively. Again, these compare favourably with the results from the Lincolnshire study, where in woods of less than 5ha, a mean of 12.4 species and range of four to 24 species was recorded.

3.4.8 Although the bulk of AWIs were present within the deciduous woodland, some AWIs were present in the more recent plantations or rides, for example, but were absent or distinctly less frequent within the more mature deciduous woodland, such as alder buckthorn, yellow pimpernel *Lysimachia nemorum*, slender St John's wort, betony and bush vetch, indicating that these areas or features support an important part of the diversity of the woodland/survey area as a whole.

3.4.9 Areas with the fewest AWIs recorded, particularly P1, P2 and the south eastern part of DW3, are shown as not wooded in early 20th Century late Ordnance Survey maps, while the rest of the survey area was shown as woodland by the end of the 19th Century. The lower AWI counts in these areas are, at least in part, likely to reflect the apparently more recent origin of their habitats.

Species

3.4.10 Although several species recorded, including wood sorrel, tormentil and sanicle, are identified as Near Threatened (NT) in the England vascular plant Red List[26], the survey area and its component

[23] Rackham, O. (2003): *Ancient Woodland, its history, vegetation and uses in England*. New Edition. Castlepoint Press.

[24] Peterken, G. (2000): Identifying ancient woodland using vascular plant indicators. *British Wildlife*: **11** (3) 153 – 158.

[25] Rose, F. (1999): Indicators of ancient woodland - the use of vascular plants in evaluating ancient woods for nature conservation. *British Wildlife*: 10 (4) 241 – 251.

[26] P.A. Stroh et al. (2014): *A Vascular Plant Red List for England*. BSBI.

habitats are considered to be more important for their plant communities than for the presence of rare or scarce species.

Geographical evaluation

3.4.11 The deciduous woodland, more recent plantations and rides within or immediately adjoining the main development site (DW1, DW2 and DW3, P3, P4 and P5, R1, R2 and R3) are considered to be of at least Local Importance for their plant species and communities. The more established plantations within the site (P1 and P2) are considered to be of Local Importance. The stream which passes under the access route at DW5 (grid ref: 504845, 132530) is also considered to be of Local Importance, forming part of a relatively natural woodland watercourse. The survey area as a whole is considered to be of District Importance . The wider woodland areas (western and eastern blocks), of which the survey area forms a part, are considered to be of County Importance as it likely that, under criterion CH2 of the Sussex Local Wildlife Site Selection Criteria[27], they would be considered to represent a significant area of a Habitat of Principal Importance. under the same criterion.

3.4.12 Due to the difficulty of replacing such habitat the areas of deciduous woodland are considered to be of the greatest importance, but the plantation areas and rides also support important aspects of the diversity of the survey area as a whole, and include elements that would be difficult to reproduce. However, the more established plantations (P1 and P2) are considered to be the least important areas, due to their relatively species poor character and homogenous structure.

3.4.13 The double hedgerow (H1 and H2 as shown on the access route Phase 1 habitat plan at Appendix I) and grass verges located alongside the proposed access route between the two main woodland blocks (grid ref: 505560, 131965), as well as the ponds, which were surveyed and reported on in the PEA for the access road[28] but were not resurveyed here, are considered to be of Site Importance for their plant species and communities. However, despite being relatively species-poor the double hedgerow H1/H2 is nevertheless Priority Habitat, and also qualifies as Important under the Hedgerow Regulations 1997. The improved grassland forming part of two fields located north and south of the hedgerows between the woodland blocks is also considered to be of Site Importance.

[27] Sussex Local Wildlife Sites Initiative (2017): *Sussex Local Wildlife Site Selection Criteria*.

[28] UEEC (2020): *Land East of Loxwood, West Sussex: Preliminary Ecological Appraisal Report*.

4 Fauna

4.1 Desk Study Records

Statutory and non-statutory site designations

4.1.1 There are nine SSSI and two SAC within 10km of the extraction site. One SSSI and both SAC are notified for bat populations, as summarised in Table 4.1 and shown in Figure 4.1.

Table 4.1: Statutory sites within 10km designated for bat populations

Site name	Location*	Description**
Ebernoe Common SSSI	7.95km south-west	Ebernoe Common is of national importance for colonies of barbastelle *Barbastella barbastellus* and Bechstein's *Myotis bechsteinii* bats, which use trees as summer maternity roosts where the female bats gather to give birth and rear their young. The bats also use the site as a foraging area and as flight paths for dispersal to their foraging territories both within and outside of the SSSI.
Ebernoe Common SAC	7.95km south-west	The site is designated under article 4(4) of the Habitats Directive (92/43/EEC) as it supports the following species listed in Annex II: barbastelle bat *Barbastella barbastellus*, Bechstein's bat *Myotis bechsteinii*. The barbastelle maternity colony utilises a range of tree roosts in the site, usually in dead tree stumps, but the species appears to be present throughout the year, with individuals utilising a range of roost sites in tree holes and under bark. The site also holds a maternity colony of Bechstein's bats, mainly roosting in old woodpecker holes in the stems of live mature sessile oak trees. While Bechstein's feed exclusively in the woodland, barbastelles commute into the surrounding countryside using the woodland corridors which branch out from the site.
The Mens SAC	6.50km south	The site is designated under article 4(4)of the Habitats Directive (92/43/EEC) as it supports the following species listed in Annex II: barbastelle bat *Barbastella barbastellus*. The Mens SAC has been selected for its maternity colony of barbastelles which utilise a range of tree roosts; usually in dead tree stumps. The species appears to be present throughout the year; but it is not clear how many bats hibernate at the site. Barbastelles roost within the woodland but tend to forage outside of the site, commuting along woodland corridors into the wider countryside.

* Approximate distance and bearing from the extraction site.
** Only the chiropteran interest is listed above, other interest features are also present.

Protected, rare and notable species of fauna

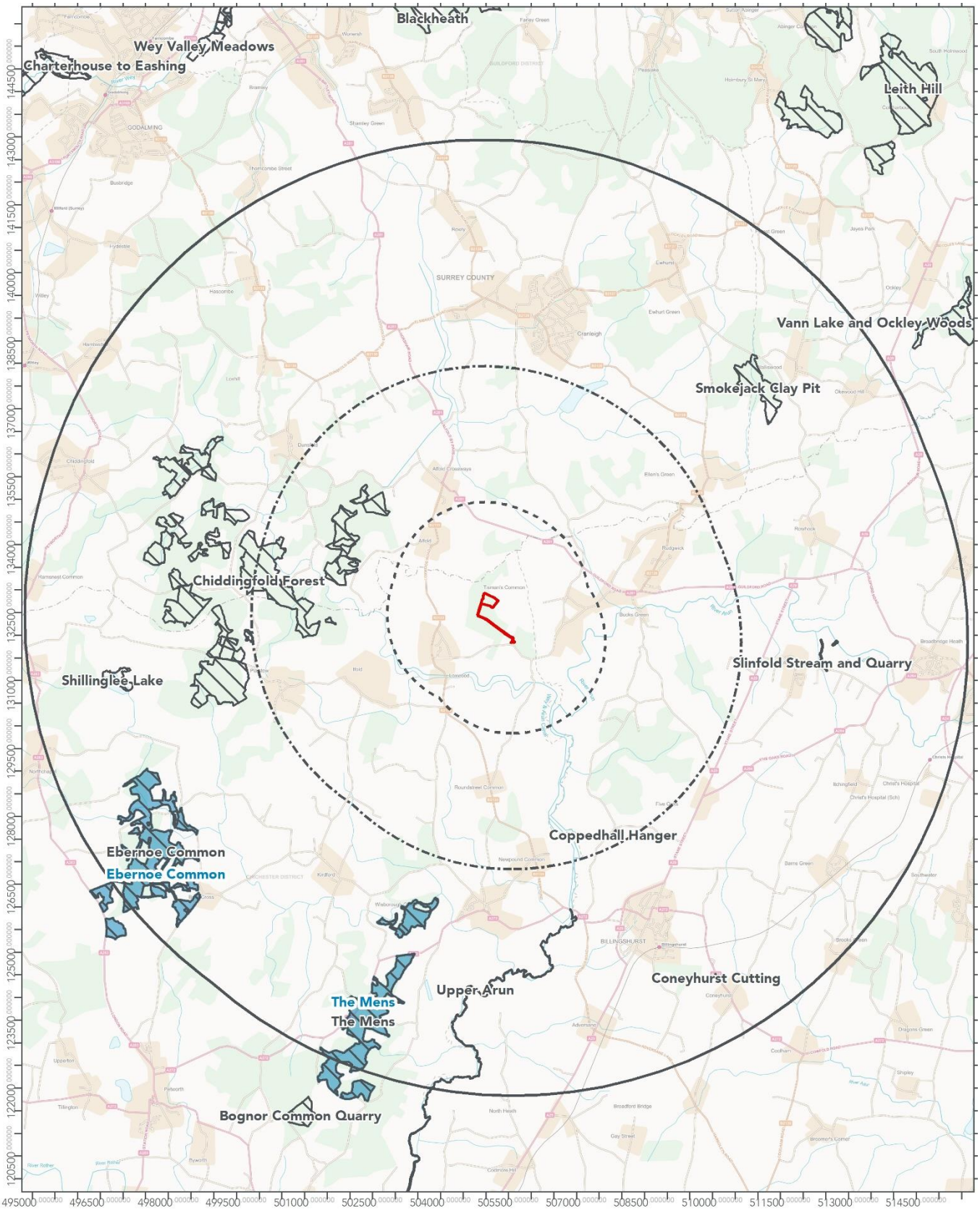
4.1.2 Biological records were obtained for the 1km search area and are summarised in Table 4.2.

Table 4.2: Records of protected, rare & notable fauna within the desk study search area

Group	Species	Designation
Birds	Kingfisher *Alcedo atthis, Red Kite Milvus milvus,*	Birds Dir.1

Group	Species	Designation
(note: species may appear more than once)	Kingfisher *Alcedo atthis*, *Brambling Fringilla montifringilla*, Hobby *Falco subbuteo*, Red Kite *Milvus milvus*, Green Sandpiper *Tringa ochropus*, Redwing *Turdus iliacus*, Fieldfare *Turdus pilaris*, Barn Owl *Tyto alba*, Hoopoe *Upupa epops*	WCA Sch.1
	Skylark *Alauda arvensis*, Cuckoo *Cuculus canorus*, Yellowhammer *Emberiza citrinella*, Reed Bunting *Emberiza schoeniclus*, Lesser Spotted Woodpecker *Dendrocopos*, Dunnock *Prunella modularis*, Herring Gull *Larus argentatus*, Linnet *Linaria cannabina*, Spotted Flycatcher *Muscicapa striata*, House Sparrow *Passer domesticus*, Marsh Tit *Poecile palustris*, Willow Tit *Poecile montana*, Bullfinch *Pyrrhula pyrrhula*, Starling *Sturnus vulgaris*, Song Thrush *Turdus philomelos*, Lapwing *Vanellus vanellus*	NERC s41
	Skylark *Alauda arvensis*, Lesser Spotted Woodpecker *Dendrocopos minor*, Yellowhammer *Emberiza citrinella*, Herring Gull *Larus argentatus*, Linnet *Linaria cannabina*, Nightingale *Luscinia megarhynchos*, Grey Wagtail *Motacilla cinerea*, Spotted Flycatcher *Muscicapa striata*, House Sparrow *Passer domesticus*, Willow Tit *Poecile montana*, Marsh Tit *Poecile palustris*, Starling *Sturnus vulgaris*, Redwing *Turdus iliacus*, Fieldfare *Turdus pilaris*Mistle Thrush *Turdus viscivorus*, Song Thrush *Turdus philomelos*, *Vanellus vanellus*	RL
	Kingfisher *Alcedo atthis*, Greylag Goose *Anser anser*, Mallard *Anas platyrhynchos*, Meadow Pipit *Anthus pratensis*, Swift *Apus apus*, Black-headed Gull *Chroicocephalus ridibundus*, Stock Dove *Columba oenas*, Mute Swan *Cygnus olor*, House Martin *Delichon urbicum*, Reed Bunting *Emberiza schoeniclus*, Kestrel *Falco tinnunculus*, Dunnock *Prunella modularis*, Willow Warbler *Phylloscopus trochilus*, Bullfinch *Pyrrhula pyrrhula*, Tawny Owl *Strix aluco*, Green Sandpiper *Tringa ochropus*	AL
Invertebrates	Pearl-bordered Fritillary *Boloria euphrosyne*	WCA Sch.5 part, NERC s41
	Brown Hairstreak *Thecla betulae*	WCA Sch.5 part
	Small Heath *Coenonympha pamphilus*, White Admiral *Limenitis* Shaded Broad-bar *Scotopteryx chenopodiata*, White Ermine *Spilosoma lubricipeda*, , Brown Hairstreak *Thecla betulae*, Blood-Vein *Timandra comae*, Cinnabar *Tyria jacobaeae*	NERC s41
Mammals (terrestrial)	*Pipistrellus* sp.	Habs.Dir.4, CHS Sch.2, WCA Sch.5 full
Reptiles (terrestrial)	Slow Worm *Anguis fragilis*, Grass Snake *Natrix natrix*, Adder *Vipera berus*, Common Lizard *Zootoca vivipara*	WCA Sch.5 part, NERC s41

Birds.Dir.1	Wild Birds Directive 2009/147/EC Annex 1
Habs.Dir.2/4	Habitats Directive 92/43/EEC Annex 2 or 4
CHS Sch.2	Conservation of Habitats & Species Regulations 2017 Schedules 2 (EPS animals)
WCA s1/Sch.1,5,8	Wildlife and Countryside Act 1981 Section 1 / Schedules 1, 5 (fully or partially protected), or 8
NERC s41	Natural Environment & Rural Communities Act 2006 Section 41 Species of Principal Importance
RL/AL	Red/Amber Listed (IUCN or Birds of Conservation Concern 4 (Eaton *et al.*, 2015))



Loxwood Clay Pits, West Sussex

Red line boundary

Sites of Special Scientific Interest

Special Areas of Conservation

Site Buffer 2km

Site Buffer 5km

Site Buffer 10km

0 3,250 6,500 Meters

N

Scale: 1:87,500 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-DesignatedSites210524

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Figure 4.1: Designated sites

4.2 Great Crested Newt

Desk study

4.2.1 SxBRC returned no records of great crested newt (GCN) *Triturus cristatus* from within the desk-study search zone.

Terrestrial habitat assessment

4.2.2 The extraction site forms a relatively large area of high quality terrestrial habitat for GCN. The recent broadleaved plantation (P3 and P5) provides a complex matrix of micro-habitats formed of coarse grasses which are suitable for foraging and are locally wet during rainfall, and an extensive shrub layer which provides opportunities for shelter. The surrounding more mature woodland, both plantation and semi-natural, provide further extensive opportunities for shelter, dispersal habitat and hibernation.

4.2.3 The proposed access route is surrounded by similarly good quality terrestrial habitats for GCN. However, whilst GCN may disperse across it, the existing surfaced track is considered unsuitable habitat for GCN due to the lack of vegetation cover. The improved grassland either side of H1 and H2 is also currently of low value for GCN, due to its relatively short sward.

Aquatic habitat assessment

4.2.4 There no ponds within the extraction site but analysis of Ordnance Survey MasterMap indicated the presence of twelve ponds (P1—P12) within 500m, and a further four ponds lie adjacent to the proposed access route (P13, P14, P14a and P15); see Appendix III for a pond plan. There are no significant barriers to GCN dispersal between the ponds and the survey area as the woodland tracks are relatively minor barrier features due to their size and level of traffic. Most of the ponds were able to be viewed during the PEA (UEEC, 2020) with the exception of P9 and P11 where access was denied. Accessible ponds were assessed for their suitability to support breeding great crested newts using field observations supported by a Habitat Suitability Index (HSI; Oldham et al, 2000), see below; the full results are listed at Appendix III.

4.2.5 Pond P1 is a small heavily shaded pond with good surrounding terrestrial habitat. Pond P1 achieved an HSI value of 0.65, making it of Average suitability for breeding great crested newt. P1 held water throughout the survey period.

4.2.6 Pond P2 is a rarely drying pond with good surrounding terrestrial and a good amount of in-pond vegetation. Pond P2 achieved an HSI value of 0.78, making it of Good suitability for breeding great crested newt. P2 held water throughout the survey period.

4.2.7 Pond P3 was dry at the time of survey, small and heavily shaded. Pond P3 achieved an HSI value of 0.55, making it of Below average suitability for breeding great crested newt.

4.2.8 Pond P4 is a small pond with 60% shade and good terrestrial habitat and no in-pond vegetation. Pond P4 achieved an HSI value of 0.62, making it of Average suitability for breeding great crested newt. P4 held water throughout the survey period.

4.2.9 Pond P5 is a small rarely drying pond with 60% shade and good terrestrial habitat and limited in-pond vegetation. Pond P5 achieved an HSI value of 0.66, making it of Average suitability for breeding great crested newt. P5 held water throughout the survey period.

4.2.10 Pond P6 is a small annually drying, heavily shaded pond with good terrestrial habitat and limited invertebrates. Pond P6 achieved an HSI value of 0.45, making it of Poor suitability for breeding great crested newt. P6 remained dry for the duration of surveys.

4.2.11 Pond P7 is a small sometimes drying, heavily shaded pond with moderate terrestrial habitat and plenty of in-pond vegetation. Pond P7 achieved an HSI value of 0.56, making it of Below average suitability for breeding great crested newt. P7 remained dry for the duration of surveys.

4.2.12 Pond P8 is a very small sometimes drying, heavily shaded pond with moderate terrestrial habitat and limited in-pond vegetation. Pond P8 achieved an HSI value of 0.53, making it of Below average suitability for breeding great crested newt. P8 held water throughout the survey period.

4.2.13 Pond P10 is a rarely drying pond with relatively low shade, moderate surrounding terrestrial habitat and in-pond vegetation. Pond P10 achieved an HSI value of 0.80, making it of Excellent suitability for breeding great crested newt. Although possible to view for the HSI assessment, permission for subsequent surveys could not be obtained.

4.2.14 "Pond P12" is a very small, heavily shaded waterbody with good terrestrial habitat and limited aquatic vegetation. It achieved an HSI value of 0.44, making it of Poor suitability for breeding great crested newt. Although appearing as a pond on MasterMap it is actually an on-stream pool with a notable flow, making it unsuitable for further survey.

4.2.15 Pond P13 is a very small, partially shaded pond with good surround terrestrial habitat and limited in-pond vegetation. Pond P13 achieved an HSI value of 0.54, making it of Below average suitability for breeding great crested newt.

4.2.16 Pond P14 is a small pond located towards the western edge of Pephurst Wood, adjacent to the proposed access route. It is heavily shaded and supports no in-pond vegetation. Pond P14 achieved an HSI value of 0.58, making it of Below average suitability for breeding great crested newt.

4.2.17 Pond P14a is a mostly shallow and sinuous pond located close to Pond 14 in Pephurst Wood. It is heavily shaded and supports little or no in-pond vegetation. Pond P14a achieved an HSI value of 0.51, making it of Below average suitability for breeding great crested newt.

4.2.18 Pond P15 is a mostly shallow and sinuous pond located on the southern edge of Pephurst Wood. It is heavily shaded and supports little or no in-pond vegetation. Pond P15 achieved an HSI value of 0.54, making it of Below average suitability for breeding great crested newt.

Pond surveys

4.2.19 Great crested newt was recorded in P5 only. A summary of peak counts of amphibians is presented in Table 4.3; full tables of survey results are given at Appendix III. The peak count is

defined as the maximum adult count for any one species, by torchlight survey or bottle-trapping, on one night's survey. Population estimates are presented in Table 4.4.

4.2.20 The results confirm that a Small population of great crested newts was present in P5 during the 2020 breeding season. The maximum adult count of 1 female was recorded by bottle trapping on visit 4 on 23 April 2020. No GCN eggs or larvae were found in P5.

4.2.21 No adult or juvenile great crested newts, larvae or eggs were found in any of the other surveyed ponds. Smooth and/or palmate newts were recorded in P1, P2, P4, P5, P8, P13, P14, P14a and P15.

Table 4.3: Summary of GCN peak survey results

Pond	Great Crested Newts	Smooth/Palmate Newts	Frogs/Toads
P1	0	Smooth: 1 (1♀); Palmate: 1 (1♀)	-
P2	0	Smooth: 1 (1♀); Palmate: 3 (2♀1♂)	-
P4	0	Palmate: 1 (1♀)	-
P5	1(♀)	Smooth: 1 (1♂); Palmate: 2 (1♀1♂)	-
P8	0	Palmate: 1 (1♀)	-
P13	0	Smooth: 4 (4♀); Palmate: 23 (10♀13♂)	1 Frog
P14	0	Smooth: 1 (1♀); Palmate: 2 (2♂)	1 Frog
P14a	0	Smooth: 4 (4♀); Palmate: 4 (1♀3♂)	-
P15	0	Smooth: 2 (1♀1♂); Palmate: 3 (1♀2♂)	-

Table 4.4: GCN population estimates

Pond	Peak GCN Count	Population Estimate	Breeding?
P5	1	Small	No

Evaluation

4.2.22 A Small population of great crested newt was recorded using P5 (peak count of 1 adult) during the 2020 survey season, but breeding was not recorded. GCN is likely to be absent within P1, P2, P4, P8, P13, P14, P14a and P15. The surveys were carried out during suitable weather conditions, with at least 50% of visits undertaken during the peak breeding season, and the results are considered to provide a good level of confidence in the presence or absence of GCN within each pond.

4.2.23 Overall, habitats within the extraction site (area = c.6.75ha) provide a range of features which could support a population of GCN during the terrestrial phase of their lifecycle, including coarse grasses in the field layer of recent broadleaved plantation suitable for foraging and woodland for shelter and hibernation. The site is linked to further large areas of suitable terrestrial habitat which continue off-site in all directions. This connectivity will persist following completion of the development.

4.2.24 P5 is located c.415m east of the extraction site boundary. P5 is the only pond to have supported GCN during the 2020 breeding season, but breeding was not recorded. The majority of great crested newts will remain within a core area of up to c.50–250m from the breeding pond (250m being the estimated maximum routine migratory range; Cresswell & Whitworth, 2004) if that area can fulfil their lifecycle requirements. Furthermore, Jehle (2000) determined a terrestrial zone of 63m, within which 95% of summer GCN refuges were located. In addition, following the breeding season, Jehle and Arntzen (2000) recorded 64% of newts within 20m of the pond edge. In conclusion, GCN is likely to be absent from the site and is not considered to present a constraint to the development proposals.

4.3 Breeding Birds

Desk study

4.3.1 SxBRC returned records of 32 notable bird species from within the desk-study search zone during a date range of 1981 to 2016; see Table 4.2.

Habitat assessment

4.3.2 The survey area comprises largely of mature deciduous woodland with areas of established and more recent native broadleaved plantation. There is also a small area of mature coniferous plantation as well as scattered groups of conifers. A network of rides and paths, including the proposed access route, as well as on the boundaries of the extraction site, provides access to and around the survey area. The survey area forms part of two larger woodland blocks, a larger western block, in which most of the proposed access route and development site are located, and a slightly smaller eastern block, in which a short section of the proposed access route is located. The two blocks are separated by c.80m of grassland fields through which the proposed access track passes between hedgerows. More detailed descriptions of the habitats are available in the PEAs of the site (Middlemarch, 2019) and access route (UEEC, 2020), as well as in the botanical survey result (section 3).

Common Bird Census survey

4.3.3 A total of 31 species were recorded within the survey area (including flying over), of which four are considered confirmed breeding species, 20 probable breeding species, five possible breeding species and two other species considered unlikely to have used the survey area for breeding. Of the species recorded five are included on the Birds of Conservation Concern 4 (2015) Red List (Red List species), and one is on the Amber List (Amber List species). One species included in Schedule 1 of the Wildlife and Countryside Act (Schedule 1 species). Records of these species and their use of the site are discussed below, along with accounts of status nationally and in Sussex, where relevant, for Red and Amber Listed probable and possible breeding species. Plans showing the location of records for the three surveys are shown in Appendix IV, together with the approximate location of territories or singing/calling males of confirmed and probable breeding species.

Confirmed breeding species

BoCC Green List species

4.3.4 Robin *Erithacus rubecula*: A minimum of 18 territories were identified, based on repeat records of singing males. They were distributed throughout the survey area, but most were within or on the edge of deciduous woodland. Seven were beside the proposed access road and eleven were within or immediately adjoining the extraction site. Breeding is considered confirmed with the recording of recently fledged juveniles during both the 26th May and 8th June survey visits.

4.3.5 Blue tit *Cyanistes caeruleus*: A minimum of 32 territories were identified throughout the survey area, based on repeat records of calling/singing males. Most were located in deciduous woodland, but some were in or adjoining plantations, both beside the proposed access road and within and immediately adjoining the extraction site. Breeding is considered confirmed with the recording of recently several fledged juveniles with adult(s) in attendance throughout the survey area during the 8th June survey visit.

4.3.6 Great tit *Parus major*: A minimum of nine territories were identified, based on repeat records of calling/singing males. Most were located in deciduous woodland, but some were in or adjoining plantations, both beside the proposed access road and within and immediately adjoining the extraction site. However, it is considered that this may be an underestimate of the number of territories present, based on the available habitat, because great tits are often more vocal and conspicuous earlier in the breeding season (up to early April), before the survey visits began. Breeding is considered confirmed with the recording of several recently fledged juveniles with adult(s) in attendance during the 8th June survey visit.

4.3.7 Blackcap *Sylvia atricapilla*: A minimum of eleven territories were identified within woodland and plantations, based on repeat records of calling/singing males, as well as an individual carrying nest material. Five were located beside the proposed access route and six within the extraction site. Breeding is considered confirmed with the recording of recently fledged juveniles, including with adult(s) in attendance, beside the southern eastern section of the proposed access route and in the north western corner of the extraction site during the 8th June survey visit.

Probable breeding species

BoCC Red List species

4.3.8 Song thrush *Turdus philomelos* (Section 41 species): A minimum of eight territories were identified, based on repeat records of calling/singing males. Most were located in deciduous woodland, but at least one was within a recent plantation area. Three territories were within/adjoining the extraction site and four beside the proposed access route, one of which was located very close to the south western corner of the site.

4.3.9 There was a significant decline of c.50% in the national song thrush population, mainly during the 1970s and 80s, but numbers have been relatively stable subsequently. A similar pattern was repeated within Sussex, where numbers appear to have remained relatively stable between 1988-92 and 2008-11.

4.3.10 Mistle thrush *Turdus viscivorus*: A single territory was identified in deciduous woodland/hedgerow near the northern boundary of the survey area and extraction site, based on repeat records of calling/singing males. An individual singing male was also recorded in the same area during the winter bird surveys.

4.3.11 Mistle thrush has experienced significant declines in population nationally (e.g. 41% in England between 1995 and 2018), regionally (c.50% between 1995 and 2010) and within Sussex (a loss of c.17% of occupied tetrads between 1988-92 and 2008-11).

4.3.12 Marsh tit *Poecile palustris* (Section 41 species): A minimum of three territories were identified within deciduous woodland alongside the south eastern part of the proposed access route, based on observations of individual birds. However, marsh tit is a relatively inconspicuous species and is most conspicuous/vocal during winter and early spring, before the survey began. Marsh tits were recorded quite frequently during the winter bird survey, alongside other parts of the access route and within and adjoining the extraction site. Marsh tit is considered to be a sedentary species, infrequently moving away from its breeding areas. For these reasons the estimate of breeding territories is considered likely to be an underestimate, both in terms of number and distribution.

4.3.13 Marsh tit has experienced significant declines in population nationally (e.g. c. 40% between 1995 and 2018). There has been a tendency for range reduction towards the south east, with regional declines lower than those nationally (c.13% in the south east between 1995 and 2010). A similar decline was recorded in Sussex between 1988-92 and 2008-11.

4.3.14 Nightingale *Luscinia megarhynchos*: A minimum of three territories were identified, based on repeat records of calling/singing males, as well as alarm calling birds. All were within areas of dense scrub and young trees in areas of recent plantation. One territory was located in the north western part of the Proposed Development Site and two were located to the south of the central section of the proposed access route. A fourth territory, based on a singing male recorded during the 13th May survey visit, as well as previously (see below), and casually on other occasions, was located in similar habitat to the south of the latter two.

4.3.15 These territories formed part of a larger population within the wider woodland area. For example eleven singing males (including the three or four noted above) were identified on the morning of the 20th April, largely within similar habitat in areas of recent plantation; records of singing nightingale are shown on a separate plan at Appendix IV. These birds were identified by surveying habitat around the survey area in the period immediately following the 20th April survey visit. Identification of individual birds was based on identifying simultaneously singing adjacent birds. In addition to these, a further two singing males were recorded in woodland and scrub/hedgerow just to the north. It is possible that the number of breeding territories, or successfully breeding males was, in due course, somewhat lower than this, though casual records of many of the birds were made subsequently.

4.3.16 The national nightingale population declined by c.93% between 1967 and 2018 and c.55% between 1995 and 2018, with a range contraction towards the south east. Sussex is second only to Kent in the importance of its nightingale population but a loss of c.20% of occupied tetrads was also recorded in the county between 1988-92 and 2008-11.

4.3.17 Cuckoo *Cuculus canorus* (Section 41 species): At least one singing/calling male was recorded during each survey visit, with the exception of the 8th June, in areas of recent plantation in the north western part of the extraction site and beside the central section of the proposed access route. Male cuckoos do not hold territories but move through relatively large home ranges searching for females. In addition to the survey records there were casual records of a calling cuckoo in similar habitat just to the north west of the extraction site, as well as in 'woodland' and scrub/hedgerow to the north.

4.3.18 There was a significant decline of 71% in the English cuckoo population between 1995 and 2018. Declines have been greater in England, especially in the south and east of the country, than elsewhere in the UK, where numbers have been more stable. The number of occupied tetrads in Sussex declined by 26% between 1988-92 and 2008-11. Anecdotally cuckoos are scarce in the county outside their core habitats of heathland and reedbed.

BoCC Amber List species

4.3.19 Dunnock *Prunella modularis* (Section 41 species): A minimum of two territories were identified, based on repeat records of singing males, located in woodland and recent plantation/scrub beside the south eastern part of the access route. However, it is considered likely that the true number of territories was higher than this. For example, two singing males were recorded near the northern edge of the survey area and extraction site during the 20th April survey visit and a singing male was recorded beside the south eastern end of the proposed access route during the 26th May survey visit. As dunnock is a highly sedentary species it is probable that at least most of these records also represent territories, which would increase the number of territories to five or six.

4.3.20 Nationally dunnock experienced a significant population decline of c.40% during the 1970s and 80s. However, since the late 1990s numbers have increased slightly, though they have not recovered to their previous levels and the increase has been smaller in south east England (c.5% between 1995 and 2010). In line with this, in Sussex there was a modest increase in the number of occupied tetrads between 1988-92 and 2008-11.

BoCC Green List species

4.3.21 Wren *Troglodytes troglodytes*: A minimum of 23 territories were identified, based on repeat records of calling/singing males, located in both woodland and recent and established plantations. Thirteen were alongside the proposed access route and ten within or immediately adjoining the extraction site.

4.3.22 Chiffchaff *Phylloscopus collybita*: A minimum of eight territories were identified, based on repeat records of calling/singing males, in both woodland and plantation. Four were located beside the proposed access road and four were located within or adjoining the north western part of the extraction site.

4.3.23 Garden warbler *Sylvia borin*: A minimum of four territories were identified, based on repeat records of calling/singing males, mostly in scrub and trees within recent plantations, but also

among dense scrub set within woodland. Three were located beside the proposed access route and one within the extraction site.

4.3.24 Goldcrest *Regulus regulus*: A minimum of six territories were identified, based on repeat records of calling/singing males. These were located in areas with coniferous trees, with five beside the proposed access route and one within the eastern part of the extraction site.

4.3.25 Long-tailed tit *Aegithalos caudatus*: A minimum of one territory was identified, based on repeat records of individuals, within recent plantation in the north western part of the extraction site. However, there were records from other locations, for example on the southern edge of the site during the 23th May survey visit and within recent plantation near the south western part of the proposed access route during the 26th May survey visit, which suggest the number of territories may have been higher. Further, two families of juveniles with adults were recorded in or on the edge of recent plantation beside the central section of the proposed access route during the 8th June survey. This suggests confirmation of breeding, though such families can be quite mobile.

4.3.26 Blackbird *Turdus merula*: A minimum of eleven territories were identified, based on repeat records of calling/singing males, of which three were located beside the proposed access route (though this is considered likely to be something of an underestimate) and eight were located within or adjoining the extraction site.

4.3.27 Jay *Garrulus glandarius*: One probable territory was identified within woodland adjacent to a small area of recent plantation beside the proposed access road. This was based on repeat records of birds in this area, though jays were also recorded near the central section of the proposed access route.

4.3.28 Carrion crow *Corvus corone*: One probable territory was identified within woodland adjacent to the north western section of the proposed access route, based on repeat records of birds in this area, including one carrying food (nestling). There were records of carrion crows from several other parts of the survey area.

4.3.29 Woodpigeon *Columba palumbus*: A minimum of two territories were identified, based on repeat records of calling/singing males, located in woodland within the extraction site and beside the proposed access route just to the south. Woodpigeons were recorded elsewhere, and it is possible that this is an underestimate of the number of territories.

4.3.30 Green woodpecker *Picus viridis*: Two probable territories were identified, centred on, or including, recent plantation areas alongside the central section of the proposed access route and the north western part of the extraction site. Individuals were also recorded in similar habitat beside the south eastern section of the proposed access track (13th May) and in the south eastern part of the extraction site (8th June).

4.3.31 Great spotted woodpecker *Dendrocopos major*: Two probable territories were identified in woodland near the south eastern end of the proposed access route and on the southern edge of the larger recent plantation in the north western part of the extraction site. However, other records, for example in the north east and south east of the extraction site (20th April and 13th May), and at locations along the proposed access route (13th and 26th May), as well as records in

similar locations during the winter bird survey, suggest that the true number of territories may be double this number. Great spotted woodpecker is a common species in England whose population has doubled since the 1990s.

4.3.32 Nuthatch *Sitta europaea*: A minimum of four territories were identified. All were within woodland, with two beside the proposed access route and two within the extraction site.

4.3.33 Eurasian treecreeper *Certhia familiaris*: A minimum of four territories were identified within woodland. One was beside the south eastern end of the proposed access route and one within woodland in the south western part of the extraction site. Treecreeper is a relatively inconspicuous but sedentary species, so single records are considered sufficient to identify a probable breeding territory. This also means that the number of territories is likely to have been underestimated a little.

4.3.34 Chaffinch *Fringilla coelebs*: A minimum of one territory, based on repeat records of a singing male, was identified beside the south eastern part of the proposed access track. However, singing males were also recorded near the south western corner of the extraction site (20th April), as well as near the central section of the proposed access track and near the northern edge of the extraction site (both 13th May), so it is considered that this may be an underestimate of the number of territories.

Possible breeding species

Green List species

4.3.35 Whitethroat *Sylvia communis*: A single adult was recorded during the 8th June survey visit near the north western corner of the extraction site and, shortly after, two juveniles were recorded nearby. It is possible that they may have bred within this area as suitable habitat is present. However, male territory holding birds are usually relatively conspicuous and the lack of previous records suggests that a family may have moved into this area after the young had fledged, possibly from similar suitable habitat nearby to the north west.

4.3.36 Coal tit *Periparus ater:* Birds, including calling/singing birds, were recorded in woodland in the south western part of the extraction site, as well as on its northern edge (20th April), and on the edge of plantation and woodland beside the south eastern section of the proposed access track (13th May). Suitable breeding habitat is present within the survey area, particularly where conifers are present.

4.3.37 Jackdaw *Corvus monedula*: Birds were recorded calling either side of the proposed access track as well as forming part of a mixed flock, with rooks, of more than 30 birds nearby during the 13th May survey visit. Suitable breeding habitat is present within the survey area.

4.3.38 Goldfinch *Carduelis carduelis*: A group of seven birds were recorded during the 8th June survey visit flying from scrub and trees on the edge of a small plantation beside the south eastern section of the proposed access track. Suitable breeding habitat is present within the survey area.

4.3.39 Common buzzard *Buteo buteo*: Birds were recorded in the plantation forming the north western part of the extraction site during the 20th April and 8th June survey visits, as well as beside the

proposed access route on the 8th June. Suitable breeding habitat is present within the survey area.

Other species

Schedule 1 species

4.3.40 Hobby *Falco subbuteo*: a group of three birds were recorded calling and flying over the south eastern part of the proposed access route during the 26th May survey visit. However, the lack of other records suggests they were not breeding within the survey area.

Green List species

4.3.41 Rook *Corvus frugilegus*: Rooks were recorded flying over the central part of the proposed access route as part of a mixed flock of more than 30 birds during the 13th May survey visit. Suitable breeding habitat is present within the survey area but as rooks nest colonially in rookeries, which are generally noisy and conspicuous, it is considered very unlikely that they were breeding in the survey area.

Nightjar survey

4.3.42 No nightjar were recorded in the areas of potentially suitable habitat surveyed.

Evaluation

Breeding bird assemblage

4.3.43 The breeding bird assemblage, including confirmed, probable and possible breeding, included 29 species. The species recorded, their conservation status and the number of territories, where appropriate, are summarised in Table 4.5. The most important breeding populations, from a nature conservation perspective, are considered to be those of the BoCC Red and Amber Listed and Section 41 species i.e. song thrush, mistle thrush, marsh tit, nightingale, cuckoo and dunnock. One Schedule 1 species was recorded, however, hobby was not recorded breeding.

Importance

4.3.44 The survey area supported quite a rich breeding assemblage of woodland bird species, including 22 of the 34 species used for the England woodland bird indicator[29]. Further, a number of species included in the indicator are absent from, rare or scarce within Sussex as breeding species, such as pied flycatcher, wood warbler, lesser spotted woodpecker, siskin and lesser redpoll, while several such as redstart and tree pipit are largely associated with, or confined to, particular habitats, such as heathland, or areas of the county. Some species, such as tawny owl are also unlikely to be well recorded using the CBC methodology. The assemblage recorded included six Red and Amber List species of conservation concern. The survey area as a whole is considered to be of District Importance for its breeding bird assemblage. However, the Proposed

[29] DEFRA, 2020. *Wild Bird Populations in England, 1970 to 2019*. Accessed online [21/01/2021]at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938262/UK_Wild_birds_1970-2019_final.pdf

Development site's red line boundary (including the access route), which is smaller and excludes some important boundary features, is considered to be of at least Local Importance. The larger woodland blocks of which the survey area forms a part are considered to be of County Importance for their breeding bird assemblage, based on the results of this survey, the habitat present and the population of nightingale recorded.

Table 4.5: Summary of breeding bird survey results

Species	BoCC list	Section 41	Schedule 1 / Annex 1	Minimum no. of territories or singing/calling males
Confirmed breeding species				
Robin	Green	No	-	18
Blue tit	Green	No	-	32
Great tit	Green	No	-	9
Blackcap	Green	No	-	11
Probable breeding species				
Song thrush	Red	Yes	-	8
Mistle thrush	Red	No	-	1
Marsh tit	Red	Yes	-	3
Nightingale	Red	No	-	3
Cuckoo	Red	Yes	-	1
Dunnock	Amber	Yes	-	2
Wren	Green	No	-	23
Chiff chaff	Green	No	-	8
Garden warbler	Green	No	-	4
Goldcrest	Green	No	-	6
Long tailed tit	Green	No	-	1
Blackbird	Green	No	-	11
Jay	Green	No	-	1
Carrion crow	Green	No	-	1
Woodpigeon	Green	No	-	2
Green woodpecker	Green	No	-	2
Great spotted woodpecker	Green	No	-	2
Nuthatch	Green	No	-	4
Treecreeper	Green	No	-	4
Chaffinch	Green	No	-	1
Possible breeding species				
Whitethroat	Green	No	-	?
Coal tit	Green	No	-	?
Jackdaw	Green	No	-	?
Goldfinch	Green	No	-	?

Species	BoCC list	Section 41	Schedule 1 / Annex 1	Minimum no. of territories or singing/calling males
Buzzard	Green	No	-	?
Other species				
Hobby	Green	No	Schedule 1	n/a
Rook	Green	No	-	n/a

Annex 1 EC Directive 2009/147/EC on the Conservation of Wild Birds Annex 1 Bird
Schedule 1 Wildlife and Countryside Act 1981 Schedule 1 Bird
Section 41 Natural Environment & Rural Communities Act 2006 Section 41 Species of Principal Importance
BoCC list Red/Amber/Green, Birds of Conservation Concern 4 (Eaton *et al.*, 2015))

4.4 Wintering Birds

4.4.1 A total of 28 species were recorded within the survey area, of which seven are included on the BoCC4 Red List (Red List species), and one on the Amber List (Amber List species). Two Schedule 1 species were also recorded. Records of these species and their use of the site are discussed below, along with accounts of their status nationally and in Sussex, where relevant, for Red and Amber Listed species. Plans showing the location of records during the surveys are shown in Appendix V.

BoCC Red List species

4.4.2 Song thrush *Turdus philomelos* (Section 41 species): Single birds were recorded in the small recent plantation beside the south eastern section of the proposed access route during both the 15th January and 15th February survey visits, close to the location of one of the breeding territories identified during the breeding bird survey. Also during the 15th February survey visit, two single birds were recorded either side of the eastern part of the proposed access route and a single singing male was recorded in the north of the Proposed Development site.

4.4.3 Red listing of song thrush is based on the decline in the breeding population. Many breeding birds will overwinter within the UK, usually in or close to their breeding territory, though there may be movement in severe weather. Numbers can be increased in winter by the arrival of birds from the continent.

4.4.4 Mistle thrush *Turdus viscivorus*: A singing male was recorded in the north of the extraction site, or just to the north of it, close to the location of the breeding territory identified during the breeding bird survey, during both the 16th November and 15th January survey visits. Groups of three and seven birds were also recorded in the north-east and north of the extraction site during the 15th January and 15th February survey visits respectively, as well as a three birds in the small recent plantation beside the south-eastern section of the proposed access route during both the 15th February survey visit.

4.4.5 Red listing of mistle thrush is based on the decline in the breeding population. Many breeding birds will overwinter within the UK, usually in or close to their breeding territory, though there

may be movement in severe weather. Numbers can be increased in winter by the arrival of birds from the continent.

4.4.6 Fieldfare *Turdus pilaris* (Schedule 1 species): Several groups of fieldfares were recorded during the 16th November survey visit, at the northern end of the proposed access route, and within the extraction site, with a total of c.64+ birds recorded. Flocks of c.30 and c.20 birds were recorded flying from the edge of the eastern woodland block north of the proposed access route, and in the north of the extraction site during the 16th December survey visit, as well as two birds in the south west of the extraction site. A group of three birds were recorded in the extraction site during the 15th January survey visit.

4.4.7 Red listing and Schedule 1 status of fieldfare is based on the decline in, and very small size of, the breeding population, as well as a reduction in breeding range. Large but variable numbers of birds, mainly from Fennoscandia and eastern Europe, migrate to the UK for the winter. Overwintering numbers tend to vary from year to year and flocks are quite nomadic. Movements can also be caused by severe weather. Currently there do not appear to be any indications of a significant change in the status of Fieldfare in Sussex.

4.4.8 Redwing *Turdus iliacus* (Schedule 1 species): A group of more than 30 birds was recorded in woodland to the north of the extraction site during the 15th February survey visit.

4.4.9 Red listing and Schedule 1 status of redwing is based on the decline in, and very small size of, the breeding population. Large but variable numbers of birds, mainly from Fennoscandia and eastern Europe, migrate to the UK for the winter. Overwintering numbers tend to vary from year to year and flocks are quite nomadic. Movements can also be caused by severe weather. Currently there do not appear to be any indications of a significant change in the status of Fieldfare in Sussex.

4.4.10 Marsh tit *Poecile palustris* (Section 41 species): Single birds were recorded beside the northern section of the proposed access track during the 16th November survey visit, as well as on the edge of woodland and plantation within the extraction site, and adjacent to its south eastern boundary, during the 16th December survey visit. Groups of two and three birds were recorded in the north west and north east of the extraction site during the 15th January survey visit, as well as a single bird on the edge of woodland and plantation (in the same location one was recorded on the 16th December). Two birds were recorded in woodland on the north western edge of the Proposed Development site during the 15th February survey visit.

4.4.11 Red listing of marsh tit is based on the decline in the breeding population. Marsh tits tend to be highly sedentary so records in winter are likely to be within or close to breeding territories, as noted for the breeding birds survey results. These results suggest that breeding territories are likely to be located close to these winter records, which include locations additional to those identified during the breeding bird survey, including within or adjacent to the extraction site.

4.4.12 Lesser redpoll *Acanthis cabaret*: Three birds and a single bird were recorded in birch trees in the recent plantation area in the north west of the extraction site during the 16th December survey visit. Two birds were recorded in birch trees on the northern side of the proposed access route, beside recent broadleaved plantation, during the 15th February survey visit.

4.4.13 Red listing of lesser redpoll is based on the decline in the breeding population, which decreased significantly during the 1980s, particularly in England. It is a scarce breeding species in most of lowland England, including Sussex, but numbers are usually higher during winter due to the movement of birds into the area from the north.

4.4.14 Woodcock *Scolopax rusticola*: A single bird was flushed from the eastern part of the recent plantation in the north west of the extraction site during the 16th November survey visit.

4.4.15 Red listing of woodcock is based on the decrease in the breeding range, although there have also been declines in the breeding population since the 1970s. The resident population is increased over winter with the arrival of large numbers (relative to the breeding population) of birds from the continent, including Fennoscandia and Russia. In Sussex, as a breeding species, woodcock is largely restricted to areas in and around heathland, and there was a significant decline of more than a half in its breeding range between 1988-92 and 2008-11. Birds are more numerous and widely distributed during winter.

Amber List species

4.4.16 Dunnock *Prunella modularis* (Section 41 species): Single birds were recorded close to the proposed access route on the eastern edge of the western woodland block (16th November) and near the south eastern end of the proposed access track (15th January). Dunnock are generally sedentary and these birds are likely to form part of the resident population.

Green List species

4.4.17 Blackbird *Turdus merula*: Blackbirds were recorded during all three survey visits, both beside the proposed access route and within the extraction site. Most of these are likely to form part of the resident population, which can be very sedentary, but these are often supplemented in winter by birds from the continent, though numbers are variable.

4.4.18 Robin *Erithacus rubecula*: Robins were recorded during all three survey visits, both beside the proposed access route and within the extraction site. Robins are generally sedentary and these are likely to form part of the resident population.

4.4.19 Blue tit *Cyanistes caeruleus*: Blue tit were recorded during all three survey visits, both beside the proposed access route and within the extraction site. Blue tits are generally sedentary and these are likely to form part of the resident population.

4.4.20 Great tit *Parus major*: Small numbers of great tit were recorded during the 16th December and 15th January survey visits, both beside the proposed access route and within the extraction site. Great tits are generally sedentary and these are likely to form part of the resident population.

4.4.21 Coal tit *Periparus ater*: Single birds were recorded calling from a pine tree beside the central section of the proposed access route and from the eastern part of the extraction site during the 15th January survey visit. Three birds were also recorded calling beside the northern section of the proposed access route and a single bird was recorded calling near the centre of the extraction site during the 15th February survey visit. Coal tits are generally sedentary and these are likely to form part of the resident population.

4.4.22 Long-tailed tit *Aegithalos caudatus*: Small groups of long tailed tit were recorded during all three survey visits, sometimes in mixed groups with other tit species, both beside the proposed access route and within the extraction site. Long tailed tit are generally sedentary and these are likely to form part of the resident population.

4.4.23 Wren *Troglodytes troglodytes*: Wrens were recorded during all three survey visits, both beside the proposed access route and within the extraction site. Wrens are generally sedentary and these are likely to form part of the resident population.

4.4.24 Chiffchaff *Phylloscopus collybita*: A single bird was recorded close to the north western corner of the extraction site. Although the majority of chiffchaff migrate to southern Europe and North Africa at the end of the breeding season some now overwinter in the UK.

4.4.25 Goldcrest *Regulus regulus*: A single bird was recorded in the northern part of the recent plantation in the north west of the extraction site during the 15th January survey visit. Goldcrest are generally sedentary and this is likely to form part of the resident population.

4.4.26 Jay *Garrulus glandarius*: Individual birds were recorded during all three survey visits, both beside the proposed access route and within the extraction site. Jays are generally sedentary and these are likely to form part of the resident population.

4.4.27 Carrion crow *Corvus corone*: Single birds were recorded close to the northern section of the proposed access route (16th December) and the northern edge of the extraction site (15th January).

4.4.28 Woodpigeon *Columba palumbus*: A single bird was recorded close to the proposed access route on the eastern edge of the western woodland block (16th December) and two birds were recorded in the south eastern corner of the extraction site during the 15th January survey visit.

4.4.29 Green woodpecker *Picus viridis*: Single birds were recorded in the recent plantation in the north western part of the extraction site during both the 16th November and 15th January survey visits, as well as in the recent plantation in the south eastern part of the extraction site during the 15th February survey visit. Green woodpeckers are generally sedentary and these are likely to form part of the resident population.

4.4.30 Great spotted woodpecker *Dendrocopos major*: Great spotted woodpeckers were recorded during all three survey visits, both beside the proposed access route and within or immediately adjoining the extraction site. Great spotted woodpeckers are generally sedentary and these are likely to form part of the resident population. As noted above great spotted woodpecker is a common species that has increased significantly in recent decades.

4.4.31 Nuthatch *Sitta europaea*: Nuthatches were recorded during all three survey visits, both beside the proposed access route and within or immediately adjoining the extraction site. Nuthatches are very sedentary and these are likely to form part of the resident population.

4.4.32 Eurasian treecreeper *Certhia familiaris*: Treecreepers were recorded during the 15th January survey visit, near the south eastern end of the access route and in woodland in the south western

part of the extraction site. Treecreepers are very sedentary and these are likely to form part of the resident population.

4.4.33 Chaffinch *Fringilla coelebs*: Single birds were recorded close to the proposed access route during the 16th December and 15th February survey visits. Chaffinches are generally sedentary and this is likely to form part of the resident population.

4.4.34 Siskin *Carduelis spinus*: two groups of six and five birds were recorded in birch trees in the western part of the extraction site during the 16th December survey visit. Siskin is a relatively scarce and localised breeding species in Sussex, but numbers in winter are supplemented by birds from the continent.

4.4.35 Grey heron *Ardea cinerea*: Single birds were recorded during the 16th December and 15th January survey visits. The first was recorded beside one of the ponds in the woodland near the south eastern end of the proposed access route and the second was seen flying from this area westwards over the grassland fields.

4.4.36 Buzzard *Buteo buteo*: A single bird was recorded in woodland near the northern end of the proposed access track during the 15th February survey visit.

Evaluation

Winter bird assemblage

4.4.37 The wintering bird assemblage included 28 species. The species recorded, their conservation status and the maximum number of birds recorded during a single survey visit are summarised in Table 4.6. The most important species from a nature conservation perspective are considered to be those of the BoCC Red and Amber Listed and Section 41 species i.e. song thrush, mistle thrush, fieldfare and redwing (both also Schedule 1), marsh tit, lesser redpoll, woodcock and dunnock.

Importance

4.4.38 Quite a rich assemblage of birds typical of the habitats present was recorded within the survey area. Many species recorded comprise resident species for which the survey area provides suitable breeding habitat, and which were recorded during the breeding bird survey. However, a number of species, notably fieldfare, redwing, lesser redpoll, siskin and woodcock are likely to use the survey area during winter but breed elsewhere, such as further north or in continental Europe. The assemblage included eight Red and Amber List species of conservation concern, although these are listed based on reductions in their breeding populations or range. The survey area is considered to be of Local Importance for its wintering bird assemblage.

Table 4.6: Summary of wintering bird survey results

Species	BoCC list	Section 41	Schedule 1 / Annex 1	Max. no. birds per survey
Song thrush	Red	Yes	-	1
Mistle thrush	Red	No	-	4

Species	BoCC list	Section 41	Schedule 1 / Annex 1	Max. no. birds per survey
Fieldfare	Red	No	Schedule 1	64
Redwing	Red	No	Schedule 1	>30
Marsh tit	Red	Yes	-	6
Lesser redpoll	Red	Yes	-	4
Woodcock	Red	No	-	1
Dunnock	Amber	Yes	-	2
Blackbird	Green	No	-	9
Robin	Green	No	-	10
Blue tit	Green	No	-	42
Great tit	Green	No	-	4
Coal tit	Green	No	-	1
Long tailed tit	Green	No	-	5
Wren	Green	No	-	10
Chiffchaff	Green	No	-	1
Goldcrest	Green	No	-	1
Jay	Green	No	-	3
Carrion crow	Green	No	-	1
Woodpigeon	Green	No	-	1
Green woodpecker	Green	No	-	1
Great spotted woodpecker	Green	No	-	4
Nuthatch	Green	No	-	4
Treecreeper	Green	No	-	3
Chaffinch	Green	No	-	1
Siskin	Green	No	-	11
Grey heron	Green	No	-	1
Buzzard	Green	No	-	1

Annex 1 EC Directive 2009/147/EC on the Conservation of Wild Birds Annex 1 Bird
Schedule 1 Wildlife and Countryside Act 1981 Schedule 1 Bird
Section 41 Natural Environment & Rural Communities Act 2006 Section 41 Species of Principal Importance
BoCC list Red/Amber/Green, Birds of Conservation Concern 4 (Eaton *et al.*, 2015))

4.5 Invertebrates

Desk study

4.5.1 SxBRC returned 34 records of eight species of protected invertebrate from within the desk-study search zone, during a date range of 1985 to 2018, principally of Lepidoptera (moths and butterflies). The results included four NERC section 41 species (pearl-bordered fritillary, small heath, white admiral and brown hair-streak) and one nationally notable species (black-headed cardinal beetle).

Results summary

4.5.2 A total of 268 species from the sampled groups were recorded during the surveys, including 28 species (10.4%) with a national status although it is recognised by many of the national recording schemes that a number of these may no longer warrant their current status. No evidence of stag beetle was recorded. The results included three NERC section 41 species of principal importance: small heath *Coenonympha pamphilus*, wood white *Leptidea sinapis* (also partially protected under WCA schedule 5) and white admiral *Limenitis camilla*.

4.5.3 Invertebrate species of importance recorded during the surveys are listed in Table 4.7, while the site resource usage and Specific Assemblage Type tables generated by Pantheon are shown in Table 4.8 and Table 4.9.

Table 4.7: Invertebrate species of importance

Species	Common name	Status	Habitat preferences / notes
Ampedus elongantulus	a click beetle	Notable a; Near Threatened	Ancient and well-established woodlands and parklands. Larvae found mainly in rotting stumps with red rot, typical of oak trees and beech (Fagus spp.).
Ceratina cyanea	a solitary bee	Red Data Book 3*	Prefers very hot and dry places with strong interface between ruderal vegetation such as bramble and open patchy bare ground. More common now than its status suggests.
Cheilosia carbonaria	a hoverfly	Nationally Scarce	Associated with the rides and open areas of broadleaved woodland. Larvae probably associated with thistles (Circium and Carduus spp.).
Coenonympha pamphilus	small heath butterfly	Section 41 Priority Species	Requires fine-leaved grasses such as fescues (Festuca spp.) and bents (Agrostis spp.). Prefers sites with tall and short swards, often with patches of bare ground.
Dasytes niger	a beetle	Nationally Rare	A species found in deadwood, most probably broadleaved species.
Dolichovespula saxonica	social wasp	Red Data Book K*	A social wasp formerly very scarce, not frequent across its range. Associated with woodlands and woodland edges.
Formica sanguinea	slave-making ant	Notable b	Found on sandy heaths and woodlands where it makes slaves of other ants from the Formica fusca group.
Gymnosoma rotundatum	a tachinid fly	Red Data Book 3	A parasitic fly that parasitizes shieldbugs. Found on tall flowery sites, including open areas of woodlands.
Hippodamia variegata	Adonis ladybird	Notable b*	Prefers dry and parched swards. No longer warrants a nationally significant status.

Species	Common name	Status	Habitat preferences / notes
Hylaeus dilatatus	a yellow-faced bee	Red Data Book 3*	Prefers open sites with yellow composite flowers. Nests in bare ground. No longer warrants a nationally significant status.
Lasius brunneus	brown ant	Notable A	This ant is associated with mature broadleaved trees, particularly oaks (Quercus spp.), where it nests within the tree or under bark.
Leptidea sinapis	wood white butterfly	Legal Protection; Section 41 Priority Species	A woodland butterfly associated with various vetches including meadow vetchling (Lathyrus pratensis) and bitter vetch (Lathyrus montanus). It will also utilize common bird's-foot trefoil (Lotus corniculatus).
Limenitis camilla	white admiral butterfly	Section 41 Priority Species	Larvae feed on honeysuckle (Lonicera peryclymenum) in partial shade or dappled light. Adults forage for nectar along woodland rides and in glades. Bramble (Rubus fruticosus agg.) is a favoured nectaring flower.
Medetera jacula	a dolyfly	Data Deficient	A small dolyfly found on trees. Currently there is not much known about its ecology, hence the status. Possibly not genuinely scarce.
Medetera truncorum	a dolyfly	Data Deficient	A small dolyfly found on trees. Currently there is not much known about its ecology, hence the status. Possibly not genuinely scarce.
Microdynerus exilis	a solitary wasp	Notable b	Prefers hot and dry sites with deadwood in which it nests. Has had a recent and dramatic range expansion but may still warrant its current status.
Microrhagus pygmaeus	a beetle	Red Data Book 3	A deadwood beetle associated with oak trees.
Monosapyga clavicornis	a parasitic wasp	Notable b	A parasitic wasp on mason bees. Found in sunny locations with deadwood.
Mordellistena humeralis	a tumbling flower beetle	Nationally Scarce	Larvae probably develop in the deadwood of trees or in plant stems. Adults on flowers, especially umbellifers.
Nomada ferruginata	a nomad bee	Red Data Book 1*	A cuckoo bee on the mining bees Andrena praecox and A. varians. Formally very scarce but, after a range expansion, is likely to be downgraded to a lower nationally significant status in the upcoming status review for bees, wasps, and ants.
Nomada lathburiana	a nomad bee	Red Data Book 3*	A cuckoo bee on Andrena cineraria, formerly very scarce but now no longer warrants a nationally significant status.

Species	Common name	Status	Habitat preferences / notes
Omocestus rufipes	woodland grasshopper	Nationally Scarce*	Prefers warm and sunny woodland rides and glades. Predominately feeds on grasses. Although localized to southern England, it is now thought not to warrant a nationally significant status.
Priocnemis schioedtei	a spider-hunting wasp	Notable b*	A species of open dry sites on sandy or chalky soils, also found in open areas of woodlands.
Rhagonycha lutea	a soldier beetle	Nationally Scarce	Associated with mature oak trees. Found frequently in south-east England and possibly does not warrant a nationally significant status.
Tanyptera atrata	a cranefly	Notable	A saproxylic cranefly that requires dead and dying trees such as ash (Fraxinus excelsior), birch (Betula spp.), and others.
Temnocerus coeruleus	a beetle	Notable b	–
Tipula helvola	a cranefly	Notable	Inhabits dry broadleaved woodland. The larvae probably develop in the soil.
Variimorda villosa	a tumbling flower beetle	Nationally Scarce	Larvae probably develop in the deadwood of trees, or in plant stems. Adults on flowers, especially umbellifers.

Table 4.8: Site resource usage

Broad biotope	Habitat	Species	Species with conservation status *	
Open habitats	Tall sward & scrub	96	6	*Hippodamia variegata* – Nb†; *Cheilosia carbonaria* – NS; *Ceratina cyanea* – RDB3†; *Hylaeus dilatatus* – RDB3†; *Lepidea sinapis* – S41; *Omocestus rufipes* – NS†
Tree-associated	Shaded woodland floor	42	3	*Medetara truncorum* – DD; *Cheilosia carbonaria* – NS; *Tipula helvola* – N
Tree-associated	Decaying wood	38	8	*Dasytes niger* – NR; *Ampedus elongantulus* – NA: NT; *Microrhagus pygmaeus* – RDB3; *Medetara jacula* – DD; *Tanyptera atrata* – N; *Lasius brunneus* – NA; *Monogyna clavicornis* – Nb; *Microdynerus exilis* – Nb
Open habitats	Short sward & bare ground	37	6	*Nomada ferruginata* – RDB1†; *Nomada lathburiana* – RDB3†; *Hylaeus dilatatus* – RDB3†; *Formica sanguinea* – Nb; *Priocnemis schioedtei* – Nb; *Coenonympha pamphilus* – S41
Tree-associated	Arboreal	27	5	*Rhagonycha lutea* – NS; *Temnocerus coeruleus* – Nb; *Dolichovespula saxonica* – RDBK†; *Limenitis camilla* – S41
Wetland	Peatland	10	–	–

Broad biotope	Habitat	Species	Species with conservation status *	
Wetland	Marshland	9	–	–
Wetland	Running water	7	–	–
Wetland	Wet woodland	5	–	–
Tree-associated	Wet woodland	5	–	–

* Excluding research-only moths.

† Accepted as being more common than this status suggests; likely to be downgraded.

Table 4.9: Site Specific Assemblage Types

Broad biotope	SAT	Code	Species	Species with conservation status *		Reported condition
Open habitats	Scrub edge	F001	28	3	*Cheilosia carbonaria* – NS; *Microdynerus exilis* – Nb; *Omocestus rufipes* – NS†	Favourable
Open habitats	Rich flower resource	F002	26	4	*Ceratina cyanea* – RDB3†; *Nomada ferruginata* – RDB1†; *Nomada lathburiana* – RDB3†; *Hylaeus dilatatus* – RDB3†	Favourable
Tree-associated	Bark & sapwood decay	A212	23	3	*Dasytes niger* – NR; *Monosapyga clavicornis* – Nb; *Microdynerus exilis* – Nb	Favourable
Tree-associated	Heartwood decay	A211	6	3	*Ampedus elongantulus* – Na: NT; *Microrhagus pygmaeus* – RDB3; *Tanyptera atrata* – N; *Lasius brunneus* – NA	Favourable
Open habitats	Bare sand & chalk	F111	4	–	–	Unfavourable (4 of 19 species)
Open habitats	Open short sward	F112	2	1	*Coenonympha pamphilus* – S41	Unfavourable (2 of 13 species)

* Excluding research-only moths.

† Accepted as being more common than this status suggests; likely to be downgraded.

Habitat assessment

4.5.4 The site is represented by a range of habitats broadly covering three broad biotopes: 'open habitats', 'tree-associated', and 'wetland'. However, it is the open terrestrial biotope that dominates the site in terms of species associations with 147 species recorded, even though it is not the dominant habitat type on the site.

4.5.5 The open habitats that are the most prominent across all areas of the site are the tall sward and scrub with a total of 96 species of association recorded. The resource is wide-ranging, and includes bees and wasps, beetles, and flies. Six species are noted by Pantheon as being of particular value to the habitat, although only two are thought to be genuinely significant, in terms of national status.

4.5.6 The short sward and bare ground habitat include 37 species, and six of those also have a nationally significant status. Three of these require a downward revision in their status. The recourse is principally found on the clear-felled area of the site and, to a lesser extent, along sunny areas of the proposed access track. The resource is characteristically predominated with ground-nesting bees and wasps and also species of bee and wasp that nest in deadwood.

4.5.7 The 'tree-associated' biotope was found to have a resource of 103 species, although there are many more likely to be present. Of the resource, 42 are associated with the shaded ground floor and are therefore indicators of closed canopy woodlands and true woodland species. This resource includes a suite of three scarce species; however, *Medetera truncorum* is possibly not a scarce species, only under-recorded.

4.5.8 The habitat with the greatest resource of scarce species is the decaying wood habitat. This includes 38 species, of which eight have a nationally significant status. Only one of these is thought likely not to be genuinely nationally significant. This resource is rich with beetles, many of which are associated with the heartwood rot of mature and old trees. The resource is found throughout the site but is most abundant along the northern and eastern side of the site, where mature trees are more abundant and possess deadwood features.

4.5.9 The arboreal canopy is highlighted also by Pantheon with 27 species recorded. This fauna is, along with decay wood, difficult to sample effectively, particularly over short periods of time, and the arboreal canopy and decaying wood habitats may be much richer than the survey suggests. Notwithstanding this, five species with a nationally significant status were recorded, although two are not thought to be genuinely scarce. Where the arboreal canopy is best is where the canopy is varied, and light is able to penetrate to the lower branches and shrub layer.

4.5.10 The wetland fauna on the site is small (23 species), and as there are no water features on the site, this is to be expected. All are intrinsically linked not to the site but to the adjacent habitats or temporary features on the site, such as waterfilled depressions along woodland paths.

Specific Assemblage Types

4.5.11 There are four assemblages that are highlighted by the analysis as being in 'favourable condition', all of which are pertaining to woodlands. The SAT with the greatest number of associates is the scrub fringe (F001). This has a resource of 28 species. This is a very rich assemblage on the site owing to the extensive interfaces between woodland edge and the clear-felled area and also along a sunny part of the access track. The complex forms of the edge also increase the structural diversity of the site, increasing opportunities to invertebrates.

4.5.12 The rich flower resource (F002) with 26 species of association is presented by a range of species from woodlands and, more typically, the open habitats. The clear-felled area is rich with this assemblage of species and, to a lesser extent, the access track verges.

4.5.13 The assemblage that is of greatest significance, however, is the bark and sapwood decay, again a SAT deemed to be in favourable condition. This typical deadwood assemblage is very rich, given that the fauna is problematic to sample, owing to many of the species living almost their entire lives within the decaying timbers. This resource includes the nationally rare beetle *Dasytes niger*.

4.5.14 The heartwood decay SAT (A212) is less evident on the site, owing largely to the lack of very old and degenerate trees. It is mainly recorded from the eastern edge of the site. However, there is a resource of species associated with this niche feature, and it is also in favourable condition. This resource includes the Red Data Book 3 *Microrhagus pygmaeus* beetle.

4.5.15 The two highlighted SATs that fall short of being of high value to the site and favourable condition status are the bare sand and chalk and open short sard SATs. This is to be expected at a site where there is not a large area of the habitat present. However, the two assemblages do serve to help increase the biodiversity value of the site and are in part complementary to other habitats, even the wooded ones, as they provide hot, dry, and open basking sites for woodland species and a location where the rich flowering resource can proliferate.

Species

4.5.16 The survey of the site recorded 268 species and 28 species identified by Pantheon as being of value; however, there are a number that are more common now than their status suggests, so in time this number would be revised downwards as further status reviews are completed. However, even when removing these species, the list is still rich and includes some very scarce species. The overall diversity of 268 species is not especially rich, particularly when considering the south-east location of the site. However, the sample site is comparatively small.

4.5.17 Notwithstanding the above, the value of the site can be shown through the quality of the species recorded; 10.4% of the species have a nationally significant status. This is a large proportion of the total species, indicating towards the value of the site and each of the habitat types. This is supported by the SAT analysis where four out of the six highlighted assemblages are deemed to be in favourable condition.

4.5.18 Some of the key species from the survey are the beetles and butterflies. The click beetle *Ampedus elongantulus* is a scarce species that requires red cubic heartwood, typically found in old oaks and beech trees. Scots pine (*Pinus sylvestris*) can also exhibit this rot form.

4.5.19 The presence of a suite of woodland butterflies is of particular note for the site. The most noteworthy are the wood white (*Lepidea sinapsis*) and white admiral (*Limenitis camilla*). The wood white population is centred along the existing access track and into open clear-felled areas. The white admiral similarly can be found, sometimes in abundance, along the tracks and also small glade areas along the eastern edge of the proposed development. There are no other wood white records within 1km of the site, based on the 1km data search zone used in the desk study.

4.5.20 Alongside the woodland fauna is an open habitat fauna. This fauna is associated with the clear-felled area and typified by species that love hot, dry, and open sites. This includes a resource of bees, ants, and wasps, including a number that are of some significance such as *Microdynerus exilis*. The fauna has a provisional inventory of 52 species.

Site evaluation

4.5.21 The site comprises a moderately diverse woodland invertebrate fauna that includes a high proportion of scarce species indicative of niche woodland features such as heartwood rot and woodland edge. The site is also likely to include many more scarce species of woodlands and woodland edges, including those that are poor dispersers and therefore colonisers of newly created habitats.

4.5.22 The valuation of the site takes into consideration the range of species recorded, including the scarce species, the overall assemblages and those of particular families (beetles and butterflies), and the importance of the habitats to the species. It also considers the context of the site, lack of data from the surrounding forested areas in relation to the species that are supported on those sites, including the effect of any losses that a proposed development would or could have on the wider invertebrate resource or particular species.

4.5.23 In evaluating the data collected from the surveys, it is suggested that the site's key features and species should be considered to be of County (medium) Importance.

4.5.24 The site is considered to be of County (medium) importance and not one of a lower status, owing to the site having a rich resource of deadwood invertebrates. This fauna is also likely to be greater than what is evidenced in this survey report, as invertebrate species can be elusive, in particular the saproxylics, and therefore not all species would have been recorded during these surveys. The site also includes potentially significant populations of woodland butterflies, with the wood white being the most noteworthy.

4.5.25 The site is not currently thought to be of greater status (Regional), owing to the presence of a number of scarce species not now thought to be worthy of a nationally significant status. It is also acknowledged that the surrounding forest may support populations of some of the key species noted in this report, and through appropriate measures these may not be significantly and permanently impacted through the proposed development.

4.6 Badger

Desk study

4.6.1 SxBRC does not supply badger *Meles meles* records for animal welfare reasons.

Habitat assessment

4.6.2 The extraction site provides a range of habitats over a relatively large area which are suitable for badger, including extensive woodland suitable for sett creation, and a mosaic of coarse grassland, tall ruderal and scrub in the broadleaved plantation suitable for foraging. A search for

badger setts and signs of their presence was undertaken during the PEAs, such as badger paths, footprints, latrines, badger hairs caught at fence lines, scratching posts or evidence of foraging (snuffle holes). Field signs of badger were noted within the extraction site and surrounding woodland including paw prints along footpaths through woodland adjacent to the site, characteristic snuffle holes and scattered latrines (Middlemarch, 2019). No setts or evidence of badger activity were observed along the proposed access route (UEEC, 2020). A more thorough investigation was recommended to help determine the potential level of badger activity within the area.

Field sign survey

4.6.3 A comprehensive walkover survey within c.30m of the extraction site and access route was undertaken on 24 July 2020 to search for setts and field signs. Very few field signs were recorded during the walkover but six mammal burrows and one area of foraging (snuffle holes) were noted, as listed and depicted below and shown on the plan at Appendix VI:

- Burrow B1: one hole large enough for badger, possibly used as fence underpass. Located within the Site; appeared inactive in July 2020.
- Burrow B2: three holes of sufficient size and characteristic shape. Located on the northern Site boundary; appeared inactive in July 2020.
- Burrow B3: likely old rabbit warren - holes too small for badger. Located within the Site; appeared inactive in July 2020.
- Burrow B4: three holes, shape indicative of collapsed rabbit holes. Located c.20m south of the Site; appeared inactive in July 2020.
- Burrow B5: one hole large enough for badger. Located c.20m north of the Site; appeared inactive in July 2020.
- Burrow B6: one hole but probably too small for badger. Located c.15m north of the proposed access in Hurst Wood; appeared inactive in July 2020.


Burrow B1


Burrow B2


Burrow B3, likely disused rabbit warren


Burrow B6

Camera trap monitoring

4.6.4 Three trail cameras were deployed to monitor animal activity around the three mammal burrows which appeared most likely to have potential to become actively used by badger, as listed below. Table 4.10 presents a summary of the camera data. As can be seen, very little badger activity was recorded during more than three months of monitoring within and around the Site, with just one record of badger passing in front of camera 3 on 10 October 2020 but not seen to enter the burrow.

- Burrow B1: Trail Cam 3 installed on 6 August 2020.
- Burrow B2: Trail Cam 5 installed on 6 August 2020.
- Burrow B5: Trail Cam 4 installed on 6 August 2020.

Table 4.10: Summary of camera trap monitoring for badger

Trail 3 – Total number of days deployed: 96				
Week	***Species observed***			***Activity / additional comments***
	Fox	***Badger***	***Deer***	
06/08/20-09/08/20				
10/08/20-16/08/20	2		1	Passing in front of camera
17/08/20-23/08/20			2	Passing in front of camera
24/08/20-30/08/20				
31/08/20-06/09/20				
07/09/20-13/09/20		1		Passing in front of camera
14/09/20-20/09/20				
21/09/20-27/09/20	1			Passing in front of camera
28/09/20-04/10/20	1			Passing in front of camera
05/10/20-11/10/20			1	Passing in front of camera
12/10/20-18/10/20				
19/10/20-25/10/20				
26/10/20-01/11/20				
02/11/20-08/11/20				
09/11/20-11/11/20				

Trail 4 – Total number of days deployed: 96				
Week	*Species observed*			*Activity / additional comments*
	Fox	*Badger*	*Deer*	
06/08/20-09/08/20				
10/08/20-16/08/20	1		2	Passing in front of camera
17/08/20-23/08/20			1	Passing in front of camera
24/08/20-30/08/20			2	Passing in front of camera
31/08/20-06/09/20				
07/09/20-13/09/20				
14/09/20-20/09/20				
21/09/20-27/09/20				
28/09/20-04/10/20				
05/10/20-11/10/20				
12/10/20-18/10/20				
19/10/20-25/10/20				
26/10/20-01/11/20				
02/11/20-08/11/20				
09/11/20-11/11/20				

Trail 5 – Total number of days deployed: 96				
Week	*Species observations*			*Activity / additional comments*
	Fox	*Badger*	*Deer*	
06/08/20-09/08/20				
10/08/20-16/08/20			2	Passing in front of camera
17/08/20-23/08/20			1	Passing in front of camera
24/08/20-30/08/20	1		2	Passing in front of camera
31/08/20-06/09/20				
07/09/20-13/09/20				
14/09/20-20/09/20				
21/09/20-27/09/20				
28/09/20-04/10/20				
05/10/20-11/10/20				
12/10/20-18/10/20			1	Foraging
19/10/20-25/10/20			3	Foraging / passing in front of camera
26/10/20-01/11/20				
02/11/20-08/11/20			2	Passing in front of camera
09/11/20-11/11/20				

Camera number	Date and time	Photo and description

Trail 3	10/10/2020 02:08am	 Badger passing in front of camera

Evaluation

4.6.5 The results show that badger was not actively using the mammal burrows within or around the Proposed Development Site during summer/autumn 2020, and the low number and restricted distribution of field signs indicate that the Site is not a core part of their territory. Very few camera trap recordings were made of badger during 96 days of monitoring with three cameras and limited evidence of badger was recorded elsewhere in the survey area.

4.6.6 Although the species has been observed to occasionally pass through the Site (once during three months monitoring), none of the mammal burrows noted during the field sign survey is considered to be an active badger sett.

4.7 Roosting Bats

Desk study

4.7.1 SxBRC returned two records of one species of bat from within 2km of the survey area, in 2013, both *Pipistrellus* sp.

Habitat assessment

4.7.2 There were no buildings within the survey area. The Preliminary Ground-level Roost Assessment (PGRA) within the extraction site found that the majority of trees were young or early mature, either self-seeded or part of recently replanted plantation. However, 31 mature trees mainly within the south-western quarter of the site and along the boundaries exhibited potential roost features for bats and were assessed as follows:

- High suitability: T3
- Moderate suitability: T1, T2, T6, T7, T9, T12, T13, T15, T18, T19, T25, RT1, RT2, RT3, RT4, RT6
- Low suitability: T4, T5, T8, T10, T11, T14, T16, T17, T20, T21, T22, T23, T24, RT5

4.7.3 Alongside the proposed access route the PGRA found that the majority of trees, both scattered and within woodland, were in good condition and did not display any features suitable for roosting bats. However, four mature trees (T26, T27, T28 and T29) were of moderate suitability for roosting bats due to the range of PRFs exhibited and proximity to good foraging and commuting habitat. In addition, three trees (T30, T31, T32) along the access track were of low suitability for roosting bats and contained potential roost features.

4.7.4 The results of the PGRA are presented in Appendix VII while the locations of trees with bat roost potential are shown at Appendix I.

Evaluation

4.7.5 Felling or arboricultural works to these trees, where required to facilitate the development or access proposals, could result in destruction of a bat roost or present a risk of killing, injury or disturbance if bats are present during the works. Presence/absence surveys for bats roosting in high and moderate suitability trees were not carried out in 2020 because no trees with roosting bat potential were identified in the north-west quadrant of the Site which is intended to be the focus of construction activity over the short term (1—2yrs). Furthermore, the low to moderate levels of bat activity recorded within the extraction site during the transect surveys (see section 4.8) would indicate that bat roosts of high conservation significance are unlikely to be present. In addition, bats' usage of tree roost habitats is dynamic and changeable throughout the year and between years, which could render the survey data out of date by the time subsequent phases are addressed. However, the final proposals for site access and the drainage lagoon are likely to affect moderate suitability trees T13, T15, T18 and T19 at the outset, and tree climbing and aerial inspection surveys are being undertaken in 2021. Conversely, low suitability trees are not required to undergo further surveys, instead tree works will be undertaken in accordance with a Non-Licenced Method Statement to reduce the risk of killing/injury to bats.

4.8 Foraging and Commuting Bats

Habitat assessment

4.8.1 The survey area's mosaic of ancient, deciduous and plantation woodland, scrub, scattered trees, hedgerow and grassland habitats are likely to provide extensive opportunities for foraging and commuting bats. The deciduous woodland and recently replanted plantation in particular are likely to support an abundant invertebrate assemblage, both within the extraction site and alongside the access route. Linear features including traditional boundary features, woodland edge and rides may serve as commuting routes while providing further opportunities for foraging.

4.8.2 The survey area was divided into two distinct sections both of which were subject to equivalent bat activity survey effort: the extraction site, and the proposed access route[30].

[30] An alternative access from Loxwood Road was also explored along a c.420m alignment of unsurfaced track passing through semi-natural deciduous woodland from approximately 505295,131768 before joining the primary route at approximately 505305,132137. This was investigated principally in relation to its use by foraging and commuting bats and forms part of the bat survey transect but is no longer being considered for site access.

Transect surveys

4.8.3 Monthly bat activity surveys were carried out between April and October 2020 in both areas, and comprised one transect per subdivision (site and access); see Appendix VIII for a plan showing survey transects and transect points. These were mostly dusk surveys, but in July and September both dusk and dawn surveys were carried out in the same 24hr period. Full survey results are included at Appendix IX and summarised in the tables and graphs below; example sonograms recorded at the survey area are included at Appendix X.

All transect data: site and access

4.8.4 Table 4.11 presents a summary of all transect survey data collected during the 2020 bat active season. The abundance of foraging and commuting bats ranged from low to high, with generally higher levels of activity recorded along and around the proposed access route than within the extraction site. Approximately 1,189 bat observations were made in total during the transect surveys, dominated by common pipistrelle *Pipistrellus pipistrellus* and soprano *P. pygmaeus* pipistrelle (48.9% and 30.8%, respectively) but with a significant minority of *Myotis spp*. bats (9.5%), the latter probably a reflection of the survey area's woodland character. The apparent abundance of serotine *Eptesicus serotinus* (4.7%) is exaggerated by the July 2020 survey along the access route during which one serotine was seen to make 35 foraging passes over the recent plantation clearing to the north of the access track close to Hurst wood (transect point R8). A relatively high proportion were barbastelles *Barbastella barbastellus* (2.9%), a rare species whose distribution is restricted to southern England. However, the majority of these were recorded in April 2020 along the access route, particularly between R11 and R15 close to the stream, and the species was observed infrequently thereafter. Figure 4.2 to Figure 4.4 show a comparison of the relative abundance of bats in each part of the survey area (site and access), as well as temporal changes in the abundance of individual species over the course of the season.

Table 4.11: Monthly bat transect survey data: site and access

ALL DATA											
Date	Time	Location	BABA	EPSE	MYsp	NYNO	PIPI	PIPY	PLAU	*TOTAL*	Eval.
Apr-20	Dusk	Access	21	0	2	0	39	90	1	*153*	High
	Dusk	Site	2	0	2	0	10	20	0	*34*	Low
May-20	Dusk	Access	0	0	7	0	29	11	1	*48*	Low
	Dusk	Site	0	0	11	0	80	8	0	*99*	Mod
Jun-20	Dusk	Access	1	0	11	1	22	15	1	*51*	Mod
	Dusk	Site	0	0	9	0	49	18	0	*76*	Mod
Jul-20	Dusk	Access*	0	51	22	5	121	56	2	*257*	High
	Dusk	Site	1	1	12	9	41	2	0	*66*	Mod
Jul-20	Dawn	Access	2	4	10	0	64	9	3	*92*	Mod
	Dawn	Site	0	0	7	0	54	15	1	*77*	Mod
Aug-20	Dusk	Access	6	0	6	1	23	31	1	*68*	Mod
	Dusk	Site	0	0	0	0	4	8	0	*12*	Low
Sep-20	Dusk	Access	2	0	5	1	8	34	2	*52*	Mod
	Dusk	Site	0	0	0	2	1		2	*5*	Low
Sep-20	Dawn	Access	0	0	0	0	20	16	2	*38*	Low
	Dawn	Site	0	0	0	0	0	0	0	*0*	Nil
Oct-20	Dusk	Access	0	0	8	1	10	31	0	*50*	Low
	Dusk	Site	0	0	1	2	6	2	0	*11*	
* Mainly one EPSE		*Total*	*35*	*56*	*113*	*22*	*581*	*366*	*16*	*1189*	
		%	*2.9*	*4.7*	*9.5*	*1.9*	*48.9*	*30.8*	*1.3*	*100*	

SITE ONLY											
Date	Time	Location	BABA	EPSE	MYsp	NYNO	PIPI	PIPY	PLAU	*TOTAL*	Eval.
Apr-20	Dusk	Site	2	0	2	0	10	20	0	*34*	Low
May-20	Dusk	Site	0	0	11	0	80	8	0	*99*	Mod
Jun-20	Dusk	Site	0	0	9	0	49	18	0	*76*	Mod
Jul-20	Dusk	Site	1	1	12	9	41	2	0	*66*	Mod
Jul-20	Dawn	Site	0	0	7	0	54	15	1	*77*	Mod
Aug-20	Dusk	Site	0	0	0	0	4	8	0	*12*	Low
Sep-20	Dusk	Site	0	0	0	2	1		2	*5*	Low
Sep-20	Dawn	Site	0	0	0	0	0	0	0	*0*	Nil
Oct-20	Dusk	Site	0	0	1	2	6	2	0	*11*	
		Total	*3*	*1*	*42*	*13*	*245*	*73*	*3*	*380*	
		%	*0.8*	*0.3*	*11.1*	*3.4*	*64.5*	*19.2*	*0.8*	*100*	

ACCESS ONLY											
Date	Time	Location	BABA	EPSE	MYsp	NYNO	PIPI	PIPY	PLAU	*TOTAL*	Eval.
Apr-20	Dusk	Access	21	0	2	0	39	90	1	*153*	High
May-20	Dusk	Access	0	0	7	0	29	11	1	*48*	Low
Jun-20	Dusk	Access	1	0	11	1	22	15	1	*51*	Mod
Jul-20	Dusk	Access*	0	51	22	5	121	56	2	*257*	High
Jul-20	Dawn	Access	2	4	10	0	64	9	3	*92*	Mod
Aug-20	Dusk	Access	6	0	6	1	23	31	1	*68*	Mod
Sep-20	Dusk	Access	2	0	5	1	8	34	2	*52*	Mod
Sep-20	Dawn	Access	0	0	0	0	20	16	2	*38*	Low
Oct-20	Dusk	Access	0	0	8	1	10	31	0	*50*	Low
* Mainly one EPSE		*Total*	*32*	*55*	*71*	*9*	*336*	*293*	*13*	*809*	
		%	*4.0*	*6.8*	*8.8*	*1.1*	*41.5*	*36.2*	*1.6*	*100.00*	

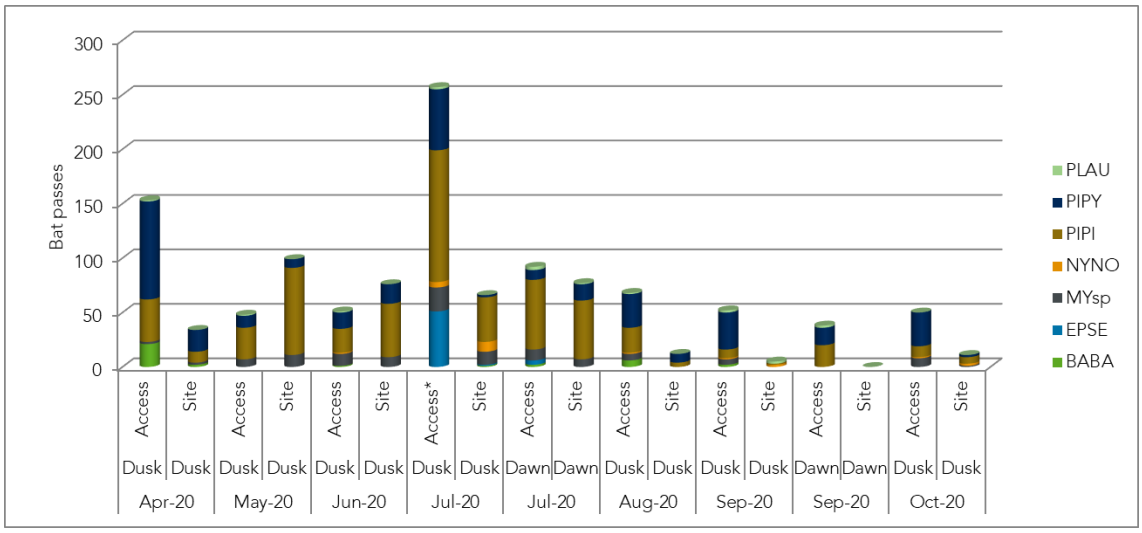

Figure 4.2: Bat passes during transect surveys, all species: site and access compared

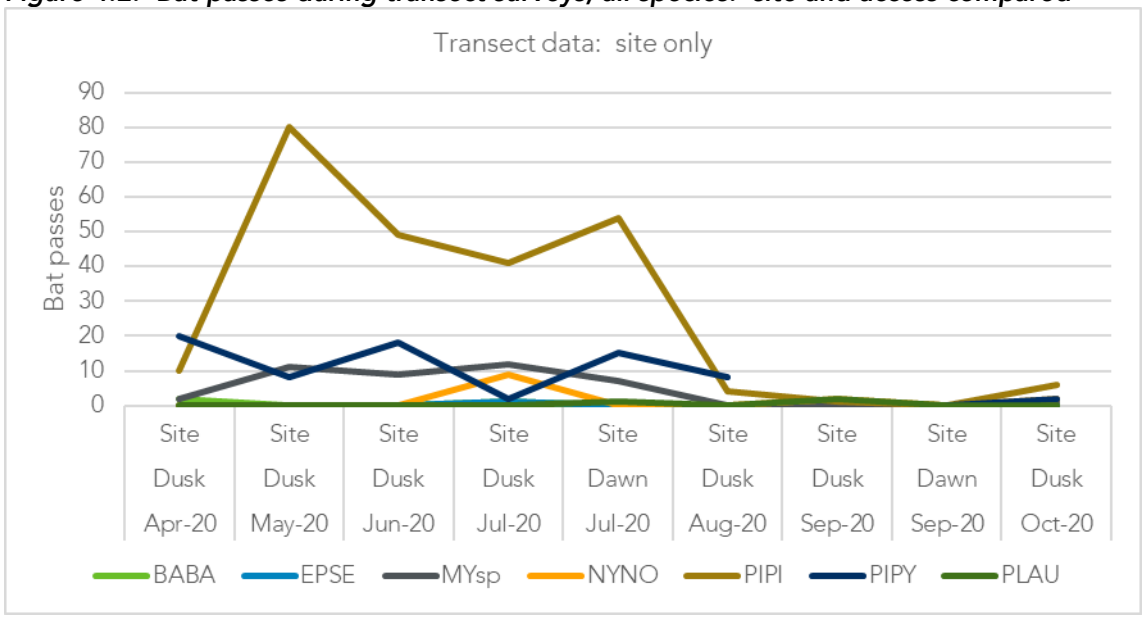

Figure 4.3: Bat passes during transect surveys, all species: Proposed Development site

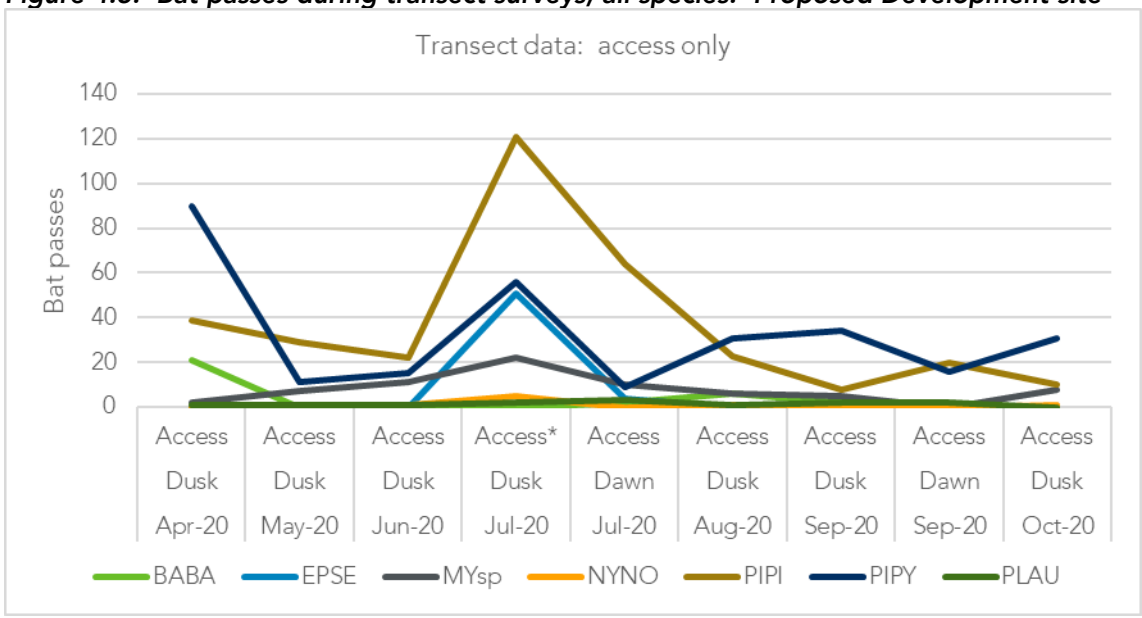

Figure 4.4: Bat passes during transect surveys, all species: proposed access

Transect data: site only

4.8.5 Features which appeared to be particularly favoured by foraging and commuting bats during observations made within the extraction site are listed below (and shown on a plan at Appendix VIII), along with an indicative evaluation of their level use relative to the survey area:

- Higher activity: Common and soprano pipistrelle bat species were regularly recorded using the track to the south of the extraction site between transect points 6 and 8. Bat species appeared to be using the ride for foraging and commuting behaviours.
- Higher activity: Common and soprano pipistrelle bats were recorded foraging in a small clearing to the south east of the site, around transect point 9. Most of the foraging behaviour was recorded by soprano pipistrelle bats species. These recordings were associated with commuting behaviour to the north and east along the adjacent trackways.
- Moderate activity: Frequent foraging behaviour was recorded in the open areas to the north of the site, surrounding transect points 13,14 and 15. Soprano pipistrelle was most common, followed by common pipistrelle, with occasional noctule recorded using this section.
- Moderate activity: *Myotis* species bats were recorded across the site, they were most often recorded using the pathways to the north of the site around transect points 16,17 and 18 and along the central pathway of the site along transect points 4,5 and 6. These pathways have a defined structure but are not as open as the trackways to the south and west.

Transect data: access only

4.8.6 Features which appeared to be particularly favoured by foraging and commuting bats during observations made along the access route transect are listed below (and shown on a plan at Appendix VIII), along with an indicative evaluation of their level use relative to the survey area:

- High activity: The track passing through the cow field between Pephurst wood and Hurst wood (between transect points R6 and R7) which is bounded by hedgerows H1/H2 on either side. This feature was regularly used by foraging and commuting pipistrelles which appeared to make frequent foraging passes along the hedgerows and between the two sections of woodland edge, and occasional *Myotis* bats which exhibited similar behaviour but also appeared to commuting north-south along the bridleway.
- High activity: A small clearing (R4) close to Loxwood Road in Beggars Copse which was favoured by foraging pipistrelles particularly in the period immediately after sunset, which may indicate the presence of a nearby roost.
- High activity: The recent plantation clearing to the north of the access track close to Hurst wood (R8) which was favoured by foraging serotine and pipistrelles.
- Moderate activity: The western end of the access track as it passes through Great Scrubbs (R10 to R11) on the approach towards Great Birchfield which was sporadically used by all species and may have been associated with a north-south commuting route along the adjacent public right of way.
- High activity: The recent plantation clearing around Great Birchfield (R11 to R13), particularly the area north of the access track, which was favoured by pipistrelles, noctule,

serotine and to a lesser extent *Myotis* bats, together with the northward stretch around the stream (R13 to R14) which appeared to be used as a commuting route by pipistrelles, *Myotis* bats and in April 2020 barbastelle.

- Moderate activity: The northern section of the access track between R14 and R15 which was sporadically used by all species.

Remote monitoring

4.8.7 Deployment of remote automated bat detectors coincided broadly with each transect survey, and comprised two detectors per transect each monitoring for five nights per month between April and October 2020; see Appendix VIII for a plan showing the locations of remote detector deployments. Table 4.12 presents a summary of all bat passes recorded during remote monitoring at locations both within the extraction site and alongside the access route; example sonograms recorded at the survey area are included at Appendix X.

4.8.8 Figure 4.5 shows an index of relative bat activity recorded in the survey area, expressed as average bat passes per hour (BPPH). The data are shown per detector deployment and by month, for both the extraction site and access route. The same data are plotted onto a plan at Appendix VIII. Figure 4.6 displays the data from all remote detectors (from both site and access) summed to show the change in total bat activity (BPPH) within the survey area over the course of the season.

4.8.9 The data show one clear outlier recorded in April 2020 close to the northern boundary of the site where approximately 156.0 bat passes were recorded per night-time hour over the course of five nights; the overwhelming majority (147.6BPPH or 94.6%) were common pipistrelle passes and, in the context of subsequent months data, is likely to reflect an intensive period of early season foraging rather than a navigation feature of particular importance.

4.8.10 Beyond the outlier, the data show relatively low to moderate levels of bat activity were recorded, frequently registering less than 20BPPH. Bat activity was higher in April, June and July, broadly registering 20—40BPPH. However, it is important to note some limitation to the remote monitoring: data from SM5 in June (access) was corrupted, and in October the same detector recorded only noise files; in July SM7 (site) recorded only noise files (see also para 2.8.13).

4.8.11 Notwithstanding these limitations, Figure 4.7 and Figure 4.8 show changes in the average bat passes per hour over the course of the season, but separated for the extraction site and access route. The data indicate that bat activity within the site was comparatively higher earlier in the season (April to June), whereas along the access route activity was comparatively higher in mid-season (May to July). In both locations bat activity appeared to decline towards the end of the season.

Abbreviations:

BABA	Barbastelle	EPSE	Serotine	MYBE	Bechstein's
MYBR	Brandt's	MYDA	Daubenton's	MYMY	Whiskered
MYsp	*Myotis* sp.	NYLE	Leisler's	NYNO	Noctule
NYsp	*Nyctalus* sp.	PINA	Nathusius' pipistrelle	PIPI	Common pipistrelle
PIPY	Soprano pipistrelle	PIsp	Pipistrelle sp.	PLAU	Brown long-eared

Table 4.12: Total number of bat passes during remote monitoring, all species: site and access

	BABA	EPSE	MYBE/DA	MYMY/BR	MYSP	NYLE	NYNO	NYSP	PINA	PIPI	PIPY	PLAU	*Total*
Access	43	31	3	20	52	7	10	3		4682	1318	1	*6170*
SM4				1	4					2181	26		*2212*
Apr										11	1		*12*
May				1	2					457	19		*479*
Jun										109			*109*
Jul					2					1604	6		*1612*
SM8	18	3	2	14	36	1	7			668	326	1	*1076*
Aug	1				1	1	6			603	57		*669*
Sep	17	3	2	14	28		1			52	266	1	*384*
Oct					7					13	3		*23*
SM5	25	28	1	5	12	6	3	3		1833	966		*2882*
Apr	1	6		1			1			421	504		*934*
May		4		3		1				483	426		*917*
Jul	13	18	1		12	5	2			759	31		*841*
Aug	11			1				3		169	5		*189*
Sep										1			*1*
Site	148	6	11	32	170	1	84	3	2	12427	1656	3	*14543*
SM6	140	3	5	4	60		45			3555	1027	1	*4840*
Apr	12	2	1		14		3			1010	242	1	*1285*
May			2		12		10			418	90		*532*
Jun					4		3			1129	268		*1404*
Jul					2		5			3	26		*36*
Aug	128		1	1	11					933	352		*1426*
Sep		1	1	3	16		24			59	29		*133*
Oct					1					3	20		*24*
SM7	8	3	6	28	110	1	39	3	2	8872	629	2	*9703*
Apr	7	1	5	25	75	1	7	3	2	7198	281		*7605*
May					5		5			309	19		*338*
Jun		1			6					1267	260	1	*1535*
Aug	1		1	3	13		23			78	46	1	*166*
Sep		1			5		4			1	17		*28*
Oct					6					19	6		*31*
Total	*191*	*37*	*14*	*52*	*222*	*8*	*94*	*6*	*2*	*17109*	*2974*	*4*	*20713*

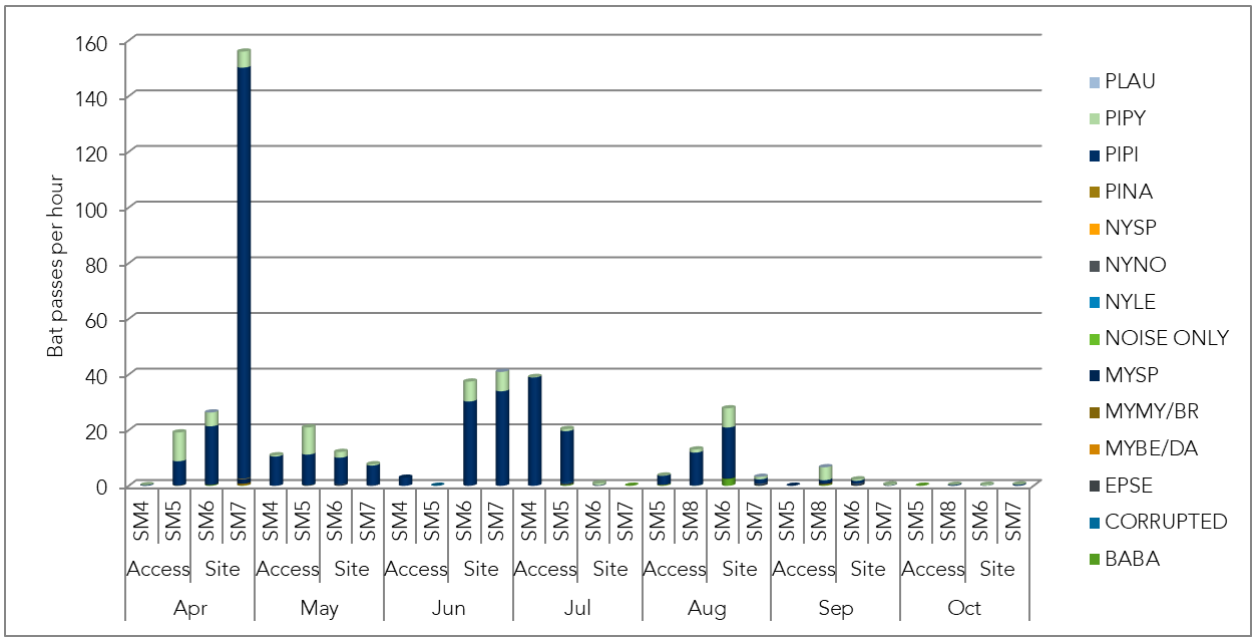

Figure 4.5: Bat passes per hour, by detector and month: site and access

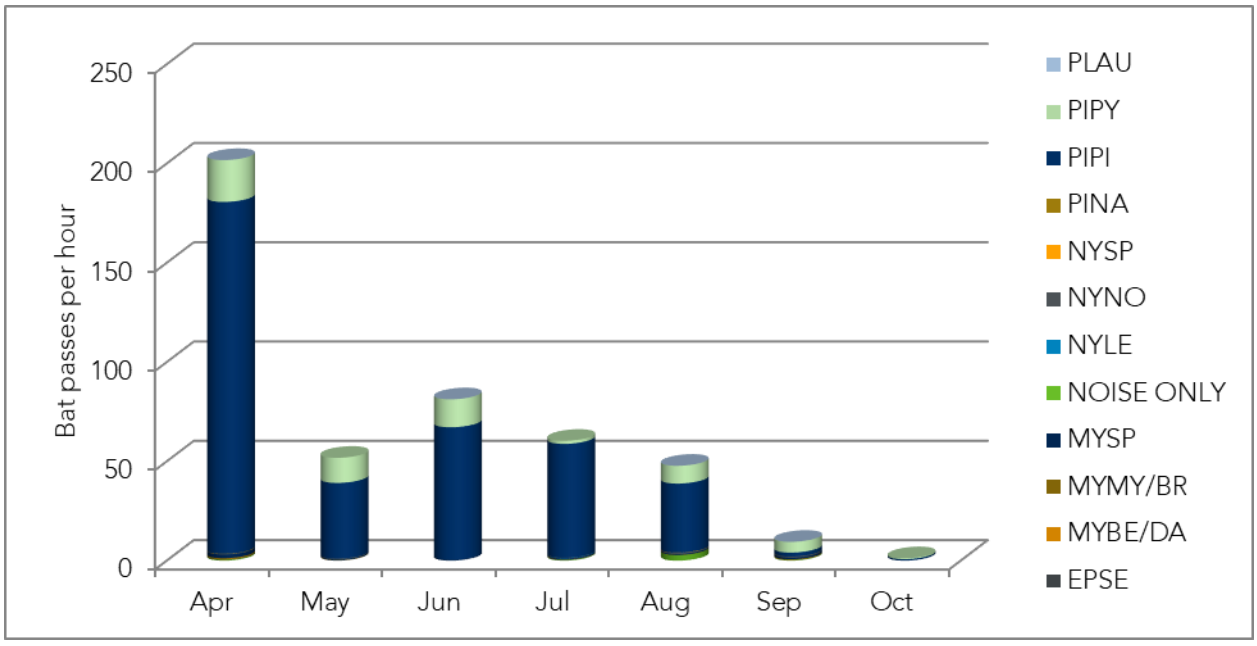

Figure 4.6: Bat passes per hour, by month: site and access

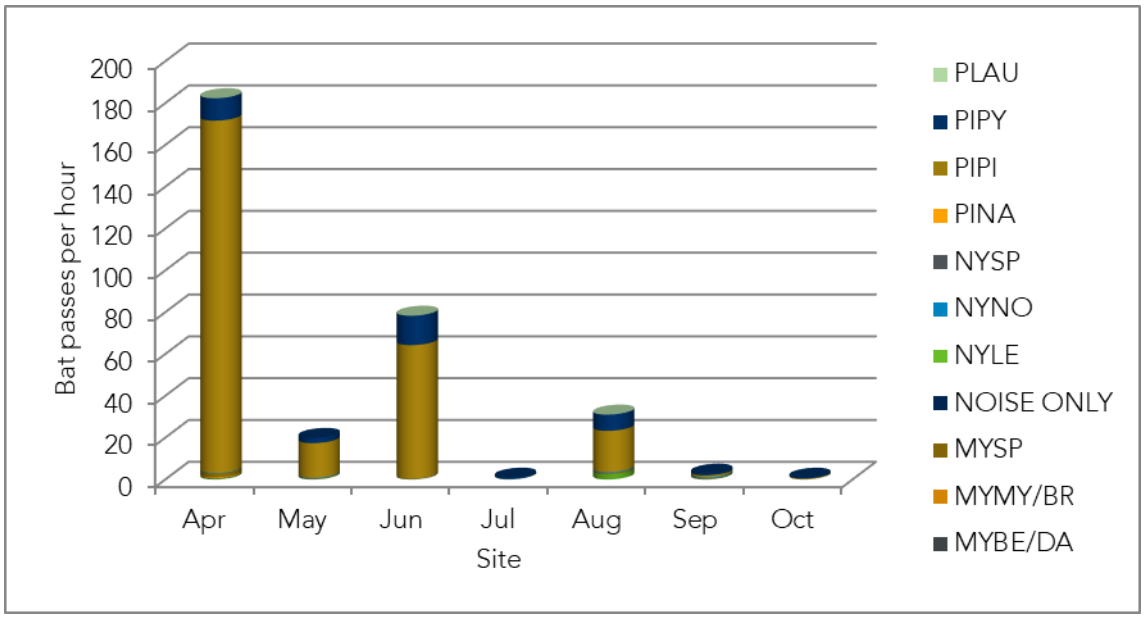

Figure 4.7: Bat passes per hour, by month: site

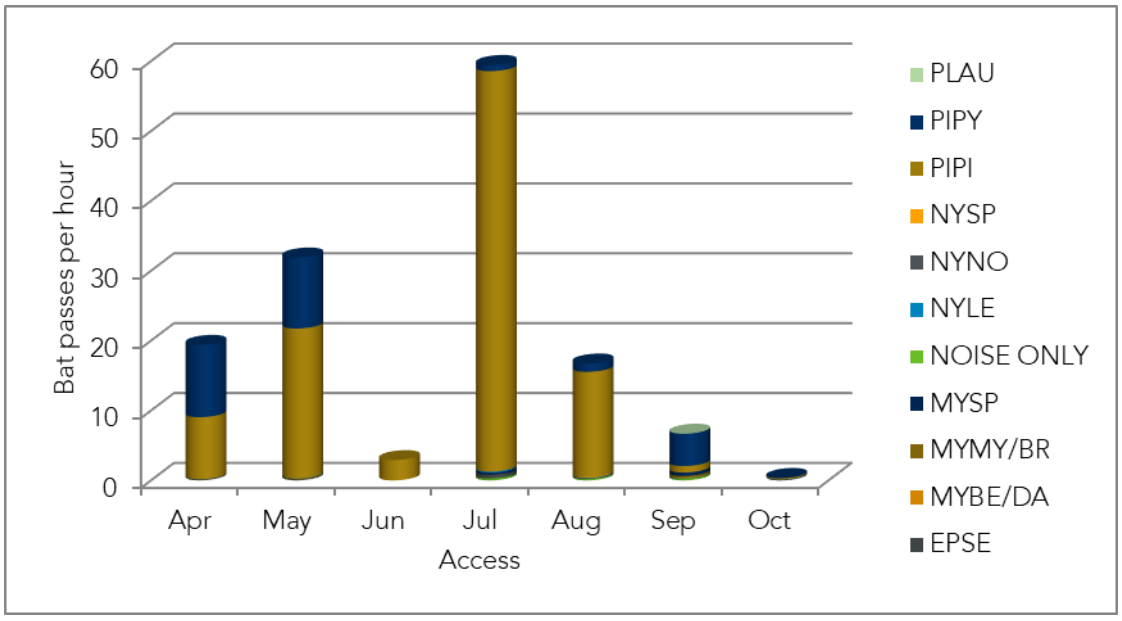

Figure 4.8: Bat passes per hour, by month: access

Evaluation

Species assemblage

4.8.12 Species diversity recorded during the bat activity surveys included at least nine species. Their local and national conservation status is listed in Table 4.13 (BCT, 2010; Mathews *et al.*, 2018; Russ, 2012; Sussex Bat Group[31]). There is no record of these species having been previously observed within 2km of the site as confirmed during the desk study stage, although the genus *Pipistrellus sp.* has been recorded. This is likely due to an absence of survey data rather than an absence of bats.

[31] Sussex Bat Group website: Bats in Sussex. Accessed online [14/10/20] at: http://www.sussexbatgroup.org.uk/batsinsussex

4.8.13 *Myotis* bat call parameters overlap significantly and it is not normally possible to conclusively identify them to species level unless they are in the hand. The *Myotis* bat calls recorded within the survey area were most closely matched to the call parameters of Brandt's *M. brandtii*, Bechstein's *M. bechsteinii*, Daubenton's *M. daubentonii* and whiskered *M. mystacinus* bats. The survey area falls broadly within the known distribution of all four species. Bechstein's bat is extremely rare and found almost exclusively within woodland habitat, which is widespread within the survey area; it is hence assumed that all four *Myotis* species could be present locally.

Table 4.13: Conservation status of recorded bat species (abundance and distribution)

Species	Sussex abundance/distribution	UK abundance/distribution	UK status
Barbastelle	Very rare, widespread	Very rare, widespread in England and Wales	Vulnerable
Serotine	Uncommon, widespread	Uncommon, widespread, southern England	Vulnerable
Bechstein's	Very rare	Very rare, southern	Least concern
Brandt's/whiskered	Scarce, widespread / Scarce, widespread	Widespread, scarce in England & Wales / Scarce, widespread, absent in Scotland	Data deficient
Daubenton's	Fairly abundant, widespread	Widespread, fairly abundant	Least concern
Leisler's	Rarely recorded	Scarce but widespread o southern Scotland	Near threatened
Noctule	Uncommon, widespread	Uncommon, widespread, absent in Scotland	Least concern
Nathusius' pipistrelle	Scarce, widespread	Scarce, widespread, includes migrants	Near threatened
Common pipistrelle	Abundant, widespread	Widespread, abundant	Least concern
Soprano pipistrelle	Fairly common, widespread	Fairly common, widespread	Least concern
Brown long-eared	Relatively abundant, widespread	Widespread, relatively abundant	Least concern

Species abundance

4.8.14 Figure 4.9 summarises species composition recorded during passive monitoring within the survey area over the course of the survey period, both within the extraction site and along the access route. The data are expressed as average bat passes per hour (BPPH) and gives an index of relative bat activity within the site. It is important to note that BPPH is not the same as total number of bats, as a single bat might pass the detector on multiple occasions when foraging up and down a feature. This shows that the majority (96.9%) of all bat calls recorded were from pipistrelle bats, with common pipistrelles registering an average of 376.79 BPPH, soprano pipistrelles registering an average of 64.21 BPPH, and Nathusius' pipistrelles registering an average of 0.04 BPPH. Of the remaining bat passes, those of *Myotis spp.* (1.4% or 5.77 BPPH)

were the next most frequently recorded, followed by barbastelle (0.9% or 3.77 BPPH), *Nyctalus spp.* (0.5% or 2.19 BPPH), serotine (0.2% or 0.83 BPPH) and finally brown long-eared bats (0.02% or 0.08 BPPH). This means that 97.7% of all bats recorded during passive monitoring were of the genus *Eptesicus*, *Nyctalus* or *Pipistrellus*. These results are broadly consistent with those recorded during the transect surveys.

4.8.15 Taking account of species rarity and abundance, and the type, complexity and characteristics of foraging and commuting habitats available within and around the survey area (Wray *et al.*, 2010), it is considered that the survey area as a whole is of Local to County importance to foraging and commuting bats.

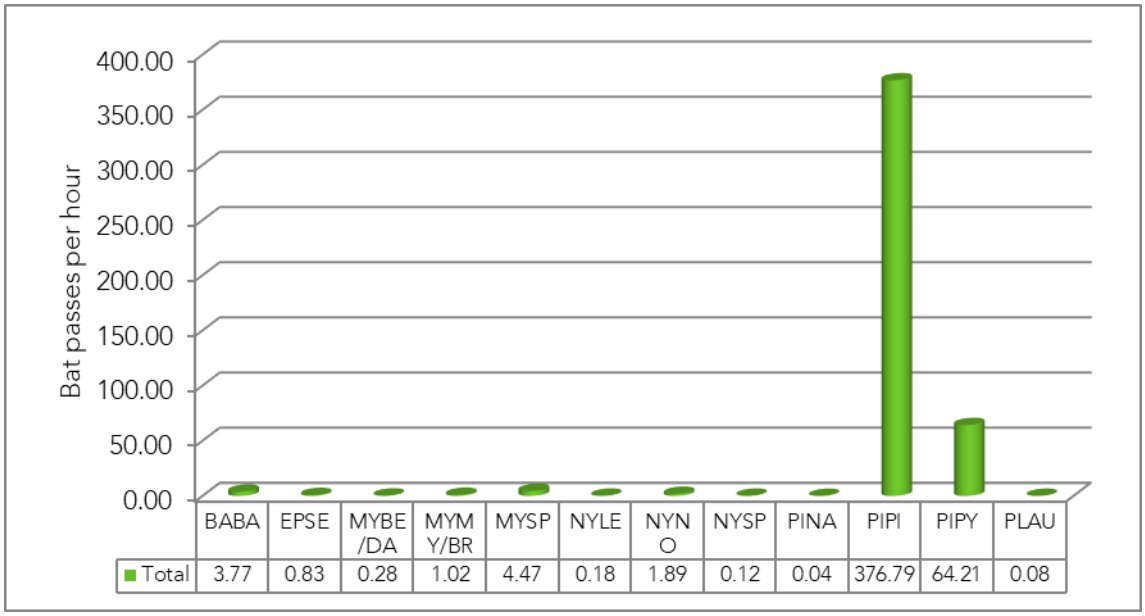

Figure 4.9: Bat pass species composition, all remote monitoring data (site and access)

4.9 Hazel Dormouse

Desk study

4.9.1 SxBRC returned no records of hazel dormouse *Muscardinus avellanarius* within the desk study search area.

Habitat assessment

4.9.2 Deciduous and ancient woodland and plantation habitats within and alongside the extraction site are frequently dense and largely intact, providing potential habitat for dormouse. Food plants are present (including abundant hazel and oak, locally frequent bramble and occasional hawthorn) providing a good year-round source of food. These habitats form part of a much larger area of woodland and hedgerow networks in the wider area, which may support dispersal of dormice across the Site and into adjacent habitats.

4.9.3 Alongside the proposed access route, however, potential dormouse habitat is sparse and for the most part is anticipated to be retained and protected as part of the works. Although some small-

scale habitat removal may be required along the proposed access route, for example to make room for passing places, surveys for hazel dormouse were carried out within the extraction site only.

Nest tube survey

4.9.4 The nest tube survey recorded no observations of hazel dormouse, or signs of their presence such as nests or droppings, during the course of the survey period. A summary of the survey results is displayed in Table 4.14 and a plan of the survey area is shown in Appendix XII.

Table 4.14: Summary of hazel dormouse survey results

Survey	1	2	3	4	5
Date	19/05/2020	12/06/2020	27/08/2020	16/09/2020	07/10/2020
Hazel dormouse	None	None	None	None	None
Other species	Bird's nests	-	-	-	-

Nut searches

4.9.5 No opened hazel nuts showing the smooth-edged gnawing indicative of dormice were found during visits 4 and 5. A number of opened hazel nuts were found on the ground at the base of scattered hazel trees to the south-west of the extraction site. However, these were either jagged-edged (indicative of birds or squirrel *Sciurus carolinensis)* or showed the transverse tooth marks characteristic of mice or rodents other than dormice.

Evaluation

4.9.6 There were no observations of hazel dormouse, or signs of their presence such as nests, gnawed hazelnuts or droppings, during the course of the survey period. The survey findings provide a good level of confidence that hazel dormouse is likely to be absent from the extraction site. Surveys were carried out in suitable weather conditions at an appropriate time of year for dormouse surveys. A total of 90 nest tubes were installed within approximately 4.2ha of deciduous semi-natural and plantation woodland, exceeding the recommended number of nest tubes. The survey achieved a detection probability index score of 36 which gives a good degree of confidence in the survey findings. Hazel dormouse is not considered to present a constraint to the development proposals.

4.10 Reptiles

Desk study

4.10.1 SxBRC returned six records of terrestrial reptile species from within the desk-study search area, during a date range of 2000 to 2015. All four of the widespread species have been recorded in the vicinity; slow worm *Anguis fragilis*, common lizard *Zootoca vivipara*, grass snake *Natrix natrix* and adder *Vipera berus.*

Habitat assessment

4.10.2 The extraction site forms a relatively large area of high quality habitat for reptiles. The recent broadleaved plantation (P3 and P5) provides a complex matrix of micro-habitats formed of coarse grasses which are suitable for foraging, and an extensive shrub layer which provides opportunities for shelter. The surrounding more mature woodland, both plantation and semi-natural, provide further extensive opportunities for shelter, dispersal habitat and hibernation. The proposed access route is surrounded by similarly good quality habitats for reptiles. However, whilst reptiles may disperse across it, the existing surfaced track is considered unsuitable habitat due to the lack of vegetation cover. The improved pasture grassland to the north and south of hedgerows H1 and H2 is also currently of low value for reptiles, due to its relatively short sward. However, the track verge on the inside of the double hedge and elsewhere along the access route adjacent to more open, recent plantation is unmanaged and provides suitable vegetation structure for reptiles.

Field surveys

4.10.3 The Visual Encounter Surveys and Artificial Refuge Surveys (including natural/pre-existing refuges) recorded adult and juvenile common lizard and slow worm and adult grass snake throughout the survey period, with the exception of the September visit. Their recorded distribution within the survey area was throughout the suitable open habitats, in particular the north-west and south-east quadrants of the extraction site (i.e. young plantation) where insolation is relatively high (see Appendix XIII). No adder or signs of their presence (e.g. skin sloughs, eggs/egg-cases) were observed during the survey. A summary of the survey results is displayed in Table 4.15. Peak adult counts for each species are highlighted in bold.

Evaluation

4.10.4 The survey findings indicate that low populations of common lizard (peak count of 3 adults) and grass snake (peak count of 2 adults), and an exceptional population of slow worm (peak count of 29 adults) were present within the survey area during the 2020 survey season. If results recorded along the proposed access route are excluded, then low populations of common lizard (peak count of 3 adults) and grass snake (peak count of 2 adults), and an exceptional population of slow worm (peak count of 24 adults) were present.

4.10.5 Surveys were carried out in suitable weather conditions at an appropriate time of year for reptile surveys and the density of refuges exceeded the recommended level (80 refuges were used across approximately 2.7ha of suitable habitat within the extraction site, and 45 refuges were used along c.1.1km of habitat adjacent to the proposed access route). The survey results are therefore considered to provide an accurate account of the reptile assemblage on site. However, the aim of this survey was to establish presence or likely absence and a greater level of survey effort would be required in order to obtain a reliable population estimate.

4.10.6 Overall, the survey area achieves a site score of 5 and meets the criteria for a Key Reptile Site (Froglife, 1999; see Table 2.14). In this context the survey area should be considered of herpetological importance at the Local level. The same classification would apply to the extraction site only if results recorded along the access route are excluded.

Table 4.15: Summary of reptile survey results

Survey	1	2	3	4	5	6	7	8	9	10	11
Date (2020)	16 Apr	17 Apr	20 Apr	24 Apr	26 May	8 Jun	12 Jun	19 Jun	22 Jun	15 Jul	8 Sep
Location	Site	Site	Site	Site	Site+Access	Access	Access	Access	Access	Site+Access	Site+Access
Start	15.30	09.30	10.00	10.00	08.30	14.00	15.00	09.00	15.00	08.30	08.30
End	17.30	11.30	12.00	12.00	12.30	16.30	17.30	11.30	17.30	12.30	12.30
Common lizard	1M 2J	1M 1A	1M 1A 1J	1J	1A	**1A 1F 1M 2J**	**3A**	2A	**3F 3J**	**2A 1F 1J**	0
Slow worm	1F 3J	2F 1M 2J	3F 2M 1A 4J	1F 1M 6J	9F 1M 6J	4F 1M	2F 1M	1F 1J	0	**28F 1M 7J**	0
Grass snake	0	0	0	0	1A	0	0	0	0	**2A**	0
Adder	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0

A = adult (unsexed), F = female, M = male, J = juvenile, U = status unidentified

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5 Summary

5.1 Introduction

5.1.1 Surveys for flora and fauna were undertaken in relation to a proposed minerals and waste development at Land north of Loxwood Road, Billingshurst, West Sussex (Grid Reference: 505115, 132770). This report has been prepared as a technical appendix to an Ecological Impact Assessment (EcIA) of the effects of the Proposed Development on important ecological features.

5.2 Results

Desk study

5.2.1 No Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites are located within a 5km radius of the Proposed Development Site. No Sites of Special Scientific Interest (SSSI) are located within a 2km radius of the Site. No locally designated non-statutory sites are located within a 1km radius of the Site. However, the Site falls within a SSSI Impact Risk Zone for Chiddingfold Forest SSSI and The Mens SSSI which are located approximately 2.70km north-west and 6.50km south, respectively. Planning applications for minerals extraction within this zone will require the LPA to consult with Natural England prior to determination.

5.2.2 There are records of a range of protected or notable species in the locality, including birds, invertebrates, terrestrial mammals, flowering plants and terrestrial reptiles, together with three priority habitats and other habitats: Traditional Orchard, Deciduous Woodland, and Ancient Woodland.

Habitat and Vegetation Communities Evaluation Summary

5.2.3 A summary evaluation of the habitats and vegetation communities present within and adjacent to the extraction site and access route is set out at Table 5.1 and Table 5.2.

Table 5.1: Summary of habitat evaluation - extraction site

Habitat	Importance	Rationale
Deciduous Woodland DW1, DW2, DW3, R1, R2 and R3	At least Local	All of the deciduous woodland areas surveyed are considered to represent relatively high quality Lowland Mixed Deciduous Woodland Priority Habitat (HPI), based on their structure and species composition.
Deciduous Plantation P3, P4 and P5	At least Local	The more recent plantations cannot currently be identified as Priority Habitat, largely because of the poorly developed canopy, although they are developing towards such habitat and could be viewed as temporary open areas or clearings within the wider woodland. Includes Ancient Replanted Woodland at P4 which is defined as an irreplaceable habitat under the NPPF.

Habitat	Importance	Rationale
Deciduous Plantation P1 and P2	Local	The established broadleaved plantations probably meet the Lowland Mixed Deciduous Woodland Priority Habitat (HPI) definition, though they are relatively species poor and structurally homogenous examples, and consequently of less importance.

Table 5.2: Summary of habitat evaluation - proposed access route

Habitat	Importance	Rationale
Deciduous Woodland DW4, DW5, R3 and R4	At least Local	All of the deciduous woodland areas surveyed are considered to represent relatively high quality Lowland Mixed Deciduous Woodland Priority Habitat (HPI), based on their structure and species composition. Includes Ancient Woodland in parts of DW4 which is defined as an irreplaceable habitat under the NPPF.
Deciduous Plantation P6 and P7	Local	The more recent plantations cannot currently be identified as Priority Habitat, largely because of the poorly developed canopy, although they are developing towards such habitat and could be viewed as temporary open areas or clearings within the wider woodland.
Stream at DW5	Local	Part of a relatively natural woodland watercourse.
Coniferous Plantation C1	Site	Closed canopy mature conifer plantation with scattered shrubs and extensive bare ground.
Species poor hedge H1/H2	Site	The double hedgerow H1/H2 located alongside the proposed access route between the two main woodland blocks (grid ref: 505560, 131965), although species-poor, qualifies as Hedgerow Priority Habitat (HPI) and is also Important under the Hedgerow Regulations 1997.
Ponds P13, P14, P14a, P15	Site	Small extent and limited richness in plant species and communities; unlikely to qualify as Priority Habitat; support populations of smooth and palmate newt which are partially protected under schedule 5 of the WCA.

Faunal Evaluation Summary

5.2.4 A summary evaluation of the animal populations present within and adjacent to the extraction site and access route is set out at Table 5.3.

Table 5.3: Summary of faunal evaluation - extraction site & access route

Species	Importance	Rationale
Great crested newt	Site	The Site contains no aquatic habitat but a relatively large area of good quality terrestrial habitat. However, GCN is likely to be absent from the Site. Good quality terrestrial habitat is extensively available adjacent to the access route also but the track itself is of negligible value to the species due to the general absence of vegetation cover. Four ponds are present close to the access route (P13, P14, P14a and P15) but GCN was found to be absent from these ponds.

Species	Importance	Rationale
Breeding birds	At least Local	Quite a rich breeding assemblage of woodland bird species, including 22 of the 34 species used for the England woodland bird indicator, six Red and Amber List species of conservation concern, and four Species of Principal Importance (SPI) under the NERC Act.
Wintering birds	Local	Quite a rich assemblage of birds typical of the habitats present, including eight Red and Amber List species of conservation concern, four SPI and two species listed on schedule 1 of the WCA.
Invertebrates	County (medium)	A moderately diverse woodland invertebrate fauna is present and includes a high proportion (10.4%) of scarce species indicative of niche woodland features such as heartwood rot and woodland edge. Includes three SPI and several observations of wood white which is rare in Sussex and nationally and is partially protected under schedule 5 of the WCA.
Badger	Site	The Site contains a relatively large area of habitat suitable for foraging and sett creation. However, no active setts were identified.
Roosting bats	Site (provisional)	The Site contains no buildings but 38 mature trees exhibited potential roost features.
Foraging and commuting bats	Local to County	The survey area contains a relatively large area of good quality habitat for foraging and commuting bats. At least nine species were recorded, including at least four SPI and barbastelle which is rare in Sussex and nationally.
Hazel dormouse	Site	The Site contains a relatively large area of good quality habitat for hazel dormouse. However, hazel dormouse is likely to be absent from the Site.
Reptiles	Local	The Site contains a relatively large area of good quality habitat for reptiles. Low populations of common lizard and grass snake and an exceptional population of slow worm were recorded. All three are SPI.

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Appendix I: Phase 1 Habitats Plan

Please see inserts below.

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Loxwood Clay Pits, West Sussex

- Red line boundary
- Semi-natural broadleaved woodland
- Broadleaved plantation
- Conifer plantation
- High suitability tree
- Moderate suitability tree
- Low suitability tree
- Pond numbers
- Ancient woodland
- Ancient re-planted woodland
- Retained woodland boundary 10m buffer
- Ancient woodland 15m buffer
- Ancient woodland 50m buffer

0 60 120

Meters

N

Scale: 1:1,650 **Created by:** AD

Date: May2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-A3DevSitePhase1_2_210521

URBAN EDGE ENVIRONMENTAL CONSULTING

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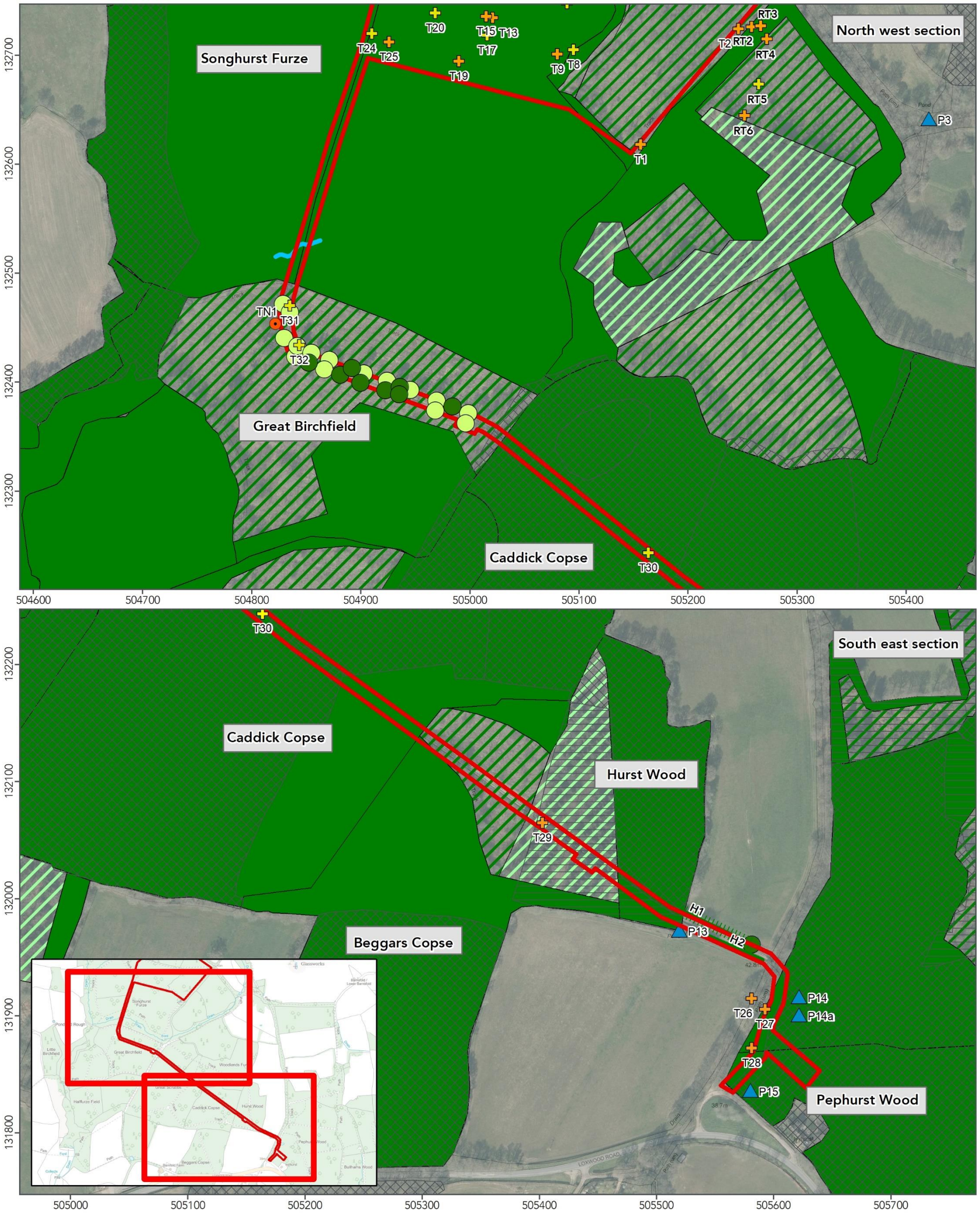
Access route, Loxwood, West Sussex



Red line boundary	High suitability tree	Ancient woodland
Semi natural broadleaf woodland	Moderate suitability tree	Ancient re-planted woodland
Broadleaved plantation	Low suitability tree	
Coniferous plantation	Pond numbers	
Semi-improved neutral grassland	Scattered broadleaved tree	
Running water	Scattered coniferous tree	
Species-poor hedgerow	Target note	
Species-poor hedgerow with trees		

0 125 250 Meters

N

Scale: 1:3,400 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-A3AccessPhase1_2_210521

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Appendix II: NVC Survey Plan, Photos & Tables

Please see inserts.

Loxwood Clay Pits, West Sussex

- Red line boundary
- Deciduous woodland
- Plantation
- Coniferous plantation
- Ancient woodland
- Ancient re-planted woodland
- Ride
- Quadrat location

0 180 360

Meters

N

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-Botany_210524

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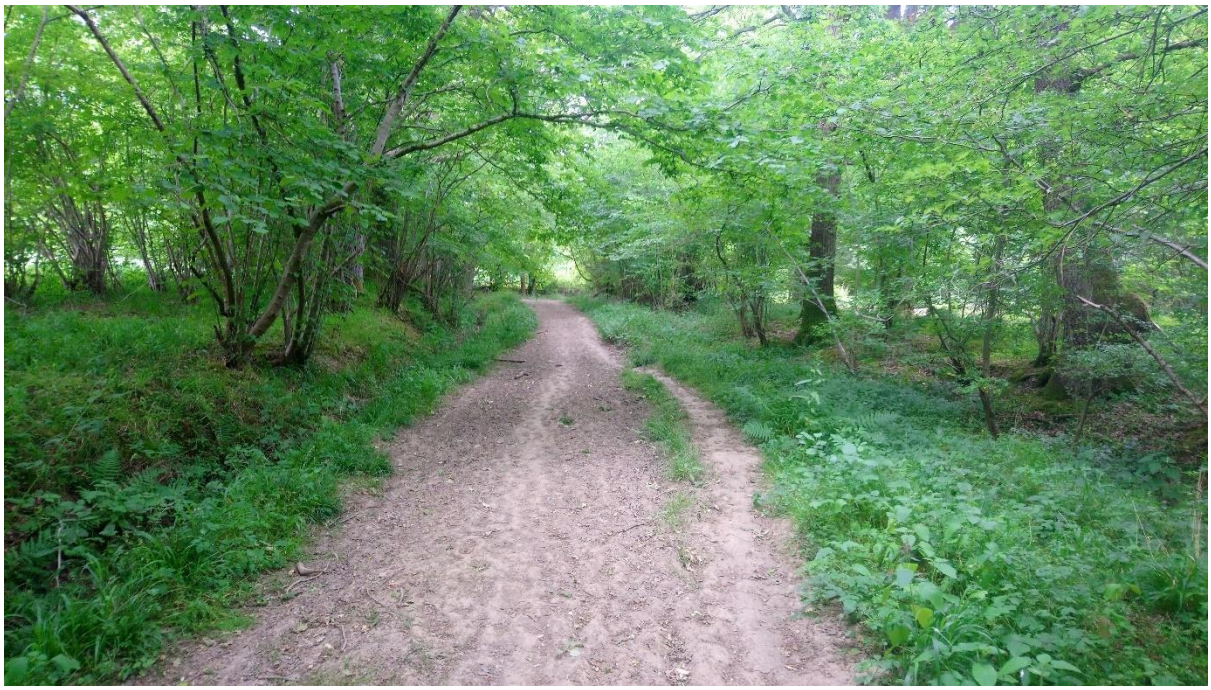
Photos

DW1

Centre of southern part of D1, with planted hazel and abundant honeysuckle and frequent bracken and bluebell in field layer

Eastern end of southern part of D1 (near DWQ3) with frequent/abundant dog's mercury and bluebell in field layer

DW2



DW2, eastern end looking east

DW2, western end looking east

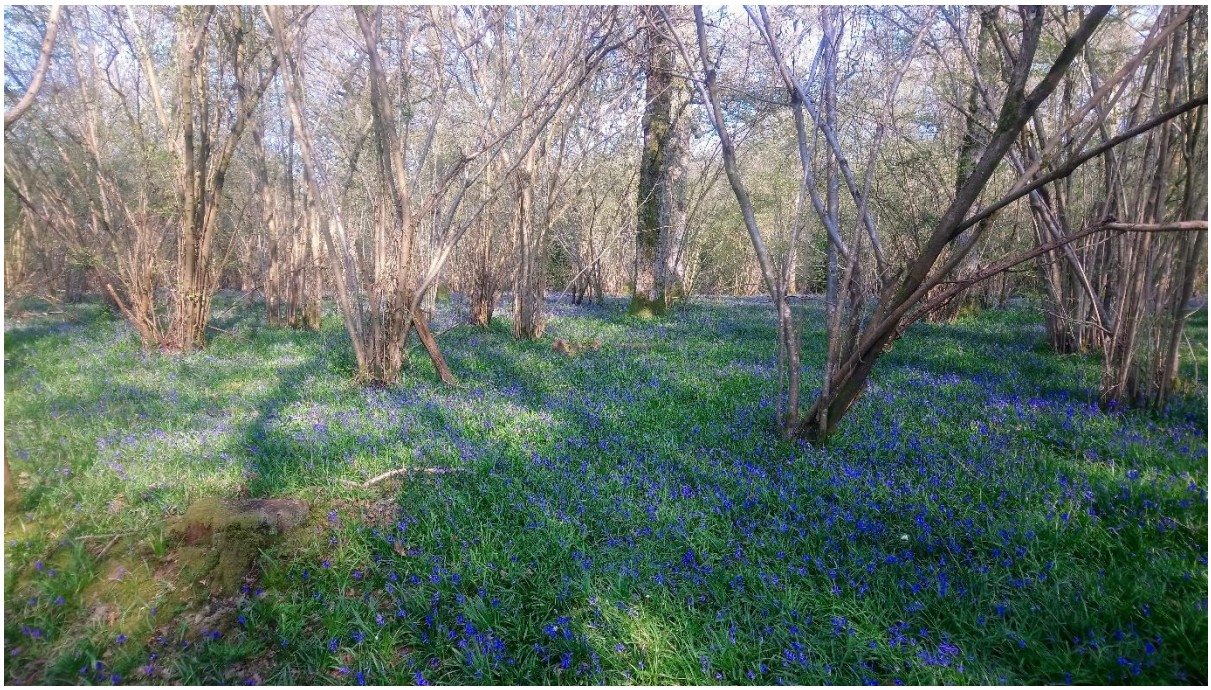
DW3

Bank within northern part of DW3 with abundant bluebell 'straw' in middle distance

Southern part of DW3 with mixed mature coniferous and native broadleaved trees, sparse shrub layer and lush field layer

DW4

DWQ4



DW4, abundant bluebell west of access road north of DW5

DW4, Caddick Copse, with locally frequent/abundant bracken and bramble

DWQ6 in Pephurst Wood

DW5

DW5 east of access road, with frequent pendulous and remote sedge on stream banks

DW5 west of access road, with locally abundant dog's mercury and frequent bluebell and cuckoo flower in foreground

P1 & P2

P2, with even aged trees, sparse shrub layer and relatively species poor field layer with abundant bramble and wood false brome

P3

P3, general shot looking NNE from south western corner

P3, general shot looking east from south western corner

Northern part of P3 looking east, with locally abundant gorse, birch and willow and scattered mature turkey oak

Northern part of P3 looking east with locally abundant bluebell

Central part of P3 looking south east, with grassy area and patchy bramble and wood sage

Near centre of P3, with foxgloves and marsh thistle

P4

General shot of P4 from bank on south eastern boundary with locally frequent foxglove, areas of grassy sward and locally abundant bracken

Locally abundant gorse in north western corner of P4

P5

P5, general shot from south with locally frequent ash on western and northern edges

P5, locally abundant marsh bedstraw and creeping buttercup in wet depression

P6

P6, general shot looking north of area north of access road

P6, south of access road looking west, with dense birch and willow to left

P7

P7 south of access road with frequent/abundant bluebell

C1

C1, showing extensive bare ground beneath conifers

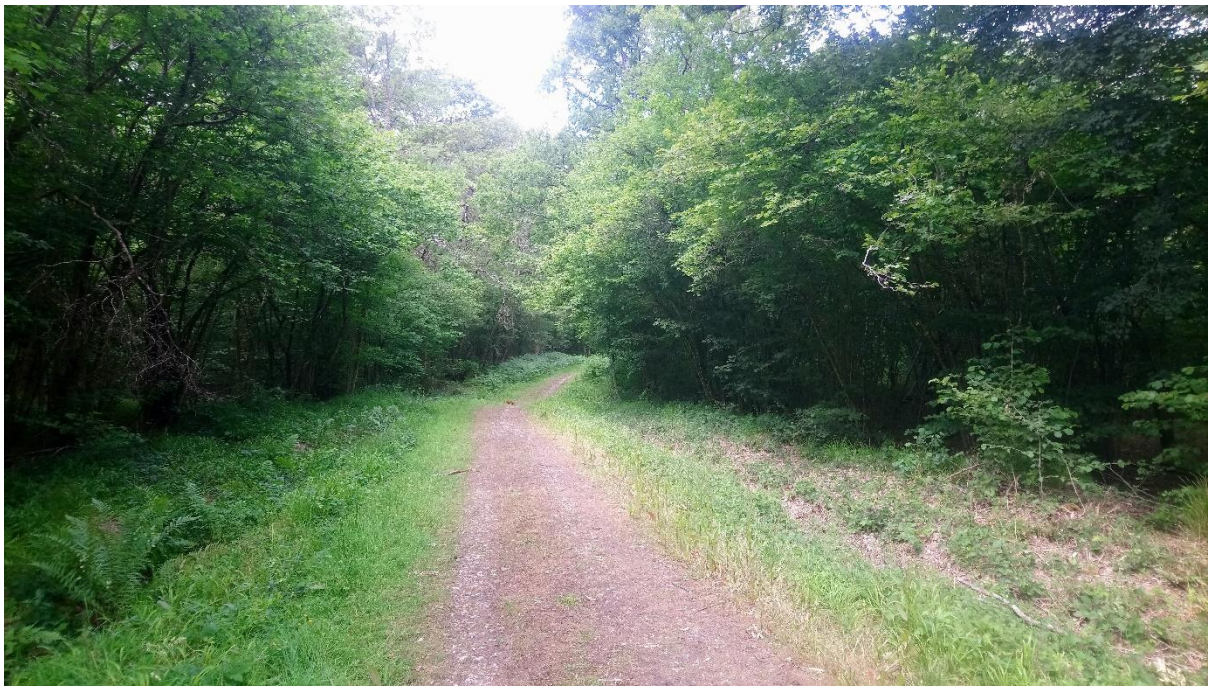
R1

Central section of R1 looking south, with abundant bluebell

Southern end of R1 looking north

R2

R2, eastern end looking west



R2, central section looking west

R3

R3

R4

R4, north western section looking south

R4, central section looking east between P6

R4, central section looking east in Caddick Copse

R4, south eastern section looking west between P7

Table AII.0.1: Floristic table – deciduous woodland

Table AII.0.2: Floristic table – plantation woodland

Table AII.0.3: Floristic table – rides

Tables AII.1-3 summarise the results of the botanical survey for deciduous woodland, plantation and rides respectively, and are listed on the following pages.

Table AII.1: Deciduous woodland results

		Area/Quadrat										
Species		**DW1**	**DWQ1**	**DWQ2**	**DWQ3**	**DW2**	**DW3**	**DW4**	**DWQ4**	**DWQ5**	**DWQ6**	**DW5**
Canopy												
Conifer		LF					LF	R				
Field maple	*Acer campestre*	R			1	O/LF	O					
Sycamore	*Acer pseudoplatanus*							R			4	
Alder	*Alnus glutinosa*											O/LF
Silver birch	*Betula pendula*	O/LA	5	4	4		R					
Hornbeam	*Carpinus betulus*							R			4	
Sweet chestnut	*Castanea sativa*	R						O				
Ash	*Fraxinus excelsior*	O/LF			1	O/LF		O/LF	5			F/A
Aspen	*Populus tremula*	LF						R/LA			5	
Wild cherry	*Prunus avium*	O										
Turkey oak	*Quercus cerris*						R					
Sessile oak	*Quercus petraea*	F/A	8	9	8	F	F	F/A	7	8	6	
Pedunculate oak	*Quercus robur*	O	1		1	O	F	F	5		6	O
Goat willow	*Salix caprea*	R						R			4	
Wild service tree	*Sorbus torminalis*	R					O	R				
Understorey/Shrub layer												
Field maple	*Acer campestre*						O					
Silver birch	*Betula pendula*	O/LA		4	5		LF	O/LF				
Downy birch	*Betula pubescens*	O/LA						O				
Hazel	*Corylus avellana*	A	10	8	9	F	F/A	A	9	9	8	A
Woodland hawthorn	*Crataegus laevigata*							R				
Hawthorn	*Crataegus monogyna*	O				F	F/A	F	4	4	6	
Ash	*Fraxinus excelsior*							O	1			
Holly	*Ilex aquifolium*	R	1					O/LF	5	4	4	O
Aspen	*Populus tremula*	R										
Blackthorn	*Prunus spinosa*							R				R
Dog rose	*Rosa canina*					O						
Grey willow	*Salix cinerea*	LF				O						
Elder	*Sambucus nigra*							R				
Guelder rose	*Viburnum opulus*							R				
Climbers												
Ivy	*Hedera helix*	O					R	O			1	
Honeysuckle	*Lonicera perclymenum*	F/LA	4	3	2	F	O	F	4	4	2	
Field Layer												
Field maple seedling	*Acer campestre*	O				LF	O	O				
Common agrimony	*Agrimonia eupatoria*						R					
Velvet bent	*Agrostis canina*	O/LA				LF	O/LF					
Common bent	*Agrostis capillaris*	LF										
Bugle	*Ajuga reptans*	O				O	O	O			3	
Hedge garlic	*Alliaria petiolata*							R/LF				
Wood anemone	*Anemone nemerosa*	O/LF			5	O		O/LF				F/LA
Sweet vernal grass	*Anthoxanthum odoratum*	LF										
Lords and ladies	*Arum maculatum*					O		R				
Hard fern	*Blechnum spicant*	R						R				
Wood false brome	*Brachypodium sylvaticum*	O				O/LF	F	O/LF	2			O
Cuckoo flower	*Cardamine pratensis*					LF						O
Glaucus sedge	*Carex flacca*						LF	O				
Hairy sedge	*Carex hirta*							R				
Pendulous sedge	*Carex pendula*	R/LF				LF	O/LA	O/LF			1	LF
Remote sedge	*Carex remota*	LF				O/LF						LF

DAFOR scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare
L Locally or patchily

Domin scale (% cover)

10 91 - 100
9 76 - 90
8 51 - 75
7 34 - 50
6 26 - 33
5 45962
4 4 - 10
3 <4 many individuals
2 <4 several individuals
1 <4 few individuals

Ancient Woodland Indicator vascular plant species

		Area/Quadrat										
Species		DW1	DWQ1	DWQ2	DWQ3	DW2	DW3	DW4	DWQ4	DWQ5	DWQ6	DW5
Wood sedge	*Carex sylvatica*	F				O/LF	F/LA	F				O/LF
Enchanter's nightshade	*Circaea lutetiana*					O	F	O/LF				O
Marsh thistle	*Cirsium palustre*	LF					O	LF				
Pignut	*Conopodium majus*							R				O
Hazel seedling	*Corylus avellana*					LF						
Hawthorn seedling	*Crataegus monogyna*	O/LF					O	O				
Cocksfoot	*Dactylis glomerata*					O	O	O				
Common spotted orchid	*Dactylorrhiza fuchsii*						R					
Tufted hair grass	*Deschampsia cespitosa*	R										
Foxglove	*Digitalis purpurea*	LF					O	LF				
Broad buckler fern	*Dryopteris dilatata*	O/LF			1			O/LF		3		
Male fern	*Dryopteris felix-mas*	O/LF				O	O	O			3	O
Great willowherb	*Epilobium hirsutum*						O					
Broadleaved willowherb	*Epilobium montanum*						O					
Hoary willowherb	*Epilobium parviflorum*						R					
Wood spurge	*Euphorbia amygdaloides*							R				
Lesser celandine	*Ficaria verna*	R/LF				O						A
Wild strawberry	*Fragraria vesca*	O/LF			2	O	F	O				
Ash seedling	*Fraxinus excelsior*	O/LF			3		F	O/LF	2	1	3	
Cleavers	*Galium aparine*					LF	LA					O
Marsh bedstraw	*Galium palustre*					LF	R	R				O
Herb Robert	*Geranium robertianum*						O	O				
Wood avens	*Geum urbanum*	O/LF					O	F			2	
Ground ivy	*Glechoma hederacea*						LA					
Ivy	*Hedera helix*						O	O			2	
Yorkshire fog	*Holcus lanatus*	LF					O					
Bluebell	*Hyacinthoides non-scripta*	F/LA		4	6	O	F/LA	F/LA	6	5	3	F
Tutsan	*Hypericum androseanum*	O				R	O					
Hairy St John's wort	*Hypericum hirsutum*							R				
Slender St John's wort	*Hypericum pulchrum*	O					O/LF	O		1		
Square-stemmed St John's wort	*Hypericum tetrapterum*							O				
Holly seedling	*Ilex aquifolium*	O				LF	R	O/LF	4	2	1	
Soft rush	*Juncus effusus*	O				O/LF	O	O				
Honeysuckle	*Lonicera perclymenum*	F/LA	6	9	3			F/LA	4	4	4	
Heath wood rush	*Luzula multiflora*							O				
Hairy wood rush	*Luzula pilosa*					R		R				
Yellow pimpernel	*Lysimachia nemorum*							O				
Wood melick	*Melica uniflora*	O				O/LF	R	O/LF				
Dog's mercury	*Mercurialis perennis*	O/LF			5	F/LA	O/LA	O/LA			6	LA
Wood millet	*Milium effusum*							R				
Three-nerved sandwort	*Moerhingia trinervis*					O		R				R
Early purple orchid	*Orchis mascula*	R					R					
Wood sorrel	*Oxalis acetosa*	R						O				
Annual meadow grass	*Poa annua*	LF				O/LF						
Rough meadow grass	*Poa trivialis*						O/LA	O			3	O/LA
Cinquefoil	*Potentilla reptans*					O	O					
Barren strawberry	*Potentilla sterilis*	O/LF			2	R	O	O/LF				
Primrose	*Primula vulgaris*	O/LF		1		O	F	O/LF			1	
Selfheal	*Prunella vulgaris*					O	O					F
Wild cherry seedling/sucker	*Prunus avium*	R						O				
Blackthorn seedling/sucker	*Prunus spinosa*	R										R
Bracken	*Pteridium aquilinum*	O/LA		4		R	O/LA	O/LF				

		Area/Quadrat										
Species		**DW1**	**DWQ1**	**DWQ2**	**DWQ3**	**DW2**	**DW3**	**DW4**	**DWQ4**	**DWQ5**	**DWQ6**	**DW5**
Sessile oak seedling	*Quercus petraea*	O		1				O/LF			2	
Pedunculate oak seedling	*Quercus robur*	O										
Goldilocks buttercup	*Ranunculus auricomis*					O						R
Creeping buttercup	*Ranunculus repens*					O						
Blackcurrant	*Ribes nigrum*					R						
Bramble	*Rubus fruticosus*	F/LA	2	2	3	F	F/LA	F/LA	3	4	5	
Broadleaved dock	*Rumex obtusifolius*					O/LF		O			1	
Wood dock	*Rumex sanguineus*						O					
Butchers broom	*Ruscus aculeatus*	R										
Sanicle	*Sanicula europaea*							R				F
Figwort	*Scrophularia nodosa*	R				R	O	R				
Heath groundsel	*Senecio sylvaticus*	R										
Wild service tree seedling/sucker	*Sorbus torminalis*	R						O				
Hedge woundwort	*Stachys sylvatica*					LF	R					
Greater stitchwort	*Stellaria holostea*					O/LF	R	R				
Black bryony	*Tamus communis*	R					O	O			1	
Dandelion	*Taraxacum officinale agg.*						R	R				
Wood sage	*Teucrium scorodonia*	O/LF					O	O			3	
Elm sucker	*Ulmus sp.*	R/LF										
Nettle	*Urtica dioica*					O	R	R			1	
Germander speedwell	*Veronica chamaedrys*						O	R				
Wood speedwell	*Veronica montana*	O/LF				O/LF		F			3	O
Heath speedwell	*Veronica officinalis*	O					R	O	1			
Thyme leaved speedwell	*Veronica sepyllifolium*						R					
Bush vetch	*Vicia sepium*					LF		R				
Common dog violet	*Viola riviniana*	F	1		4	O	F	F	4	1	3	O/LF
Bare ground			8	4	5				5	5	4	
Total AWIs		22				18	15	30				11

Table AII.2: Plantation results

		Area/Quadrat													
Species		**P1**	**PQ1**	**P2**	**P3**	**PQ2**	**PQ3**	**PQ4**	**P4**	**P5**	**PQ5**	**P6**	**PQ6**	**PQ7**	**P7**
Canopy															
Silver birch	*Betula pendula*	F	5	R	O					F					O
Downy birch	*Betula pubescens*				O										R
Hornbeam	*Carpinus betulus*									R					
Ash	*Fraxinus excelsior*	A	7	A						LF					O
Aspen	*Populus tremula*				R										
Wild cherry	*Prunus avium*	O	4	R											
Turkey oak	*Quercus cerris*				LF				O						
Sessile oak	*Quercus petraea*				R										O
Pedunculate oak	*Quercus robur*	A	7	A	R										
Goat willow	*Salix caprea*	R													R
Understorey/Shrub layer															
Conifer										O/LF		O/LF		1	
Silver birch	*Betula pendula*	F	6		F/LA	4	1	4	F/LA	F		F/LA	2	2	F/LA
Downy birch	*Betula pubescens*				R				R	O/LF		F	2		O
Hazel	*Corylus avellana*	F	7	O	O/LF					O	1	O			O
Hawthorn	*Crataegus monogyna*	F	3							R		O			O
Broom	*Cytisus scoparius*											R			
Alder buckthorn	*Frangula alnus*				O					O		O			R
Ash	*Fraxinus excelsior*				O/LF					LF					O
Holly	*Ilex aquifolium*				R							R			R
Aspen	*Populus tremula*				O	1									
Blackthorn	*Prunus spinosa*											R			
Turkey oak	*Quercus cerris*											R			
Sessile oak	*Quercus petraea*											O			R
Pedunculate oak	*Quercus robur*											O			R
Field rose	*Rosa arvensis*											O			R
Dog rose	*Rosa canina*	O	2		R				R	R		O			R
Goat willow	*Salix caprea*				O					O		O			
Grey willow	*Salix cinerea*	O	2		F	2	1	2	F	F		F	2		F
Wild service tree	*Sorbus torminalis*											R			
Common gorse	*Ulex europaeus*				O				F/LA			O			
Guelder rose	*Viburnum opulus*	R	1												R
Climbers															
Honeysuckle	*Lonicera perclymenum*	F	3	R											
Field Layer															
Conifer seedling										O/LF					
Common agrimony	*Agrimonia eupatoria*				O										
Velvet bent	*Agrostis canina*	O/LF	4		F/LA	6	6	7	A	F/LA	6	F/LA	3	5	F/LA
Common bent	*Agrostis capillaris*				O		3			R		F			O
Bugle	*Ajuga reptans*	O			F					F		O			R
Scarlet pimpernel	*Anagallis arvensis*				R										
Wood anemone	*Anemone nemerosa*														O
Angelica	*Angelica sylvestris*				F				O						
Sweet vernal grass	*Anthoxanthum odoratum*				O				R			R		2	R
Wood false brome	*Brachypodium sylvaticum*	O/LF	3	F/LA	O				O	O		O/LA	3	3	O
Glaucus sedge	*Carex flacca*	O/LF	1		O/LF					O/LF		F	4		O
Wavy bittercress	*Cardamine flexuosa*				R										
Pendulous sedge	*Carex pendula*				O/LF			1	O/LA	O	1	F/LA	2		O
Remote sedge	*Carex remota*				O				O						
Wood sedge	*Carex sylvatica*	O	3	O/LF	F	1	1		O	O/LF		F			F
Common knapweed	*Centaurea nigra*											R			
Common centaury	*Centaurium erythraea*											O	1		
Common mouse ear	*Cerastium fontanum*				R										
Rosebay willowherb	*Chamerion angustifolium*				R					R					
Enchanter's nightshade	*Circaea lutetiana*			O	O					O					
Marsh thistle	*Cirsium palustre*	R			F/LA	4	3	4	O/LF	F/LA	4	F/LA	4	3	F/LA
Hazel seedling	*Corylus avellana*				O					R		R			R
Cocksfoot	*Dactylis glomerata*														O

DAFOR scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare
L Locally or patchily

Domin scale (% cover)

10 91 - 100
9 76 - 90
8 51 - 75
7 34 - 50
6 26 - 33
5 45962
4 4 - 10
3 <4 many individuals
2 <4 several individuals
1 <4 few individuals

Ancient Woodland Indicator vascular plant species

		Area/Quadrat													
Species		P1	PQ1	P2	P3	PQ2	PQ3	PQ4	P4	P5	PQ5	P6	PQ6	PQ7	P7
Common spotted orchid	*Dactylorrhiza fuchsii*									R					
Tufted hair grass	*Deschampsia cespitosa*				O/LF				R	O		O			
Foxglove	*Digitalis purpurea*				F			3	F			F	4		F/LA
Broad buckler fern	*Dryopteris dilatata*											R			
Male fern	*Dryopteris felix-mas*	O		O											R
Broadleaved willowherb	*Epilobium montanum*				O					O		O			
Red fescue	*Festuca rubra*				O/LA										
Wild strawberry	*Fragraria vesca*	O/LF		O/LF	O					F					
Ash seedling	*Fraxinus excelsior*	O/LF	3									O			
Cleavers	*Galium aparine*				O					O	4				R
Marsh bedstraw	*Galium palustre*				O/LA	5			O	O	4	O/LA			
Heath bedstraw	*Galium saxatile*				O			1							
Wood avens	*Geum urbanum*				O										
Ground ivy	*Glechoma hederacea*				O										
Yorkshire fog	*Holcus lanatus*	R		R	F/LA	5	6	7	A	F/LA	4	O	6	5	R
Bluebell	*Hyacinthoides non-scripta*	O			O/LA	5			LA						O/LA
Tutsan	*Hypericum androseanum*														R
Hairy St John's wort	*Hypericum hirsutum*								R						
Perforate St John's wort	*Hypericum perforatum*				R										O
Slender St John's wort	*Hypericum pulchrum*	R			O				O			F	2	3	O
Square-stemmed St John's wort	*Hypericum tetrapterum*				O					O		F			O
Cats ear	*Hypochaeris radicata*									R		O		2	R
Holly seedling	*Ilex aquifolium*						R								
Sharp-flowered rush	*Juncus acutiflorus*				O/LF				O						
Bulbous rush	*Juncus bulbosus*											LA			
Soft rush	*Juncus effusus*	O/LF	3		F			1	LA	O	1	F/LA	4		R
Great lettuce	*Lactuca virosa*				R										
Honeysuckle	*Lonicera perclymenum*	F/LA		R	F	4			O	O		F		5	F
Bird's foot trefoil	*Lotus corniculatus*				F	1						O			O
Greater birds foot trefoil	*Lotus pedunculatus*				O	2						O			O
Heath wood rush	*Luzula multiflora*				F			2		O	2	F/LA		4	F
Hairy wood rush	*Luzula pilosa*								O/LF			O/LF			
Yellow pimpernel	*Lysimachia nemorum*				R					R		O			R
Dog's mercury	*Mercurialis perennis*				R		1								
Field forget-me-not	*Myosotis arvensis*				R		1					O			
Rough meadow grass	*Poa trivialis*			O											
Tormentil	*Potentilla erecta*									O		O		2	R
	Potentilla x mixta											R		1	
Cinquefoil	*Potentilla reptans*				O				O	O	4	O		1	O
Barren strawberry	*Potentilla sterilis*				O/LF							O			R
Primrose	*Primula vulgaris*	O	3	O/LF	O/LF		3	3		O/LF	2	O			F
Selfheal	*Prunella vulgaris*				F					O					F
Blackthorn seedling/sucker	*Prunus spinosa*	R													
Bracken	*Pteridium aquilinum*				F/LA		3		O/LA	R		O			O/LA
Fleabane	*Pulicaria dysenterica*				LF										
Creeping buttercup	*Ranunculus repens*				O			4		O	4				R
Bramble	*Rubus fruticosus*	F/LA	7	F/LA	F/LA	6	4	6	F/LA	F/LA	6	F/LA	3	5	F/LA
Broadleaved dock	*Rumex obtusifolius*				O					R		R			
Wood dock	*Rumex sanguineus*								R						
Figwort	*Scrophularia nodosa*				O	2			R	O					
Heath groundsel	*Senecio sylvaticus*														
Smooth sowthistle	*Sonchus olraceous*									R					
Betony	*Stachys officinalis*				R										
Hedge woundwort	*Stachys sylvatica*				O										
Lesser stitchwort	*Stellaria graminea*														O
Devil's bit scabious	*Succisa pratensis*				O				LF	O/LF	2	O/LF		2	O/LF
Dandelion	*Taraxacum officinale agg.*	R			O					O					R
Wood sage	*Teucrium scorodonia*	O		O/LF	F/LA		4	4	O	F	4	F	3	4	O/LF
Nettle	*Urtica dioica*								R						
Wood speedwell	*Veronica montana*									R					

		Area/Quadrat													
Species		**P1**	**PQ1**	**P2**	**P3**	**PQ2**	**PQ3**	**PQ4**	**P4**	**P5**	**PQ5**	**P6**	**PQ6**	**PQ7**	**P7**
Heath speedwell	*Veronica officinalis*				O/LF					O	1	F	2	3	O
Thyme leaved speedwell	*Veronica sepyllifolium*														O
Bush vetch	*Vicia sepium*														R
Smooth tare	*Vicia tetraspermum*									R					
Common dog violet	*Viola riviniana*	O		R	F		3			O		O	3	3	
Squirrel-tail fescue	*Vulpia bromoides*									LA					
Bare ground			4										5	4	
Total AWIs		**6**		**3**	**13**				**7**	**7**		**11**			**16**

Table AII.3: Ride results

Species		R1	R2	R3	R4
Trees/shrubs					
Conifer					O/LF
Norway maple	*Acer platanoides*			R	
Silver birch	*Betula pendula*	R		O/LF	O/LF
Downy birch	*Betula pubescens*			R	O
Hazel	*Corylus avellana*	F	O	F	F
Hawthorn	*Crataegus monogyna*	O/LF		R	R
Ash	*Fraxinus excelsior*	O	O	O	O
Holly	*Ilex aquifolium*			R	O
Wild cherry	*Prunus avium*	R	R	R	R
Turkey oak	*Quercus cerris*			R	
Sessile oak	*Quercus petraea*	O	O	O	O
Non-native oak sp	*Quercus sp*				LF
Field rose	*Rosa arvensis*				O
Dog rose	*Rosa canina*				O
Goat willow	*Salix caprea*	R		R	R
Grey willow	*Salix cinerea*	R		O	O/LF
Elder	*Sambucus nigra*				O
Common gorse	*Ulex europaeus*			O	O
Field Layer					
Common agrimony	*Agrimonia eupatoria*				O
Velvet bent	*Agrostis canina*	O/LA	O/LA	O/LA	F/LA
Common bent	*Agrostis capillaris*				R
Bugle	*Ajuga reptans*		O		O
Hedge garlic	*Alliaria petiolata*				R
Wood anemone	*Anemone nemerosa*		O		O/LF
Angelica	*Angelica sylvestris*		R	R	O/LF
Sweet vernal grass	*Anthoxanthum odoratum*			O	O
Cow parsley	*Anthriscus sylvestris*				LA
Burdock	*Arctium sp*				R
Lords and ladies	*Arum maculatum*		R		R
Daisy	*Bellis perennis*		O		O/LF
Wood false brome	*Brachypodium sylvaticum*	F/LA	F	F	F
Cuckoo flower	*Cardamine pratensis*		R		F
Glaucus sedge	*Carex flacca*		R		F
Grey sedge	*Carex divulsa*			O	O
Hairy sedge	*Carex hirta*				O
Pendulous sedge	*Carex pendula*	F	O/LF	F/LA	F/LA
Remote sedge	*Carex remota*		R	O	R
Wood sedge	*Carex sylvatica*	F		O	O/LF
Common knapweed	*Centaurea nigra*				F
Common centaury	*Centaurium erythraea*				R
Common mouse ear	*Cerastium fontanum*				R
Enchanter's nightshade	*Circaea lutetiana*	O	O	O	O
Creeping thistle	*Cirsium arvense*		R		
Marsh thistle	*Cirsium palustre*	O/LF		O	F
Pignut	*Conopodium majus*				R
Hazel seedling	*Corylus avellana*				O
Hawthorn seedling	*Crataegus monogyna*				R
Cocksfoot	*Dactylis glomerata*	O	O	F/LA	F
Common spotted orchid	*Dactylorrhiza fuchsii*	R		O	O/LF
Tufted hair grass	*Deschampsia cespitosa*	LF			
Foxglove	*Digitalis purpurea*			O	O/LF
Broad buckler fern	*Dryopteris dilatata*		R	O/LF	
Male fern	*Dryopteris felix-mas*		O	O/LF	O
Broadleaved willowherb	*Epilobium montanum*				R
Hoary willowherb	*Epilobium parviflorum*			R	
Field horsetail	*Equisetum arvense*			LF	
Wood spurge	*Euphorbia amygdaloides*				R
Red fescue	*Festuca rubra*				O
Lesser celandine	*Ficaria verna*				O/LF
Wild strawberry	*Fragraria vesca*				O
Ash seedling	*Fraxinus excelsior*			F	
Cleavers	*Galium aparine*		R	O	O/LF
Marsh bedstraw	*Galium palustre*	O		O	
Herb Robert	*Geranium robertianum*	R		R	O/LF
Wood avens	*Geum urbanum*	O	O/LF	F	O
Ground ivy	*Glechoma hederacea*		R	R	
Reed sweet-grass	*Glyceria maxima*				LA
Ivy	*Hedera helix*				O
Yorkshire fog	*Holcus lanatus*	O		F	F
Bluebell	*Hyacinthoides non-scripta*	LA	F/LA	O/LF	O/LF
Tutsan	*Hypericum androseanum*	R		O	O
Hairy St John's wort	*Hypericum hirsutum*		R	O	
Perforate St John's wort	*Hypericum perforatum*				R
Slender St John's wort	*Hypericum pulchrum*			O	O
Square-stemmed St John's wort	*Hypericum tetrapterum*		O	O	O
Soft rush	*Juncus effusus*	O/LF	O/LF	O	O/LF
Hard rush	*Juncus inflexus*				O

DAFOR scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare
L Locally or patchily

Domin scale (% cover)

10 91 - 100
9 76 - 90
8 51 - 75
7 34 - 50
6 26 - 33
5 45962
4 4 - 10
3 <4 many individuals
2 <4 several individuals
1 <4 few individuals

Ancient Woodland Indicator vascular plant species

Species		R1	R2	R3	R4
Toad rush	*Juncus tenuis*				O/LF
Nipplewort	*Lapsana communis*	O			
Meadow vetchling	*Lathyrus pratensis*				LF
Honeysuckle	*Lonicera perclymenum*		F	F	F/LA
Bird's foot trefoil	*Lotus corniculatus*				O/LF
Greater birds foot trefoil	*Lotus pedunculatus*			O	O/LF
Heath wood rush	*Luzula multiflora*				O
Hairy wood rush	*Luzula pilosa*				R
Yellow pimpernel	*Lysimachia nemorum*		R		O
Dwarf mallow	*Malva neglecta*			R	
Wood melick	*Melica uniflora*			O	
Dog's mercury	*Mercurialis perennis*	LA	F/LA		O/LA
Three-nerved sandwort	*Moerhingia trinervis*		R		
Field forget-me-not	*Myosotis arvensis*			R	
Early purple orchid	*Orchis mascula*		R		R
Annual meadow grass	*Poa annua*		F		O/LF
Rough meadow grass	*Poa trivialis*	F/LA	F	F/LA	
Common milkwort	*Polygala vulgaris*				R
Silverweed	*Potentilla anserina*			O	
Tormentil	*Potentilla erecta*				R
Cinquefoil	*Potentilla reptans*	O	O/LF	F	O/LF
Barren strawberry	*Potentilla sterilis*		O		F
Primrose	*Primula vulgaris*	O/LF	O/LF	O/LF	F
Selfheal	*Prunella vulgaris*	O	O/LF	O	O
Bracken	*Pteridium aquilinum*		O	O/LA	O/LA
Fleabane	*Pulicaria dysenterica*			O	R
Sessile oak seedling	*Quercus petraea*			O	O
Pedunculate oak seedling	*Quercus robur*				R
Lesser spearwort	*Ranunculus flammula*				LF
Creeping buttercup	*Ranunculus repens*	O	O	R	O/LF
Bramble	*Rubus fruticosus*	F/LA	F	F	O/LA
Broadleaved dock	*Rumex obtusifolius*		O		O
Wood dock	*Rumex sanguineus*			O	
Sanicle	*Sanicula europaea*				O/LF
Figwort	*Scrophularia nodosa*	O	R	O	O
Lesser skullcap	*Scutellaria minor*				LF
Betony	*Stachys officinalis*				LF
Marsh woundwort	*Stachys palustris*			R	
Hedge woundwort	*Stachys sylvatica*		LF	O	O
Lesser stitchwort	*Stellaria graminea*				O
Greater stitchwort	*Stellaria holostea*				O
Chickweed	*Stellaria media*				R
Devil's bit scabious	*Succisa pratensis*		O	LF	O
Black bryony	*Tamus communis*			O	
Dandelion	*Taraxacum officinale agg.*		O	R	F
Wood sage	*Teucrium scorodonia*		R	O	O
Red clover	*Trifolium pratense*				LF
Nettle	*Urtica dioica*		R		O/LA
Germander speedwell	*Veronica chamaedrys*	O	O/LF		O
Wood speedwell	*Veronica montana*	O	O/LF	O	O
Heath speedwell	*Veronica officinalis*		R		
Thyme leaved speedwell	*Veronica sepyllifolium*		R		
Tufted vetch	*Vicia cracca*				O
Common vetch	*Vicia sativa*				LF
Bush vetch	*Vicia sepium*				O
Common dog violet	*Viola riviniana*	O/LF	O	R	O/LF
Total AWIs		**8**	**13**	**15**	**24**

Table AII.0.4: List of Ancient Woodland Indicator species recorded (all habitats)

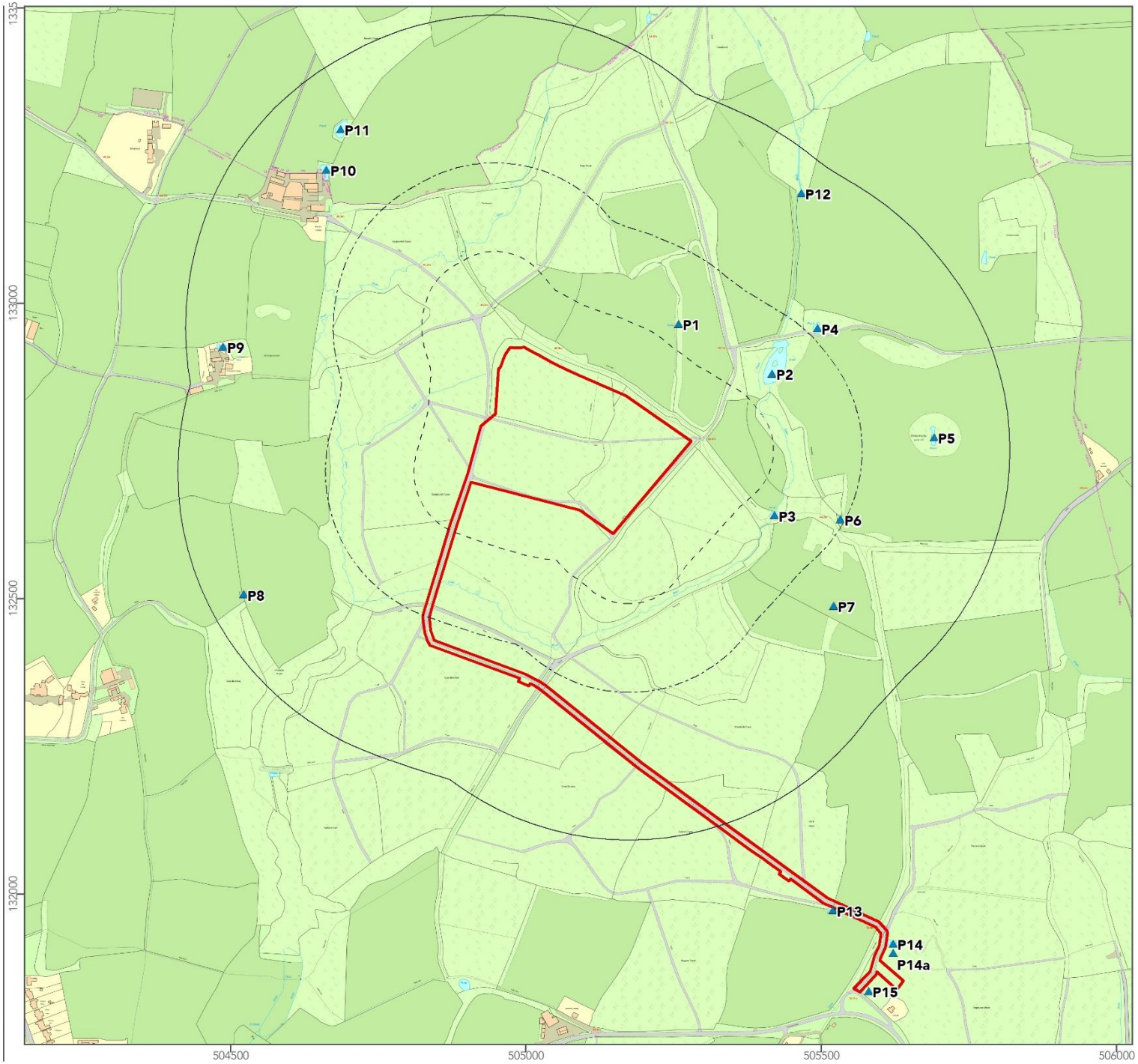
1. Acer campestre	2. Anemone nemerosa
3. Blechnum spicant	4. Carpinus betulus
5. Carex pendula	6. Carex remota
7. Carex sylvatica	8. Conopodium majus
9. Crataegus laevigata	10. Euphorbia amygdaloides
11. Frangula alnus	12. Hyacinthoides non-scripta
13. Hypericum androsaenum	14. Hypericum hirsutum
15. Hypericum pulchrum	16. Ilex aquifolium
17. Luzula pilosa	18. Lysimachia nemorum
19. Melica uniflora	20. Millium effusum
21. Moehringia trinerva	22. Orchis mascula
23. Oxalis acetosella	24. Populus tremula
25. Potentilla sterilis	26. Primula vulgaris
27. Prunus avium	28. Quercus petraea
29. Ranunculus auricomus	30. Ribes nigrum
31. Rosa arvensis	32. Ruscus aculeatus
33. Sanicula europaea	34. Scutellaria minor
35. Sorbus torminalis	36. Stachys officinalis
37. Tamus communis	38. Veronica montana
39. Viburnum opulus	40. Vicia sepium

Appendix III: Pond Plan & GCN Survey Results

Please see insert.

Loxwood Clay Pits, West Sussex

- Red line boundary
- Ponds
- 100m buffer
- 250m buffer
- 500m buffer



0 250 500

Meters

N

Scale: 1:7,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-Ponds210524

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Habitat Suitability Index results

The Habitat Suitability Index (HSI; Oldham *et al*, 2000) is a tool used to assess ponds on the basis of their suitability to support breeding great crested newts (GCN). The HSI incorporates ten suitability indices which are considered to affect GCN distribution. These are:

- Location (in Britain);
- Pond area;
- Desiccation rate (years out of ten that pond dries);
- Water quality (subjective assessment);
- Percentage of pond shaded (% of pond margin shaded 1m from the bank);
- Number of waterfowl;
- Fish population (subjective assessment);
- Number of ponds within 1km;
- Terrestrial habitat quality; and
- Percentage macrophyte cover.

The results of the HSI calculation can then be compared to categorised HSI scores used by the National Amphibian and Reptile Recording Scheme (Oldham *et al*, 2000) to identify the probability of a pond supporting great crested newts, as follows:

Habitat Quality	HSI Score
Poor	Below 0.5
Below Average	0.5 – 0.59
Average	0.6 – 0.69
Good	0.7 – 0.79
Exceptional	Above 0.8

The HSI gives an indication of whether a pond is suitable for breeding great crested newts, however, it should be noted that a low score does not preclude the possibility that GCN are using the pond. A survey of ponds carried out to test the HSI (ARG UK, 2010) found that 20% of ponds which were scored as 'below average' still contained great crested newts, although this increased to an occupation rate of 93% for those ponds scored as 'excellent'. Another important consideration when using the HSI is that pond scores can vary at different times of year, for example, if emergent vegetation is not present (and therefore under recorded) at the time of the HSI assessment.

HSI results for all accessible waterbodies potentially suitable for GCN within 500m of the Site are shown below.

Variable	Field score	SI value	Field score	SI value	Field score	SI value
	Pond 1		***Pond 2***		***Pond 3***	
Location	A	1	A	1	A	1
Pond area (m2)	<100	0.1	1600	0.85	300	0.6
Pond permanence	Never	0.9	Rarely	1	Annually	0.1
Water quality	Moderate	0.67	Moderate	0.67	Poor	0.33
% shaded 1m from bank	85	0.5	90	0.4	90	0.4
Fowl	Absent	1	Minor	0.67	Absent	1
Fish	Absent	1	Possible	0.67	Absent	1
Pond density (per km^2)	15	1	15	1	15	1
Terrestrial habitat	Good	1	Good	1	Good	1
Macrophyte cover %	15	0.45	50	0.8	0	0.3
HSI value		**0.65**		**0.78**		**0.55**
Suitability		**Average**		**Good**		**Below average**

Variable	Field score	SI value	Field score	SI value	Field score	SI value
	Pond 4		***Pond 5***		***Pond 6***	
Location	A	1	A	1	A	1
Pond area (m2)	100	0.1	100	0.1	<100	0.1
Pond permanence	Rarely	0.9	Rarely	0.9	Annually	0.1
Water quality	Poor	0.33	Moderate	0.67	Poor	0.33
% shaded 1m from bank	60	1	60	1	95	0.3
Fowl	Absent	1	Absent	1	Absent	1
Fish	Absent	1	Absent	1	Absent	1
Pond density (per km^2)	15	1	15	1	15	1
Terrestrial habitat	Good	1	Moderate	0.67	Good	1
Macrophyte cover %	0	0.3	10	0.4	5	0.35
HSI value		**0.62**		**0.66**		**0.45**
Suitability		**Average**		**Average**		**Poor**

Variable	Field score	SI value	Field score	SI value	Field score	SI value
	Pond 7		***Pond 8***		***Pond 10***	
Location	A	1	A	1	A	1
Pond area (m2)	40	0.05	45	0.05	300	0.6
Pond permanence	Sometimes	0.5	Sometimes	0.5	Rarely	0.9
Water quality	Poor	0.33	Moderate	0.67	Moderate	0.67
% shaded 1m from bank	80	0.6	95	0.3	60	1
Fowl	Absent	1	Absent	1	Absent	1
Fish	Absent	1	Absent	1	Absent	1
Pond density (per km^2)	15	1	15	1	15	1
Terrestrial habitat	Moderate	0.67	Good	1	Moderate	0.67
Macrophyte cover %	85	0.95	5	0.35	15	0.45
HSI value		**0.56**		**0.53**		**0.80**
Suitability		**Below average**		**Below average**		**Excellent**

Variable	Field score	SI value	Field score	SI value	Field score	SI value
	Pond 12		***Pond 13***		***Pond 14***	
Location	A	1	A	1	A	1
Pond area (m2)	<100	0.1	<100	0.1	200	0.4
Pond permanence	Annually	0.1	Sometimes	0.5	Sometimes	0.5
Water quality	Poor	0.33	Poor	0.33	Poor	0.33
% shaded 1m from bank	100	0.2	85	0.5	100	0.2
Fowl	Absent	1	Minor	0.67	Absent	1
Fish	Absent	1	Absent	1	Absent	1
Pond density (per km^2)	15	1	15	1	15	1
Terrestrial habitat	Good	1	Good	1	Good	1
Macrophyte cover %	10	0.4	10	0.4	5	0.35
HSI value		**0.44**		**0.54**		**0.58**
Suitability		**Poor**		**Below average**		**Below average**

Variable	Field score	SI value	Field score	SI value
	Pond 14a		***Pond 15***	
Location	A	1	A	1
Pond area (m2)	90	0.19	70	0.17
Pond permanence	Sometimes	0.5	Sometimes	0.5
Water quality	Poor	0.33	Moderate	0.67
% shaded 1m from bank	95	0.3	100	0.2
Fowl	Minor	0.67	Minor	0.67
Fish	Absent	1	Absent	1
Pond density (per km^2)	15	1	15	1
Terrestrial habitat	Moderate	0.67	Good	1
Macrophyte cover %	0	0.3	0	0.3
HSI value		**0.51**		**0.54**
Suitability		**Below average**		**Below average**

Pond survey results

Please see inserts overleaf.

Pond number: P1						Water temperature			Torch **				Bottle trap				Net				Eggs	Larvae	Torch **	Bottle trap	Net
Survey no.	Date	Surveyor	No. of traps	Turbidity*	Veg cover*	AM	PM	Peak count	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	16/04/2020	RB/AD	8	3	1	12.6	10.7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN	-
4	23/04/2020	NP/RB/AD	8	0	0	15.6	12.0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FPN	-
5	30/04/2020	NP/AD	8	4	3	10.5	9.7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	07/05/2020	RB/AD	8	2	3	12.1	11.4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Pond number: P2						Water temperature			Torch **				Bottle trap				Net				Eggs	Larvae	Torch **	Bottle trap	Net
Survey no.	Date	Surveyor	No. of traps	Turbidity*	Veg cover*	AM	PM	Peak count	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	16/04/2020	RB/AD	12	2	2	12.0	11.2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1MPN	-
4	23/04/2020	NP/RB/AD	12	1	1	16.4	13.0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN 1FPN 1MPN	-	-
5	30/04/2020	NP/AD	12	4	3	10.3	10.1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN 2FPN 1MPN	-	-
6	07/05/2020	RB/AD	12	4	3	12.3	11.9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Pond number: P4						Water temperature			Torch **				Bottle trap				Net				Eggs	Larvae	Torch **	Bottle trap	Net
Survey no.	Date	Surveyor	No. of traps	Turbidity*	Veg cover*	AM	PM	Peak count	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	16/04/2020	RB/AD	8	2	0	16.0	11.8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FPN	-	-
4	23/04/2020	NP/RB/AD	8	3	0	19.4	14.3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	30/04/2020	NP/AD	8	4	1	13.0	9.9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	07/05/2020	RB/AD	8	4	1	11.2	10.9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Pond number: P5						Water temperature			Torch **				Bottle trap				Net						Torch **	Bottle trap	Net
Survey no.	Date	Surveyor	No. of traps	Turbidity*	Veg cover*	AM	PM	Peak count	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NO ACCESS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	16/04/2020	RB/AD	7	2	1	13.6	11.1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1MPN 1FPN	-
4	23/04/2020	NP/RB/AD	6	3	1	15.8	12.2	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1MSN	-
5	30/04/2020	NP/AD	6	3	1	11.0	10.4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	07/05/2020	RB/AD	6	3	1	12.1	11.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Pond number: P8						Water temperature			Torch **				Bottle trap				Net						Torch **	Bottle trap	Net
Survey no.	Date	Surveyor	No. of traps	Turbidity*	Veg cover*	AM	PM	Peak count	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	02/04/2020	NP/RB/AD	6	4	0	9.9	7.1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	09/04/2020	RB/AD	8	4	0	14.7	10.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	16/04/2020	RB/AD	8	4	0	10.2	10.0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	23/04/2020	NP/RB/AD	8	4	0	12.6	10.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FPN	-
5	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Survey no.	Date	Surveyor	No. of traps	Turbidity*	Veg cover*	AM	PM	Peak count	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
Pond number: P13						**Water temperature**			**Torch ****				**Bottle trap**				**Net**						**Torch ****	**Bottle trap**	**Net**
Survey no.	**Date**	**Surveyor**	**No. of traps**	**Turbidity***	**Veg cover***	AM	PM	**Peak count**	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	*02/04/2020*	*NP/RB/AD*	*12*	4	2	10.0	7.8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3FSN 4MPN	-
2	*09/04/2020*	*RB/AD*	*12*	3	2	17.4	11.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13MPN 10FPN	-
3	*16/04/2020*	*RB/AD*	*12*	2	2	13.0	10.7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4FSN 5MPN	1FSN 5MPN	-
4	*23/04/2020*	*NP/RB/AD*	*12*	1	2	15.7	11.9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3FSN 2MPN	7MPN 9FPN	-
5	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pond number: P14						**Water temperature**			**Torch ****				**Bottle trap**				**Net**						**Torch ****	**Bottle trap**	**Net**
Survey no.	**Date**	**Surveyor**	**No. of traps**	**Turbidity***	**Veg cover***	AM	PM	**Peak count**	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	*02/04/2020*	*NP/RB/AD*	*12*	3	1	10.1	7.5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN	-
2	*09/04/2020*	*RB/AD*	*10*	1	1	16.7	11.4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN 2MPN	-
3	*16/04/2020*	*RB/AD*	*10*	2	1	11.9	10.4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1MPN	-
4	*23/04/2020*	*NP/RB/AD*	*10*	2	1	14.0	10.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pond number: P14a						**Water temperature**			**Torch ****				**Bottle trap**				**Net**						**Torch ****	**Bottle trap**	**Net**
Survey no.	**Date**	**Surveyor**	**No. of traps**	**Turbidity***	**Veg cover***	AM	PM	**Peak count**	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	*02/04/2020*	*NP/RB/AD*	*10*	3	1	9.9	7.4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4FSN 3FPN	1MPN 1FSN	-
2	*09/04/2020*	*RB/AD*	*10*	3	1	17.1	11.5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FPN 3MPN	-
3	*16/04/2020*	*RB/AD*	*10*	3	1	12.7	10.7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FPN 1MPN	-
4	*23/04/2020*	*NP/RB/AD*	*10*	4	1	15.1	10.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN	2MPN tadpoles	-
5	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pond number: P15						**Water temperature**			**Torch ****				**Bottle trap**				**Net**						**Torch ****	**Bottle trap**	**Net**
Survey no.	**Date**	**Surveyor**	**No. of traps**	**Turbidity***	**Veg cover***	AM	PM	**Peak count**	M	F	J	U	M	F	J	U	M	F	J	U	Y/N	Y/N	Other species		
1	*02/04/2020*	*NP/RB/AD*	*8*	2	1	10.2	7.5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1MPN	-
2	*09/04/2020*	*RB/AD*	*8*	2	1	18.0	12.0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3MPN	-
3	*16/04/2020*	*RB/AD*	*8*	2	1	13.1	10.8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1MPN	1FSN 1MSN	-
4	*23/04/2020*	*NP/RB/AD*	*8*	3	1	14.3	11.0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1FSN	1MPN	-
5	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Turbidity and vegetation cover are noted on a scale of 1 to 5, where 5 denotes highly turbid conditions or a high proportion of vegetation cover.
** Torch: Clulite CB2, 1million candle power
M/F/J/U: Denotes male, female, juvenile or unsexed
SN/PN: Denotes smooth newt or palmate newt

Appendix IV: Breeding Bird Survey Plans

The plans listed below are presented on the following pages.

Drawing no.	Data presented
UE0363ECO-BirdSurveyTransect210524 UE0363ECO-Nightjar210524	Breeding & wintering bird surveys transect route Nightjar survey area
UE0363ECO-BBS_A3DevSite_April_210524 UE0363ECO-BBS_A3DevSite_May13_210524 UE0363ECO-BBS_A3DevSite_June_210524 UE0363ECO-BBS_Access_May13_210524 UE0363ECO-BBS_Access_May26_210524 UE0363ECO-BBS_Access_June_210524	Results of the breeding bird surveys in April/May/June 2020 for both the Proposed Development Site and access route
UE0363ECO-BBS_Territories_A3DevSite_210524 UE0363ECO-BBS_Territories_Access210524 UE0363ECO-Nightingale210524	Breeding bird territories in 2020 for both the Proposed Development Site and access route Nightingale territories in & around the survey area

Conservation status and BTO code for birds recorded during the surveys

Common name	Scientific name	BTO code	Status
Starling	*Sturnus vulgaris*	SG	Red, s41
Song thrush	*Turdus philomelos*	ST	Red, s41
Mistle thrush	*Turdus viscivorus*	M.	Red
Marsh tit	*Poecile palustris*	MT	Red, s41
Nightingale	*Luscinia megarhynchos*	N.	Red
Cuckoo	*Cuculus canorus*	CK	Red, s41
Dunnock	*Prunella modularis*	D.	Amber, s41
Redwing	*Turdus iliacus*	RE	Red, Sch.1
Fieldfare	*Turdus pilaris*	FF	Red, Sch.1
Lesser redpoll	*Acanthis cabaret*	LR	Red, s41
Woodcock	*Scolopax rusticola*	WK	Red, s41
Hobby	*Falco subbuteo*	HY	Green, Sch.1
Woodpigeon	*Columba palumbus*	WP	Green
Collared dove	*Streptopelia decaocto*	CD	Green
Green woodpecker	*Picus viridis*	G.	Green
Great spotted woodpecker	*Dendrocopos major*	GS	Green
Magpie	*Pica pica*	MG	Green

Common name	Scientific name	BTO code	Status
Jay	*Garrulus glandarius*	J.	Green
Carrion crow	*Corvus corone*	C.	Green
Rook	*Corvus frugilegus*	RO	Green
Jackdaw	*Corvus monedula*	JD	Green
Blue tit	*Cyanistes caeruleus*	BT	Green
Great tit	*Parus major*	GT	Green
Coal tit	*Periparus ater*	CT	Green
Long tailed tit	*Aegithalos caudatus*	LT	Green
Garden warbler	*Sylvia borin*	GW	Green
Black cap	*Sylvia atricapilla*	BC	Green
Whitethroat	*Sylvia communis*	WH	Green
Wren	*Troglodytes troglodytes*	WR	Green
Nuthatch	*Sitta europaea*	NH	Green
Treecreeper	*Certhia familiaris*	TC	Green
Blackbird	*Turdus merula*	B.	Green
Robin	*Erithacus rubecula*	R.	Green
Chiff chaff	*Phylloscopus collybita*	CC	Green
Chaffinch	*Fringilla coelebs*	CH	Green
Goldfinch	*Carduelis carduelis*	GO	Green
Goldcrest	*Regulus regulus*	GC	Green
Siskin	*Carduelis spinus*	SK	Green
Grey heron	*Ardea cinerea*	H.	Green

Sch.1 Wildlife and Countryside Act 1981 Schedule 1 Bird

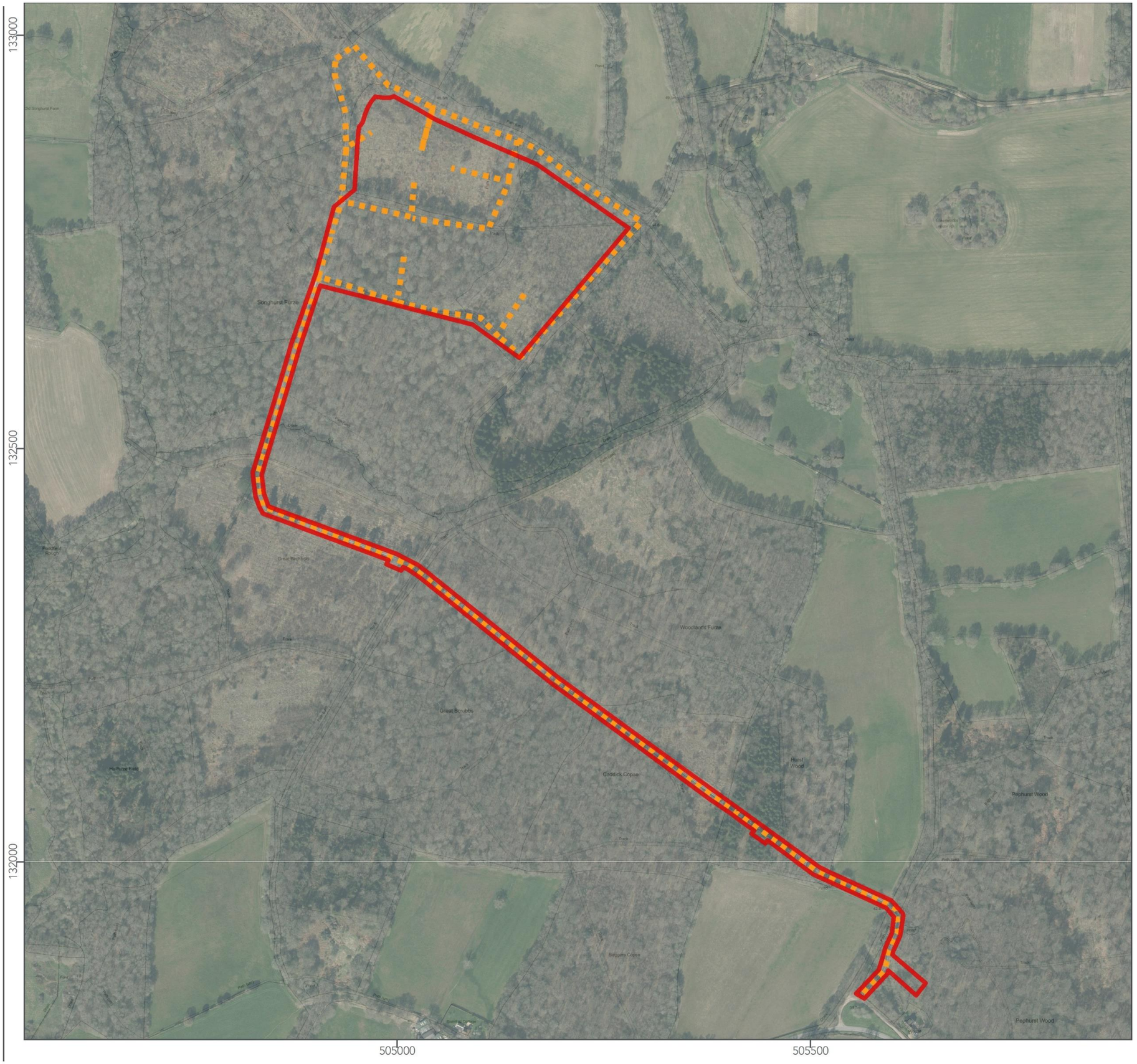
s41 Natural Environment & Rural Communities Act 2006 Section 41 Species of Principal Importance

Red/Amber/Green Birds of Conservation Concern 4 (Eaton *et al.*, 2015))

Loxwood Clay Pits, West Sussex

Red line boundary

Breeding and wintering bird transect



0 190 380

Meters

N

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BirdSurveyTransect210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
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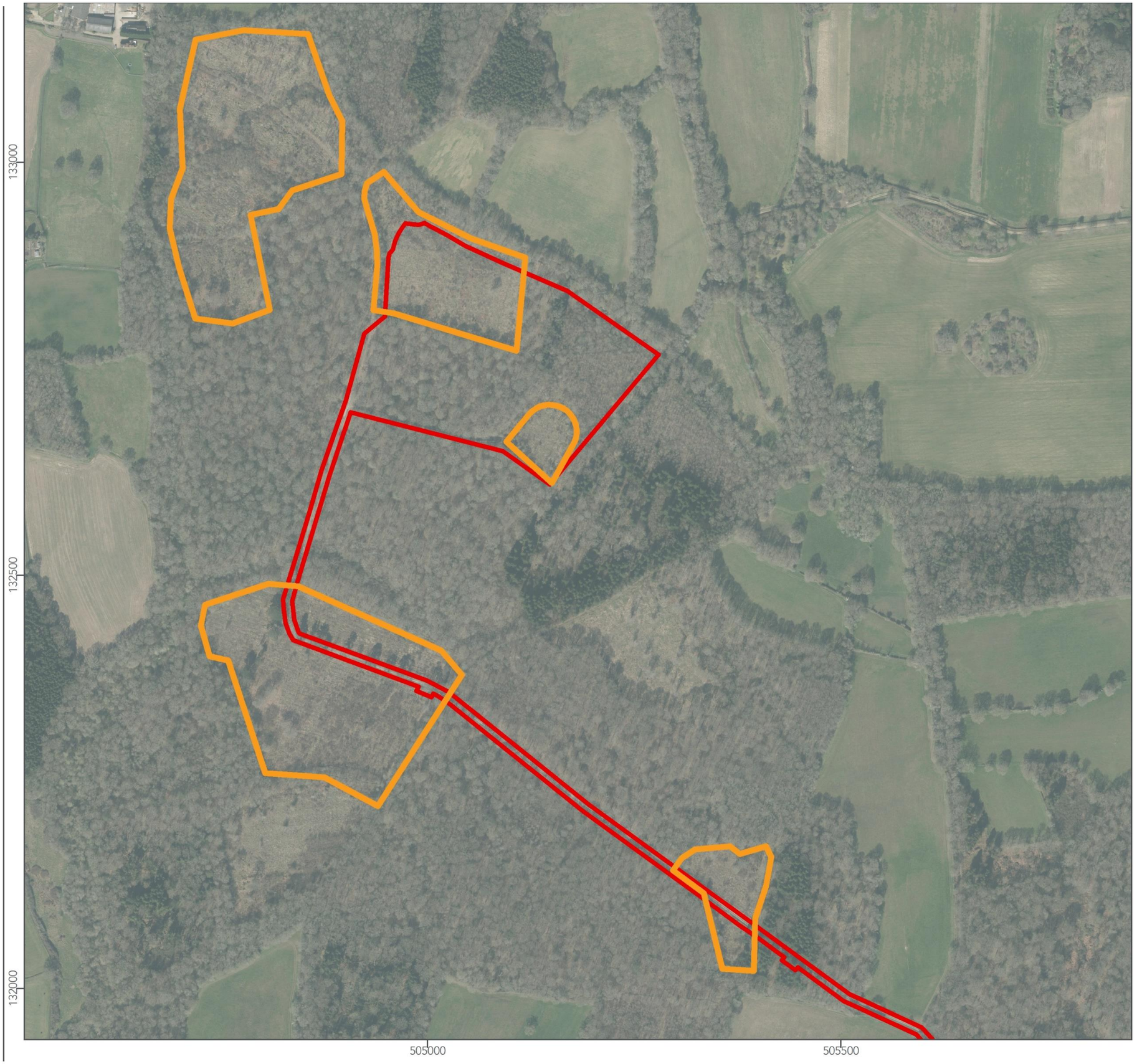
Loxwood Clay Pits, West Sussex

Red line boundary

Nightjar survey area



0 180 360

Meters

N

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-Nightjar210524

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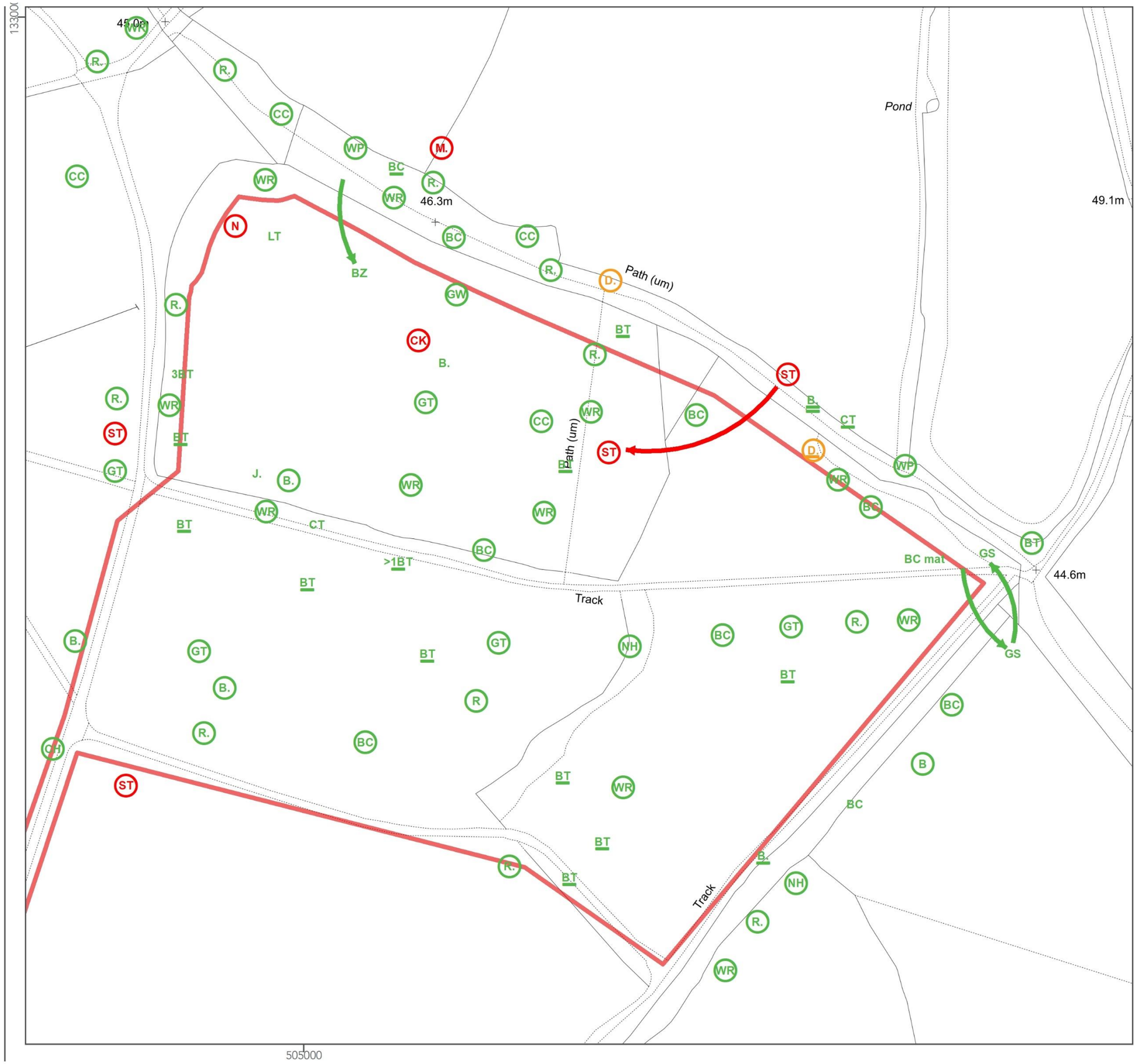
BBS April, Loxwood Clay Pits

- Red line boundary
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, amber list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, amber list
- Sp Bird in song, green list
- Sp. Repeated alarm calls, green list
- Bird movement, red list



0 60 120 Meters

N

Scale: 1:1,700 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

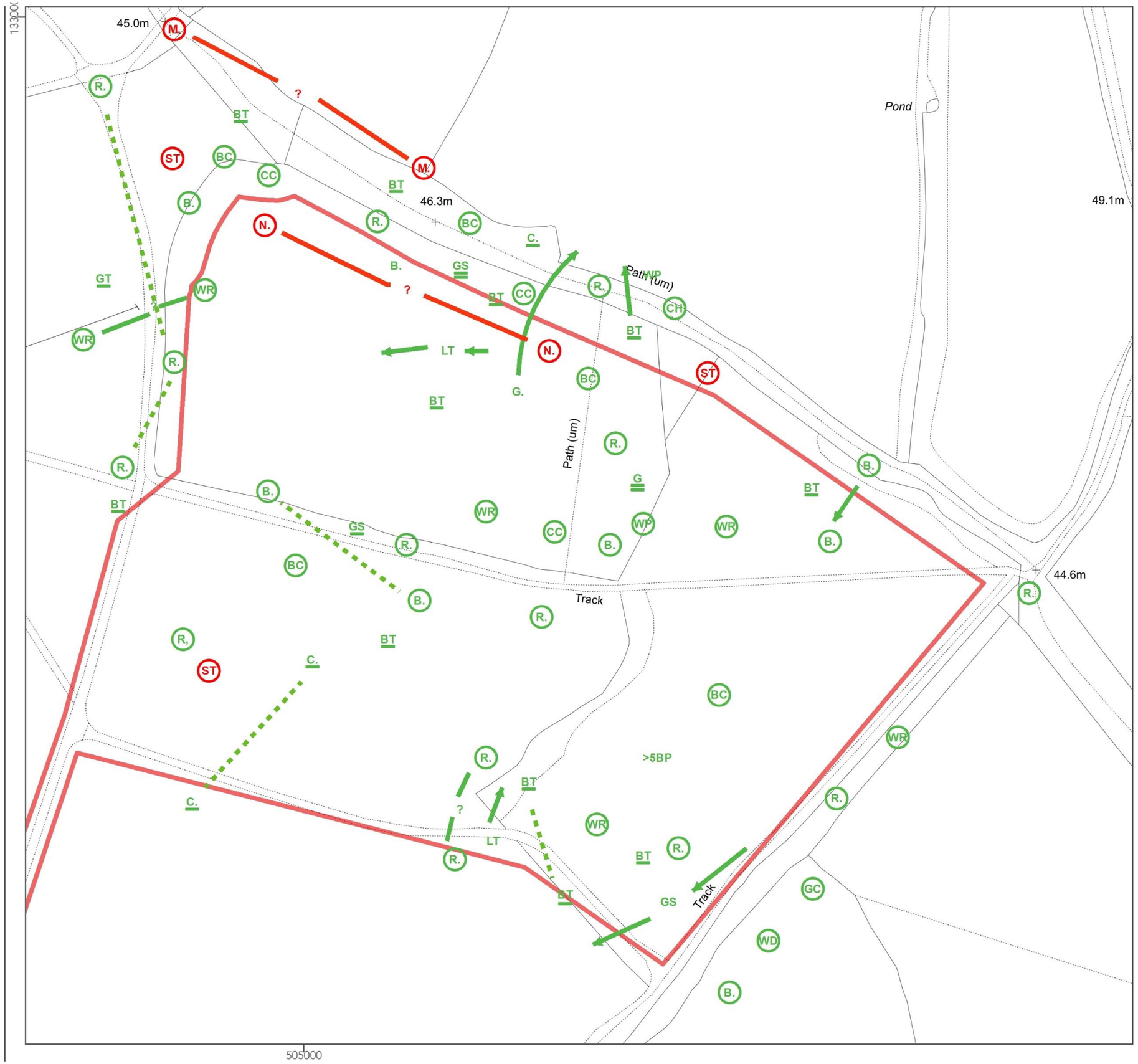
UE0363ECO-BBS_A3DevSite_April_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

BBS May
Loxwood Clay Pits

- Red line boundary
- Sp. Species, red list
- Sp. Bird not singing, green list
- Sp. Calling bird, red list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, green list
- Sp. Repeated alarm calls, green list
- Different birds, red list
- Different birds, green list
- Bird movement, red list
- Bird movement, green list



0 60 120

Meters

N

Scale: 1:1,700 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BBS_A3DevSite_May13_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

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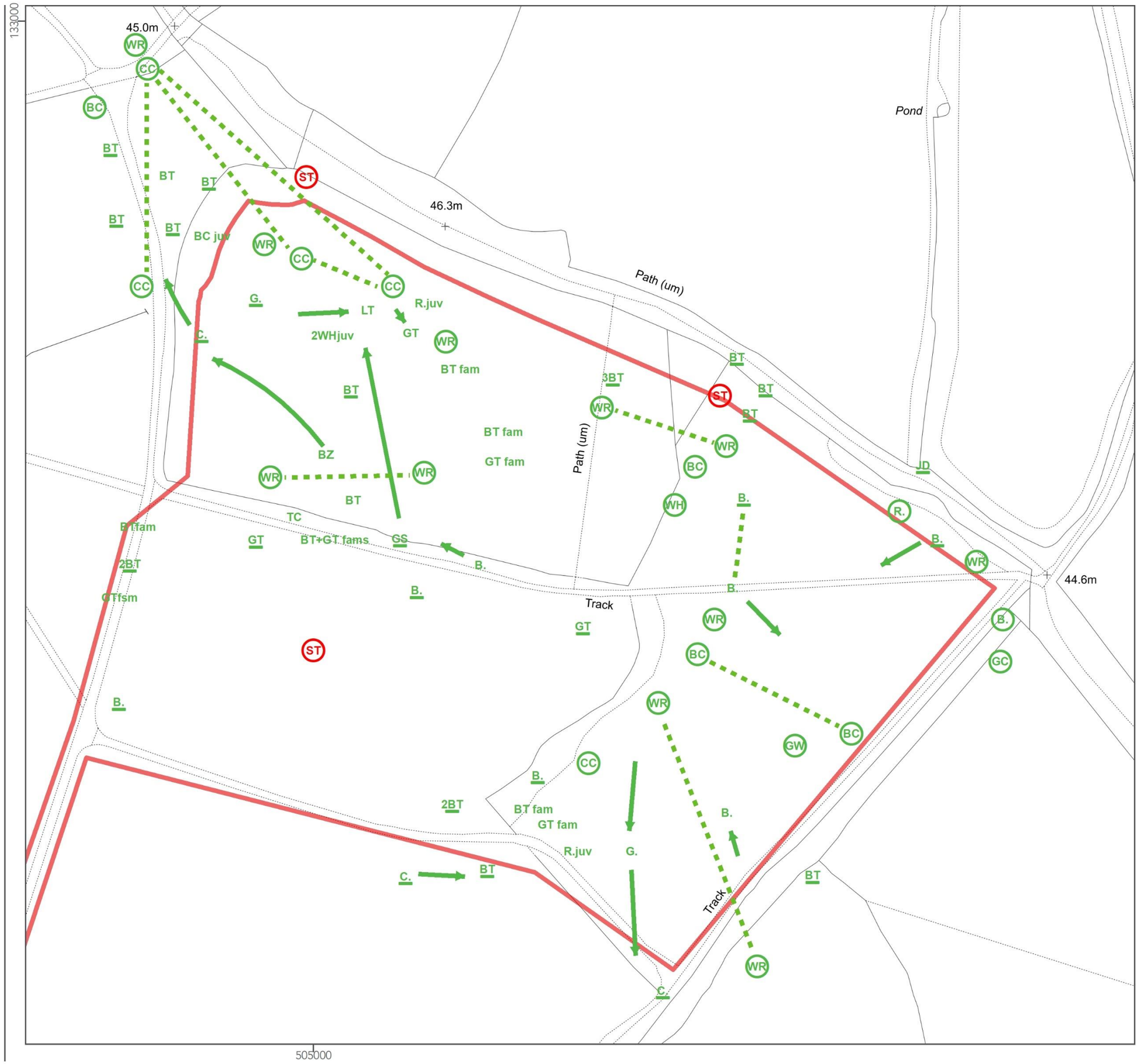
BBS June, Loxwood Clay Pits

- Red line boundary
- Sp. Species, green list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, green list
- Different birds, green list
- Bird movement, red list
- Bird movement, green list



0 60 120 N

Meters

Scale: 1:1,700 **Created by:** AD

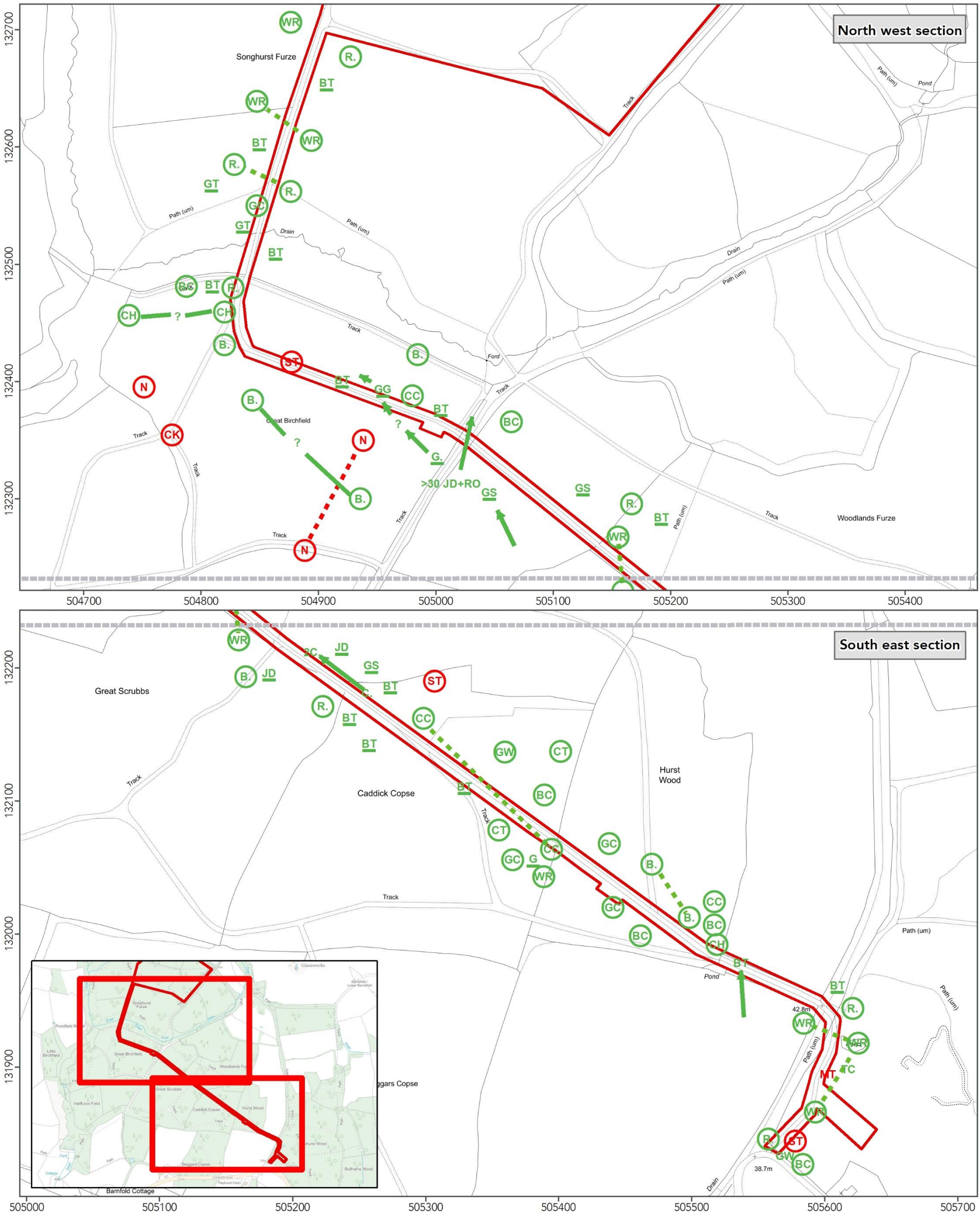
Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BBS_A3DevSite_June_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk



BBS 13 May, Access route, Loxwood

- Red line boundary
- Extent marker
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, green list
- Sp. Bird in song, red list
- Sp. Bird in song, green list
- Different birds, green list
- Bird movement, green list

0 110 220 Meters

N

Scale: 1:3,000 **Created by:** AD

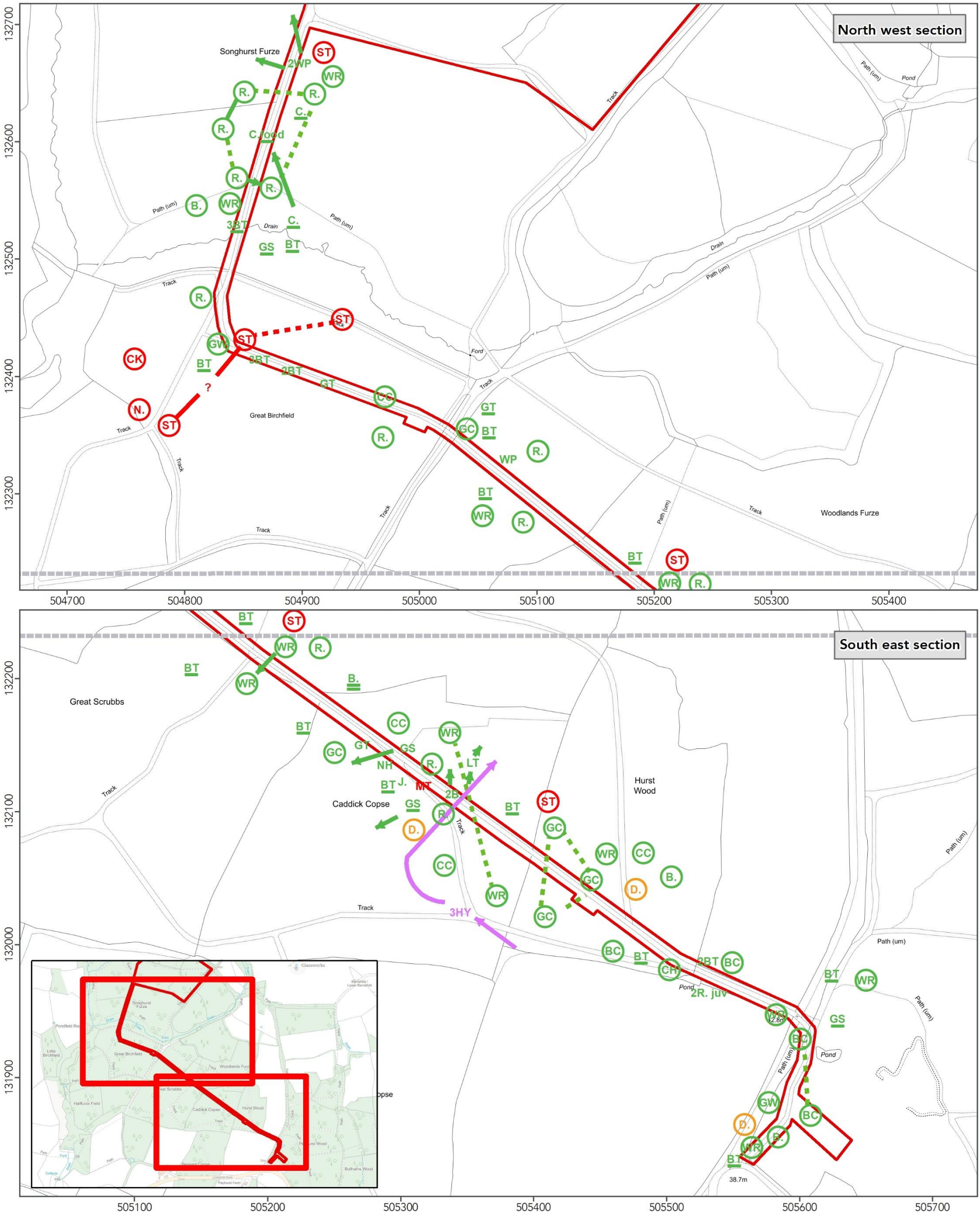
Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BBS_Access_May13_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk



BBS 26 May, Access route, Loxwood

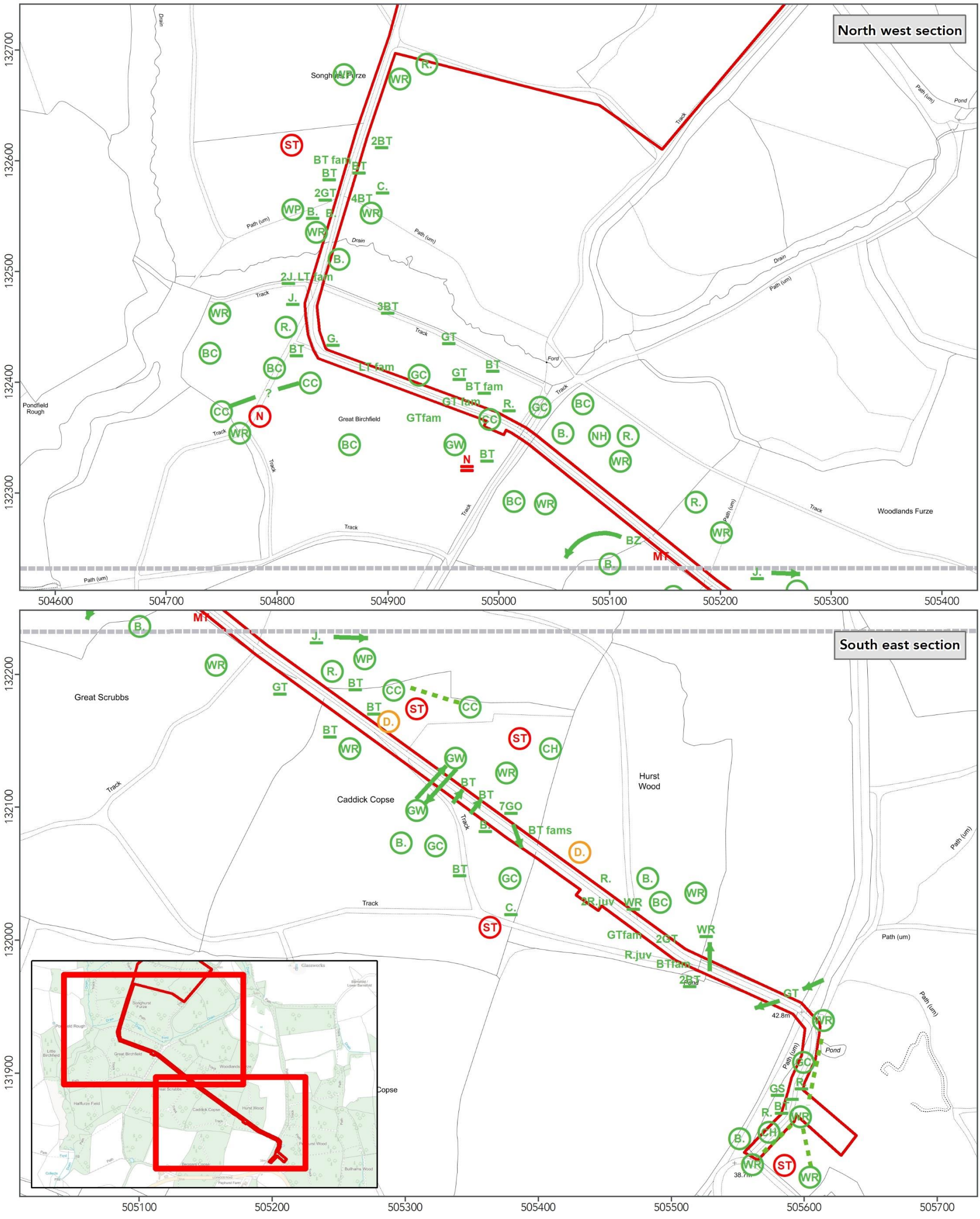
- Red line boundary
- Extent marker
- Sp. Species, shedule 1
- Sp. Species, red list
- Sp. Species, green list
- Sp. Repeated alarm calls, green list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, amber list
- Sp Bird in song, green list
- Different birds, red list
- Different birds, green list
- Bird movement, Schedule1
- Bird movement, red list
- Bird movement, green list

0 110 220 Meters

N

Scale: 1:3,000 **Created by:** AD
Date: May 2021 **Reviewed by:** NP
Drawing number:
UE0363ECO-BBS_Access_May26_210524

URBAN EDGE ENVIRONMENTAL CONSULTING
Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk



BBS June, Access route, Loxwood

- Red line boundary
- Extent marker
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, amber list
- Sp. Bird in song, green list
- Sp. Repeated alarm calls, red list
- Different birds, green list
- Bird movement, red list
- Bird movement, green list

0 110 220 Meters

N

Scale: 1:3,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BBS_Access_June_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

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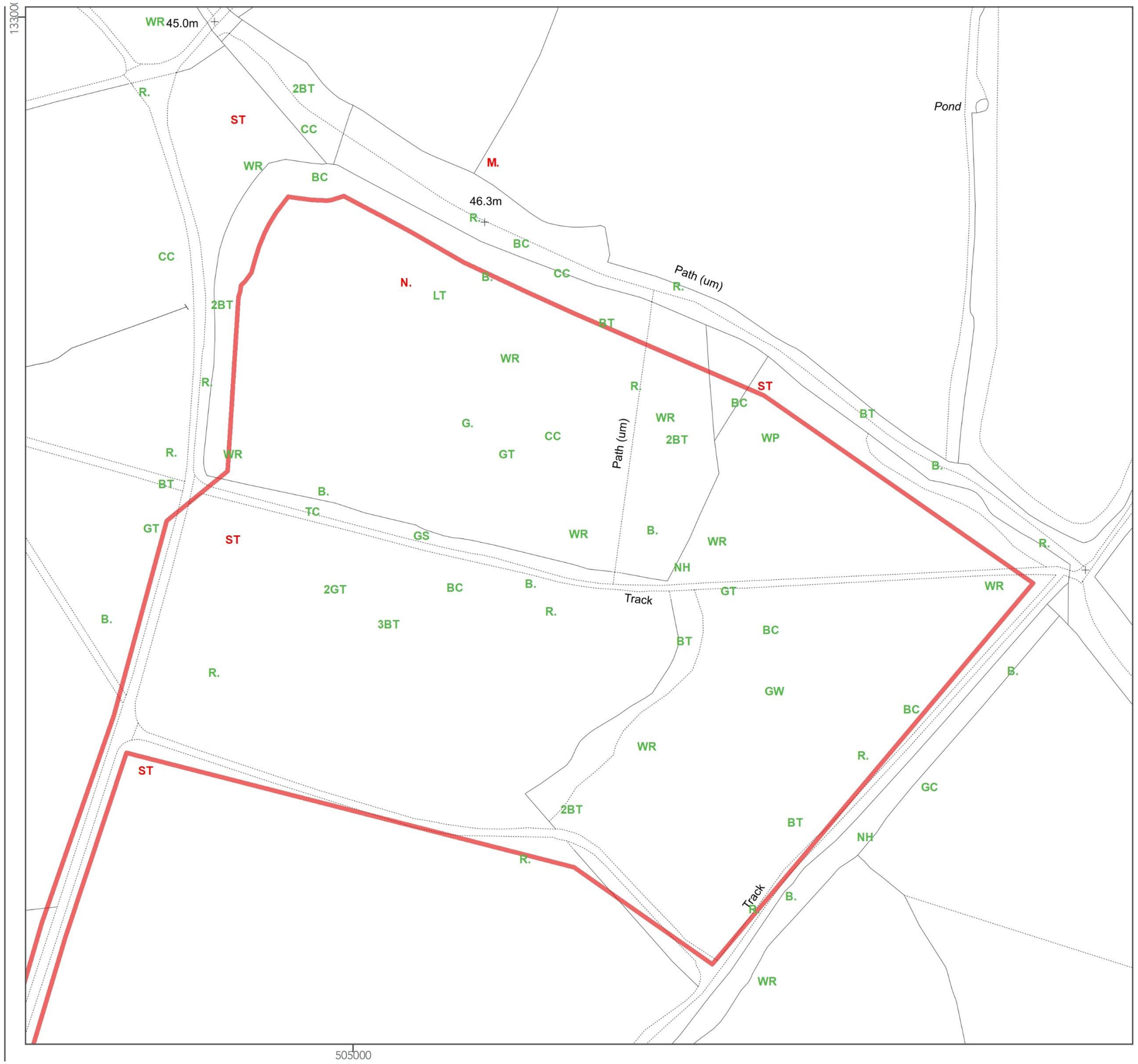
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

BBS Territories, Loxwood Clay Pits

Red line boundary

Sp. Territories, red list

Sp. Territories, green list



0 60 120

Meters

N

Scale: 1:1,700 **Created by:** AD

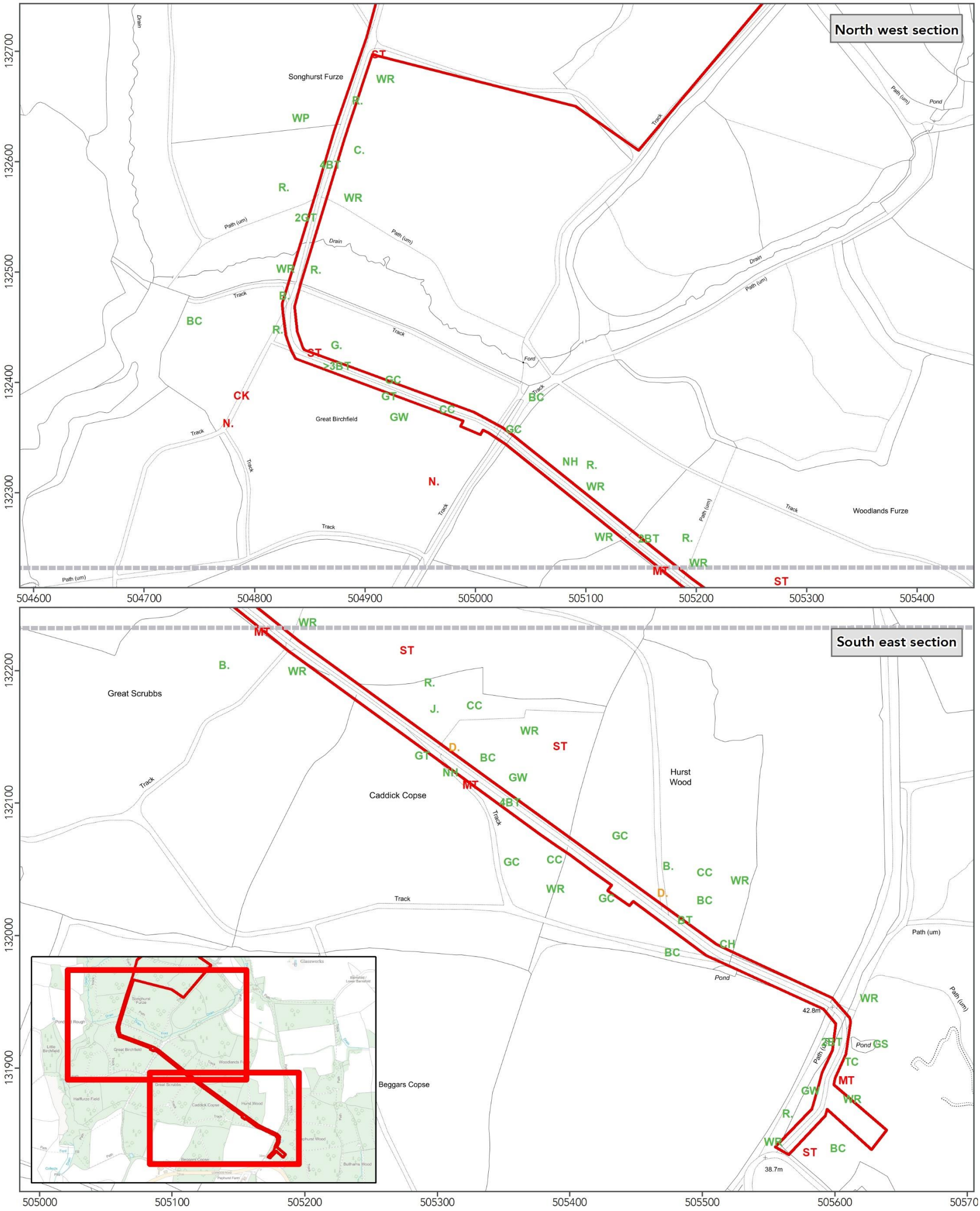
Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BBS_Territories_A3DevSite_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk



BBS Territories, Access route, Loxwood

- Red line boundary
- Extent marker
- **Sp.** Territories, red list
- **Sp.** Territories, amber list
- **Sp.** Territories, green list

0 110 220 Meters

N

Scale: 1:3,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BBS_Territories_Access210524

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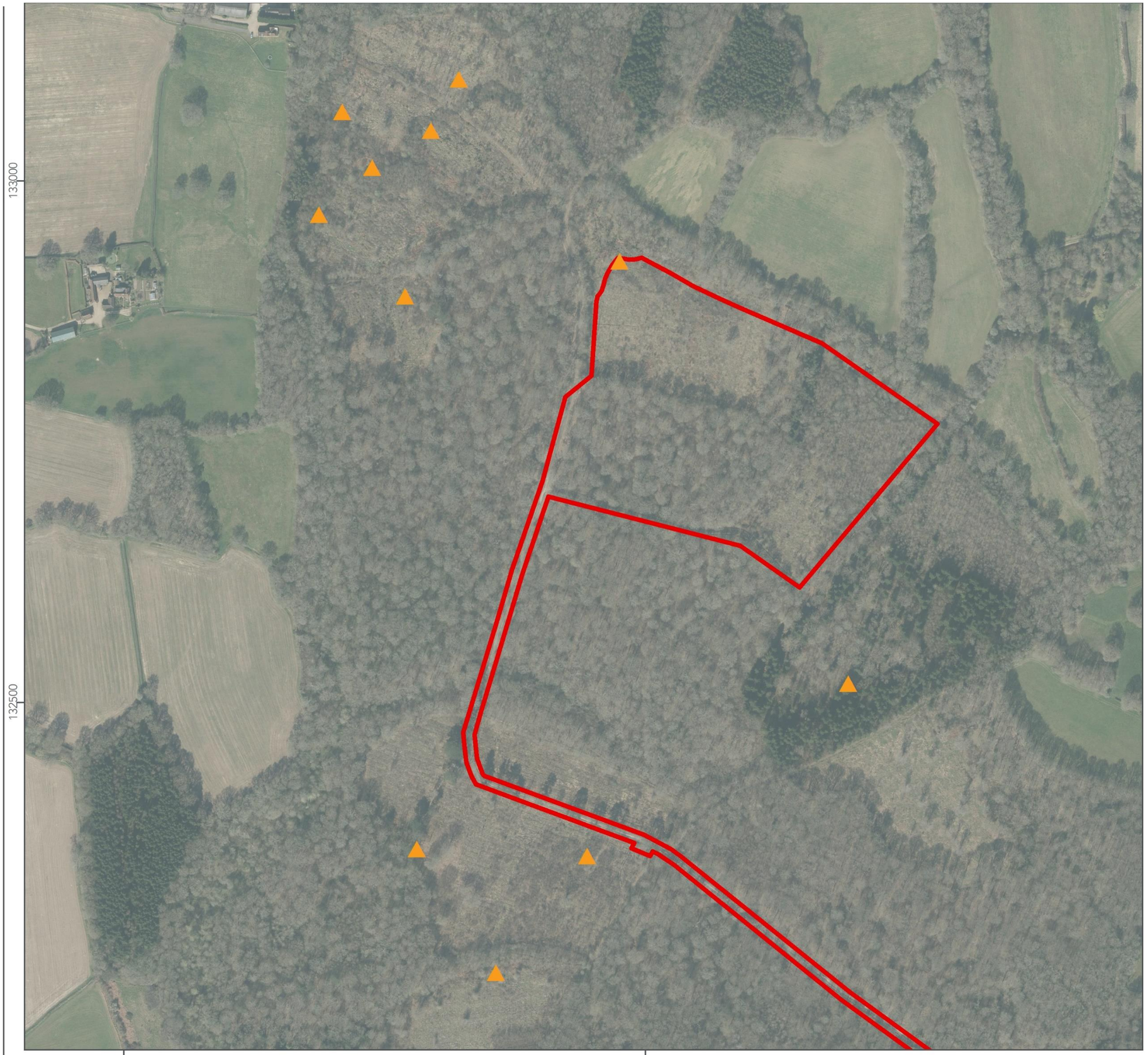
Loxwood Clay Pits, West Sussex

Red line boundary

Singing male nightingale 20-04-2020



0 150 300

Meters

N

Scale: 1:4,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-Nightingale210524

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Appendix V: Wintering Bird Survey Plans

The plans listed below are presented on the following pages.

Drawing no.	Data presented
UE0363ECO-BirdSurveyTransect210524	Breeding & wintering bird surveys transect route
UE0363ECO-WBS_A3DevSite_Nov_210524 UE0363ECO-WBS_A3DevSite_Dec_210524 UE0363ECO-WBS_A3DevSite_Jan_210524 UE0363ECO-WBS_A3DevSite_Feb_210524 UE0363ECO-WBS_Access_Nov_210524 UE0363ECO-WBS_Access_Dec_210524 UE0363ECO-WBS_Access_Jan_210524 UE0363ECO-WBS_Access_Feb_210524	Results of the winter bird surveys in November/December 2020 and January/February 2021 for both the Proposed Development Site and access route

Conservation status and BTO code for birds recorded during the surveys

Common name	Scientific name	BTO code	Status
Starling	*Sturnus vulgaris*	SG	Red, s41
Song thrush	*Turdus philomelos*	ST	Red, s41
Mistle thrush	*Turdus viscivorus*	M.	Red
Marsh tit	*Poecile palustris*	MT	Red, s41
Nightingale	*Luscinia megarhynchos*	N.	Red
Cuckoo	*Cuculus canorus*	CK	Red, s41
Dunnock	*Prunella modularis*	D.	Amber, s41
Redwing	*Turdus iliacus*	RE	Red, Sch.1
Fieldfare	*Turdus pilaris*	FF	Red, Sch.1
Lesser redpoll	*Acanthis cabaret*	LR	Red, s41
Woodcock	*Scolopax rusticola*	WK	Red, s41
Hobby	*Falco subbuteo*	HY	Green, Sch.1
Woodpigeon	*Columba palumbus*	WP	Green
Collared dove	*Streptopelia decaocto*	CD	Green
Green woodpecker	*Picus viridis*	G.	Green
Great spotted woodpecker	*Dendrocopos major*	GS	Green
Magpie	*Pica pica*	MG	Green
Jay	*Garrulus glandarius*	J.	Green
Carrion crow	*Corvus corone*	C.	Green

Common name	Scientific name	BTO code	Status
Rook	*Corvus frugilegus*	RO	Green
Jackdaw	*Corvus monedula*	JD	Green
Blue tit	*Cyanistes caeruleus*	BT	Green
Great tit	*Parus major*	GT	Green
Coal tit	*Periparus ater*	CT	Green
Long tailed tit	*Aegithalos caudatus*	LT	Green
Garden warbler	*Sylvia borin*	GW	Green
Black cap	*Sylvia atricapilla*	BC	Green
Whitethroat	*Sylvia communis*	WH	Green
Wren	*Troglodytes troglodytes*	WR	Green
Nuthatch	*Sitta europaea*	NH	Green
Treecreeper	*Certhia familiaris*	TC	Green
Blackbird	*Turdus merula*	B.	Green
Robin	*Erithacus rubecula*	R.	Green
Chiff chaff	*Phylloscopus collybita*	CC	Green
Chaffinch	*Fringilla coelebs*	CH	Green
Goldfinch	*Carduelis carduelis*	GO	Green
Goldcrest	*Regulus regulus*	GC	Green
Siskin	*Carduelis spinus*	SK	Green
Grey heron	*Ardea cinerea*	H.	Green

Sch.1 Wildlife and Countryside Act 1981 Schedule 1 Bird

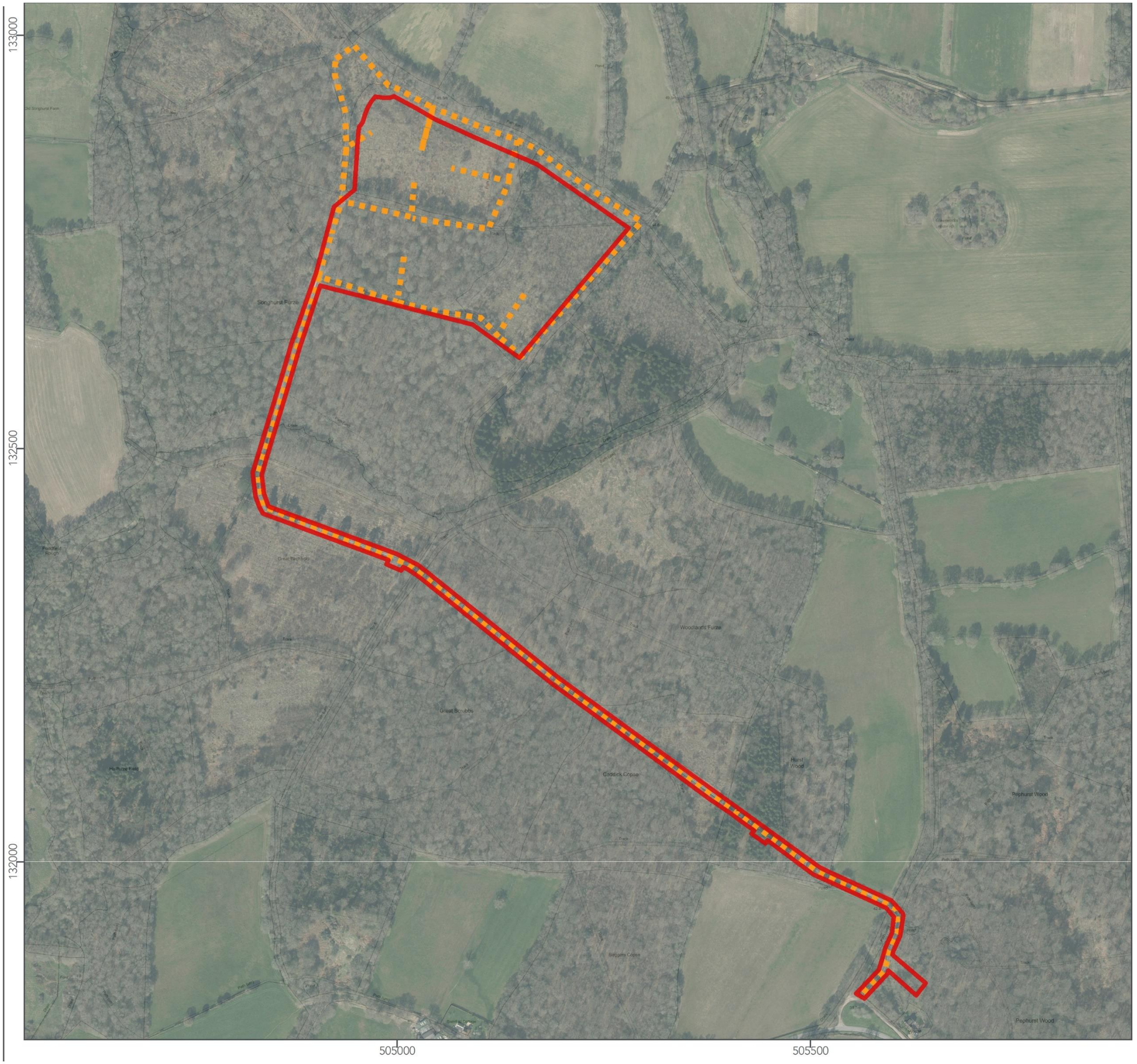
s41 Natural Environment & Rural Communities Act 2006 Section 41 Species of Principal Importance

Red/Amber/Green Birds of Conservation Concern 4 (Eaton *et al.*, 2015))

Loxwood Clay Pits, West Sussex

Red line boundary

Breeding and wintering bird transect



0 190 380

Meters

N

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

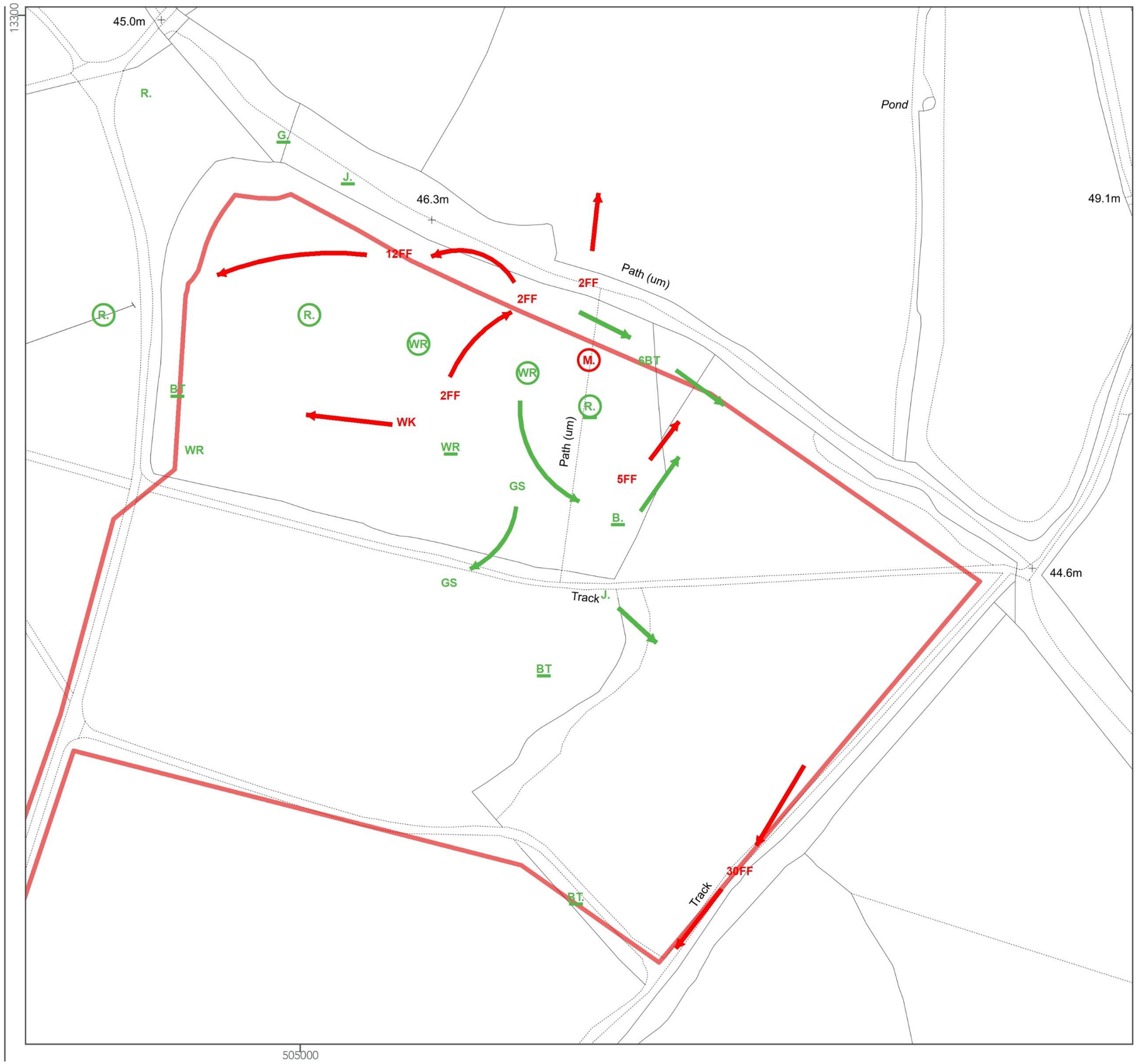
UE0363ECO-BirdSurveyTransect210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

WBS November, Loxwood Clay Pits,

- Red line boundary
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, green list
- Bird movement, red list
- Bird movement, green list



0 60 120 N

Meters

Scale: 1:1,700 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-WBS_A3DevSite_Nov_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

WBS December, Loxwood Clay Pits

- Red line boundary
- **Sp.** Species, red list
- **Sp.** Species, green list
- **Sp.** Calling bird, red list
- **Sp.** Calling bird, green list
- Bird movement, green list
- Bird movement, red list

0 60 120 N

Meters

Scale: 1:1,700 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

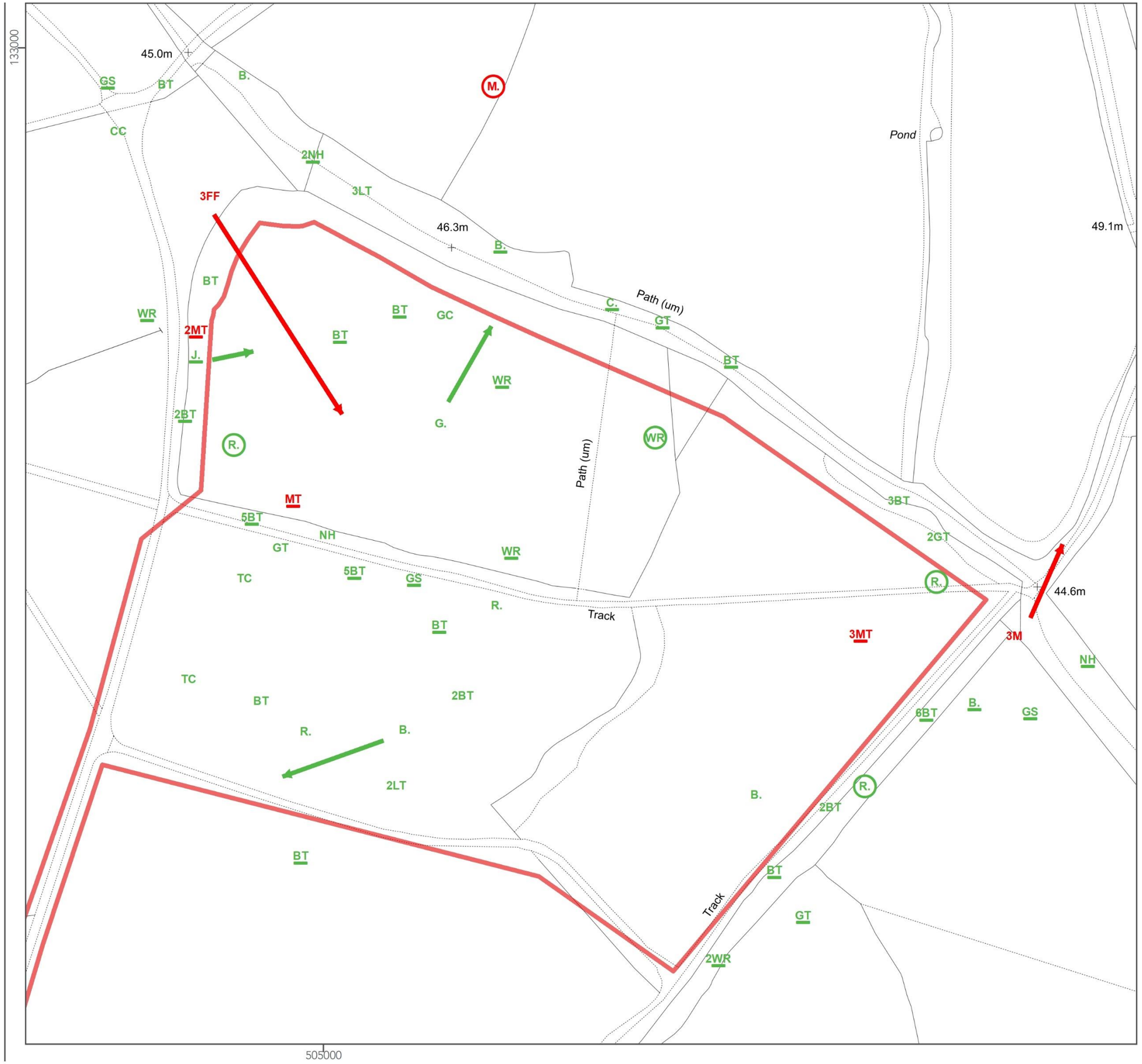
UE0363ECO-WBS_A3DevSite_Dec_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

WBS January, Loxwood Clay Pits

- Red line boundary
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, red list
- Sp. Calling bird, green list
- Sp Bird in song, red list
- Sp Bird in song, green list
- Bird movement, red list
- Bird movement, green list



0 60 120 N

Meters

Scale: 1:1,750 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

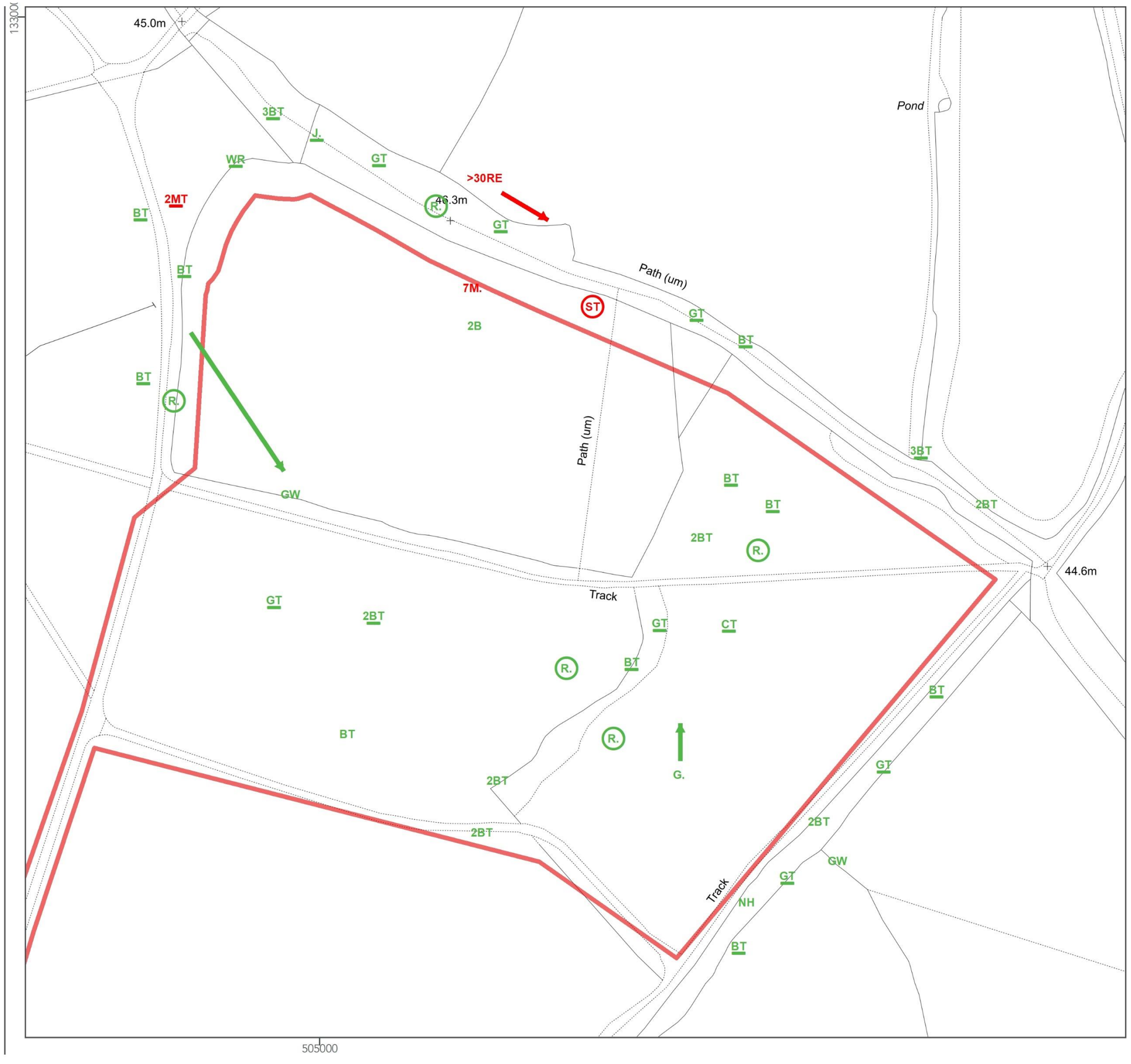
UE0363ECO-WBS_A3DevSite_Jan_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

WBS February, Loxwood Clay Pits

- Red line boundary
- Sp. — Species, red list
- Sp. — Species, green list
- Sp. — Calling bird, red list
- Sp. — Calling bird, green list
- (Sp) — Bird in song, red list
- (Sp) — Bird in song, green list
- Bird movement, green list
- Bird movement, red list



0 60 120 Meters

N

Scale: 1:1,700 **Created by:** AD

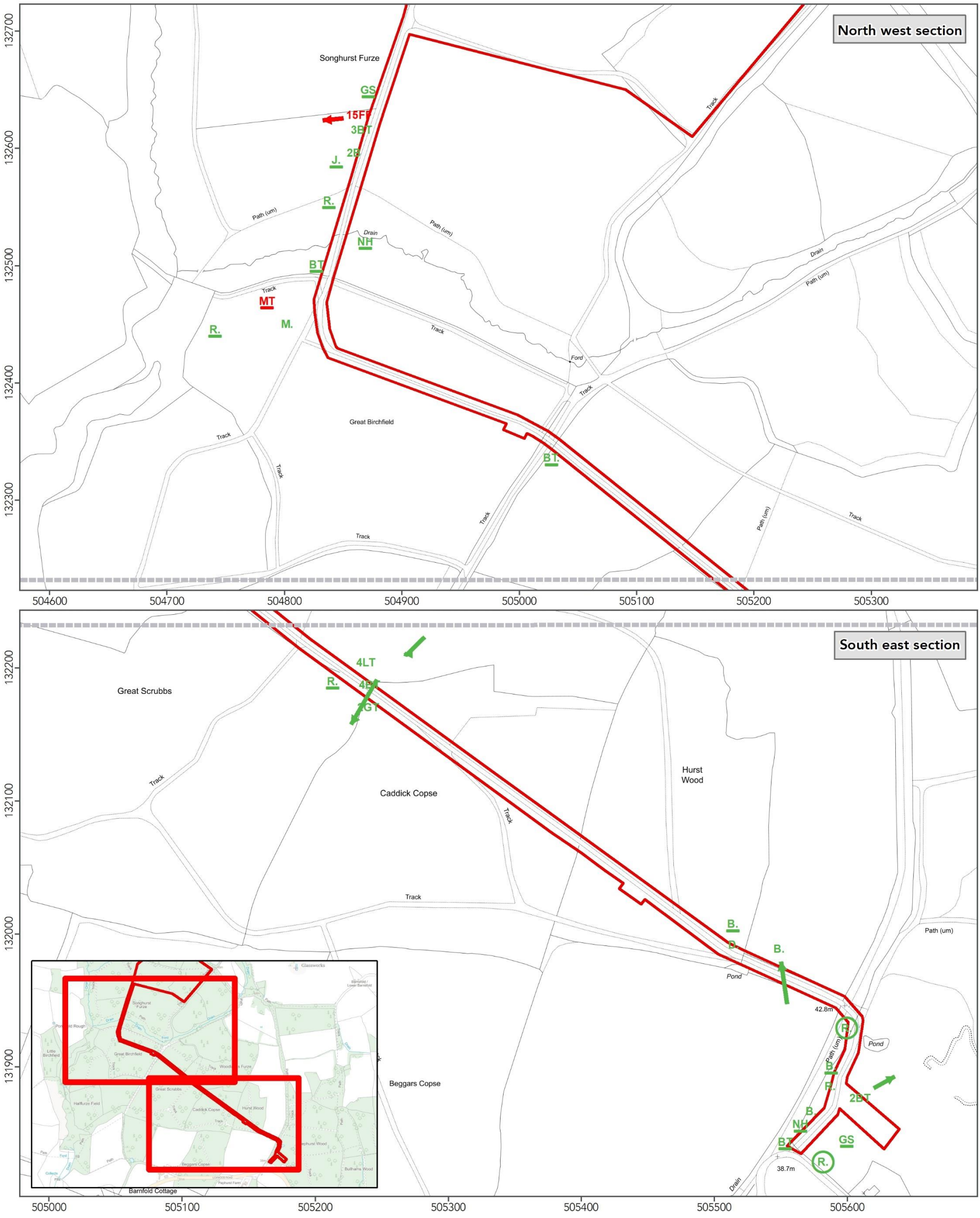
Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-WBS_A3DevSite_Feb_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk



WBS November, Access route, Loxwood

- Red line boundary
- Extent marker
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, green list
- Sp Bird in song, green list
- Bird movement, green list

0 110 220 Meters

N

Scale: 1:3,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-WBS_Access_Nov_210524

URBAN EDGE ENVIRONMENTAL CONSULTING

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Email: hello@ueec.co.uk
Web: www.ueec.co.uk

North west section

2BT
BT
2BT
Drain
NH
3BT
2GS
5LT
C.
BT
Track
B.
CH
Track
BT
WR
Ford
Track
BT
Great Birchfield
R.
GT
Path (um)
Path (um)
Track
Track
Track

132600
132500
132400
132300
504700
504800
504900
505000
505100
505200

South east section

Track
J.
WP
GT
30FF
Pond
2B
WR
42.8m
Path (um)
Path (um)
Pond
H.
GT
3BT
WR
38.7m
Drain

132000
131900
505300
505400
505500
505600
505700

WBS December, Access route, Loxwood

- Red line boundary
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, red list
- Sp. Calling bird, green list
- Sp. Bird in song, green list
- Bird movement, red list

0 75 150 Meters

N

Scale: 1:2,000 **Created by:** AD
Date: May 2021 **Reviewed by:** NP
Drawing number:
UE0363ECO-WBS_Access_Dec_210524

URBAN EDGE ENVIRONMENTAL CONSULTING
Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

North west section

Songhurst Furze
Great Birchfield
Woodlands Furze
Track
Path (um)
Drain
Ford
Pond
BT
WR
R.
B.
6S
GT
C.
2BT
H.
TC
3B
3R
D.
42.8m
38.7m

132700
132600
132500
132400
132300

504600 504700 504800 504900 505000 505100 505200 505300 505400

South east section

Great Scrubbs
Caddick Copse
Hurst Wood
Barnfold Cottage
Track
Path (um)
Pond
Drain
WR
ST
R.
2BT
BT
H.
GT
TC
3B
3R
D.
42.8m
38.7m

132200
132100
132000
131900

505100 505200 505300 505400 505500 505600 505700

WBS January, Access route, Loxwood

- Red line boundary
- Bird movement, green list
- Extent marker
- Sp. Species, red list
- Sp. Species, amber list
- Sp. Species, green list
- Sp. Calling bird, green list
- (Sp) Bird in song, green list

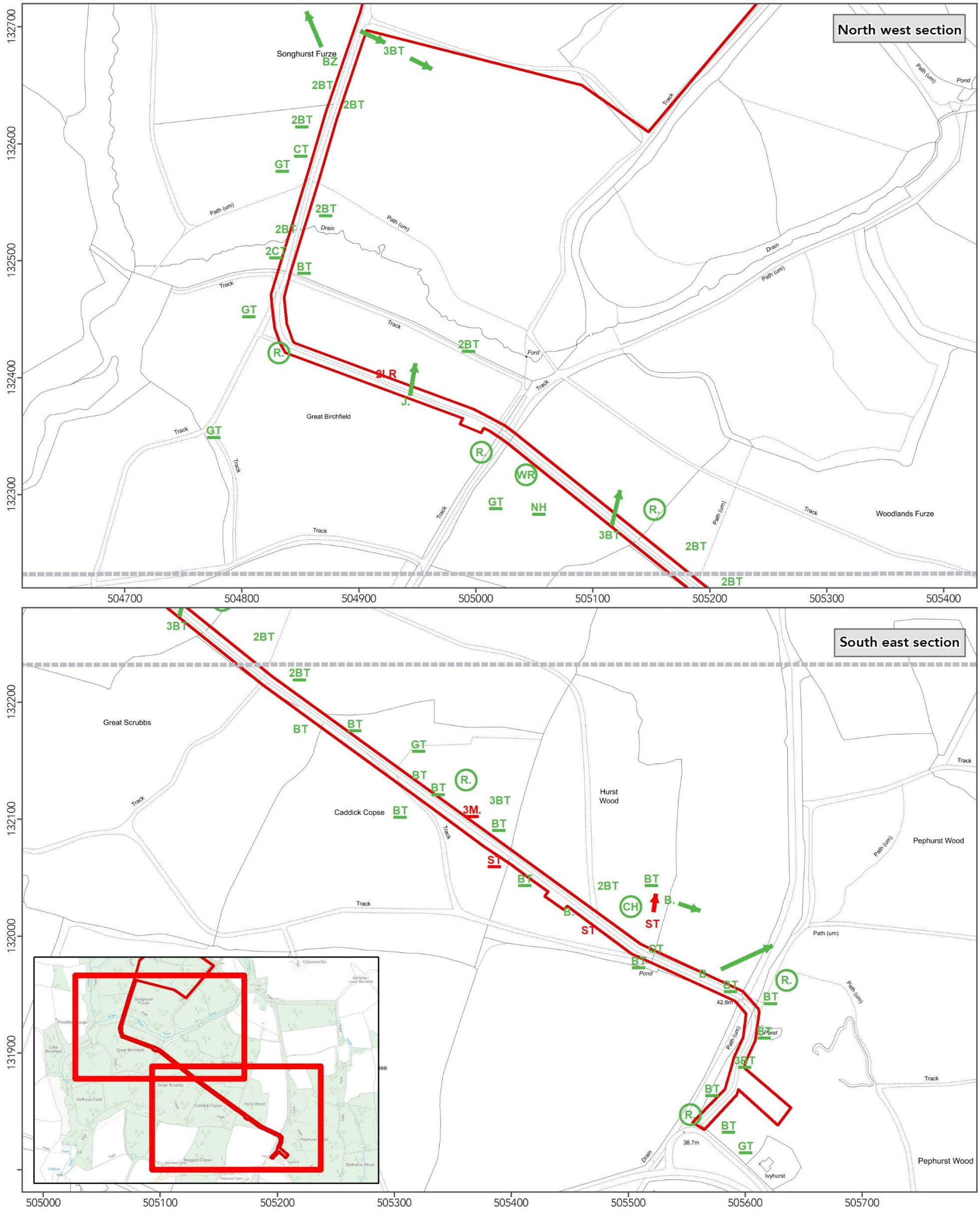
0 110 220 Meters

N

Scale: 1:3,000 **Created by:** AD
Date: May 2021 **Reviewed by:** NP
Drawing number:
UE0363ECO-WBS_Access_Jan_210524

URBAN EDGE ENVIRONMENTAL CONSULTING
Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

WBS February, Access route, Loxwood



- Red line boundary
- Extent marker
- Sp. Species, red list
- Sp. Species, green list
- Sp. Calling bird, red list
- Sp. Calling bird, green list
- Sp. Bird in song, red list
- Sp. Bird in song Green
- Bird movement, red list
- Bird movement, green list

0 125 250 Meters

N

Scale: 1:3,400 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-WBS_Access_Feb_210524

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Appendix VI: Badger Survey Plan

Please see insert.

Loxwood Clay Pits, West Sussex

Red line boundary

Running water

Semi natural broadleaf woodland

Broadleaved plantation

Coniferous plantation

Ancient woodland

Ancient re-planted woodland

Badger survey

Mammal burrow

Snuffle hole

0 150 300

Meters

N

Scale: 1:4,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-A3Badger_2_210521

URBAN EDGE ENVIRONMENTAL CONSULTING

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Email: hello@ueec.co.uk
Web: www.ueec.co.uk

Appendix VII: Trees with Roosting Bat Potential

Preliminary Roost Assessment of trees
T1: Oak
Description
Moderate suitability oak tree
Evidence of bats
None
Potential roost features (PRF)
Woodpecker hole 8m south west, tear out 16m up south west
Overall suitability for roosting bats
Moderate
T2: Oak
Description
Oak tree
Evidence of bats
None
Potential roost features (PRF)
Rot hole in stem 9m west, split & shorn limb 9m north
Overall suitability for roosting bats
Moderate
T3: Oak
Description
Live tree
Evidence of bats
None
Potential roost features (PRF)
Large central cavity in occlusion
Overall suitability for roosting bats
High
T4: Oak
Description
Dead tree
Evidence of bats

Preliminary Roost Assessment of trees
None
Potential roost features (PRF)
Several cavities towards base
Overall suitability for roosting bats
High
T5: Oak
Description
Live tree
Evidence of bats
None
Potential roost features (PRF)
Tear out occlusion
Overall suitability for roosting bats
Low
T6: Oak
Description
Alive tree
Evidence of bats
None
Potential roost features (PRF)
Woodpecker hole
Overall suitability for roosting bats
Moderate
T7: Oak
Description
Partially dead
Evidence of bats
None
Potential roost features (PRF)
possible hollow in centre from a broken limb or rot hole
Overall suitability for roosting bats
Moderate
T8: Oak
Description
Alive

Preliminary Roost Assessment of trees
Evidence of bats
None
Potential roost features (PRF)
Ivy covering
Overall suitability for roosting bats
Low
T9: Oak
Description
Some dead branches
Evidence of bats
None
Potential roost features (PRF)
hole in trunk to north and lifted bark on dead limbs to South east
Overall suitability for roosting bats
Moderate
T10: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Bark occlusion 4m long on underside
Overall suitability for roosting bats
Low
T11: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Woodpecker hole
Overall suitability for roosting bats
Low

Preliminary Roost Assessment of trees
T12: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Woodpecker hole / flaking bark / split limb
Overall suitability for roosting bats
Moderate
T13: Oak
Description
some dead branches
Evidence of bats
None
Potential roost features (PRF)
cracks in dead limbs to north two holes north and south southern cavity optimal
Overall suitability for roosting bats
Moderate
T14: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Split limbs
Overall suitability for roosting bats
Low
T15: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Two cracked and deeply fissured limbs to east creating cavities tree 24m high prf's at 6m and 8m high
Overall suitability for roosting bats

Preliminary Roost Assessment of trees
Moderate
T16: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Split & occlusion
Overall suitability for roosting bats
Low
T17: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Long central crack 8-18m
Overall suitability for roosting bats
Low
T18: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Woodpecker holes
Overall suitability for roosting bats
Moderate
T19: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Two cracked limbs, one rot hole in main trunk, all south 26m high prfs 8-10m high

Preliminary Roost Assessment of trees
Overall suitability for roosting bats
Moderate
T20: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Flaking bark
Overall suitability for roosting bats
Low
T21: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Woodpecker hole
Overall suitability for roosting bats
Low
T22: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Split & occlusion
Overall suitability for roosting bats
Low
T23: Oak
Description
Dead
Evidence of bats
None
Potential roost features (PRF)

Preliminary Roost Assessment of trees
Dead possibly hollow branch to south same to north
Overall suitability for roosting bats
Low
T24: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Split & occlusion
Overall suitability for roosting bats
Low
T25: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
5 plus large woodpecker holes west facing
Overall suitability for roosting bats
Moderate
T26: Oak
Description
Alive, some dead parts
Evidence of bats
None
Potential roost features (PRF)
Hollow limb
Overall suitability for roosting bats
Moderate
T27: Oak
Description
mostly dead
Evidence of bats
None

Preliminary Roost Assessment of trees
Potential roost features (PRF)
Hole in hollow limb and lifted bark
Overall suitability for roosting bats
Moderate
T28: Oak
Description
Mostly dead
Evidence of bats
None
Potential roost features (PRF)
Rot holes from old branches and large crack
Overall suitability for roosting bats
Moderate
T29: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Cavity in limb, nearly over hanging trackway
Overall suitability for roosting bats
Low
T30: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Holes in limbs heading towards trackway
Overall suitability for roosting bats
Low
T31: Conifer
Description
Alive
Evidence of bats

Preliminary Roost Assessment of trees
None
Potential roost features (PRF)
Flakey bark
Overall suitability for roosting bats
Low
T32: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Flakey bark
Overall suitability for roosting bats
Low
RT1: Oak
Description
Partially dead
Evidence of bats
None
Potential roost features (PRF)
Number of rot holes in east facing limb at c.8m height
Overall suitability for roosting bats
Moderate
RT2: Oak
Description
Dead
Evidence of bats
None
Potential roost features (PRF)
Hole in stem to west
Overall suitability for roosting bats
Moderate
RT3: Oak
Description
Partially dead

Preliminary Roost Assessment of trees
Evidence of bats
None
Potential roost features (PRF)
Cracked branches
Overall suitability for roosting bats
Moderate
RT4: Oak
Description
Partially dead
Evidence of bats
None
Potential roost features (PRF)
Broken limbs forming a cavity
Overall suitability for roosting bats
Moderate
RT5: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Dense ivy cover
Overall suitability for roosting bats
Low
RT6: Oak
Description
Alive
Evidence of bats
None
Potential roost features (PRF)
Two holes in stem
Overall suitability for roosting bats
Moderate

Appendix VIII: Bat Survey Plans

The plans listed below are presented on the following pages.

Drawing no.	Data presented
UE0363ECO-BatSurveyTransects210521	Foraging & commuting bat survey transect routes
UE0363ECO-BatSurveyRemoteDetectorLocations210521	Remote bat detector deployment locations
UE0363ECO-BatSurveyTransectsPeakActivity210524	Features observed during transect surveys to be of moderate/high value to foraging & commuting bats
UE0363ECO-BatSurveyRemoteDetectorsResults210521	Remote bat detector deployment locations, each represented by a pie chart of proportionate size to the number of bat passes per hour recorded during 5 nights monitoring, by species

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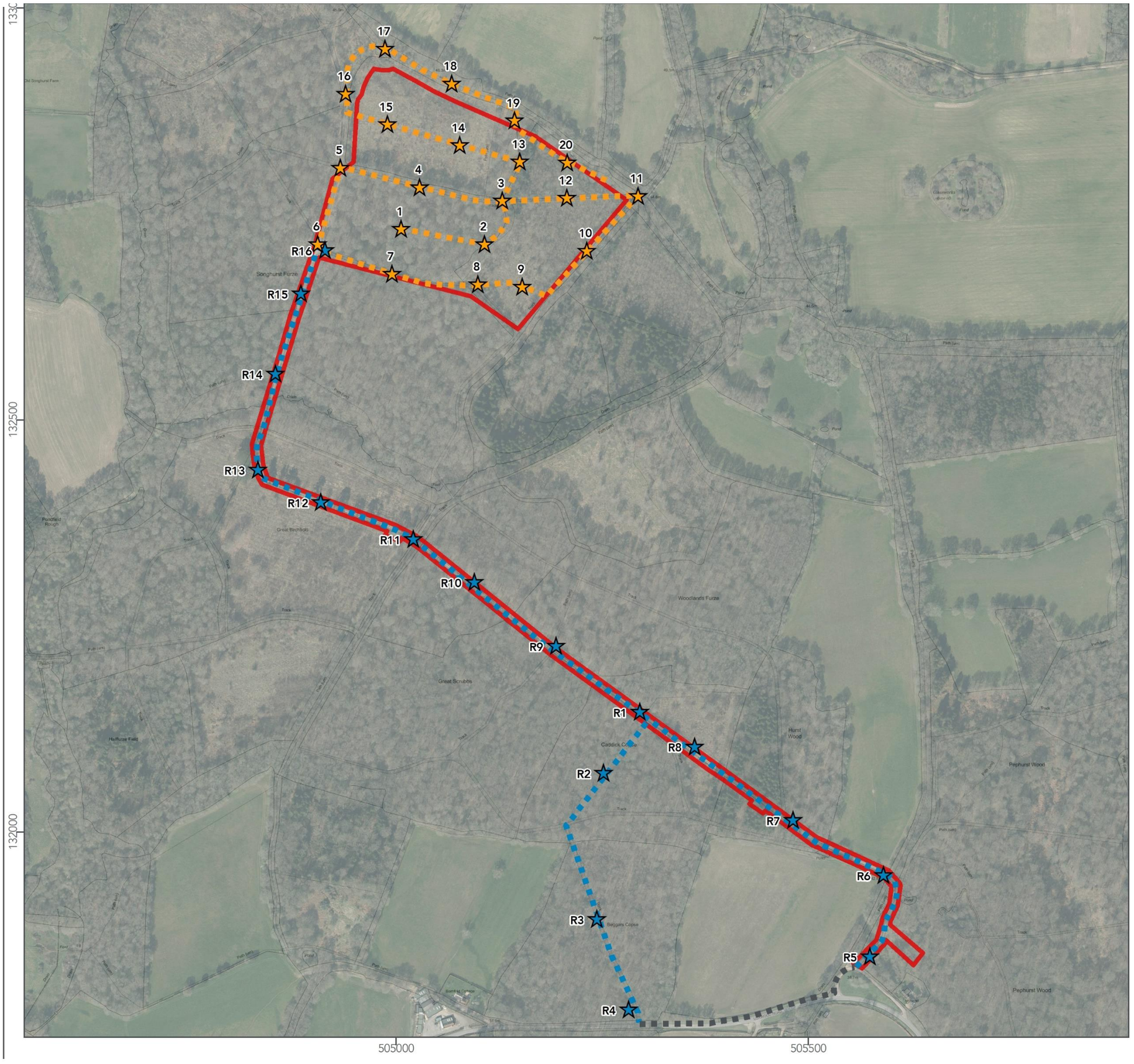
Loxwood Clay Pits, West Sussex

- Red line boundary
- Bat transect point: site
- Bat transect point: access
- Bat transect: site
- Bat transect: access
- Bat transect: access (not surveyed)



0 190 380

Meters

N

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BatSurveyTransects210521

URBAN EDGE ENVIRONMENTAL CONSULTING

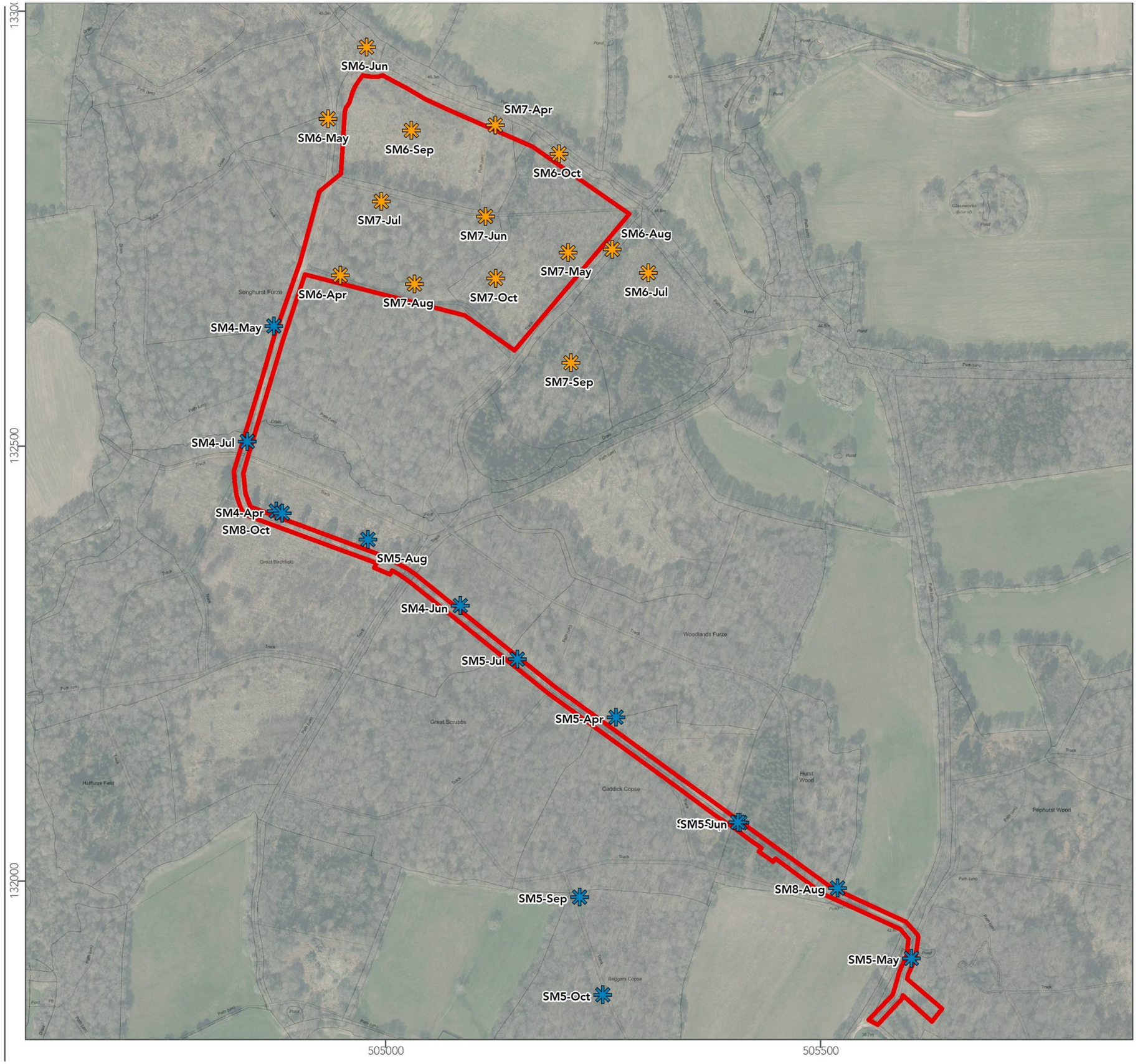
Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

Loxwood Clay Pits, West Sussex

Red line boundary

Remote bat detectors: site

Remote bat detectors: access



0 180 360

Meters

N

Scale: 1:4,750 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BatSurveyRemoteDetectorLocations210521

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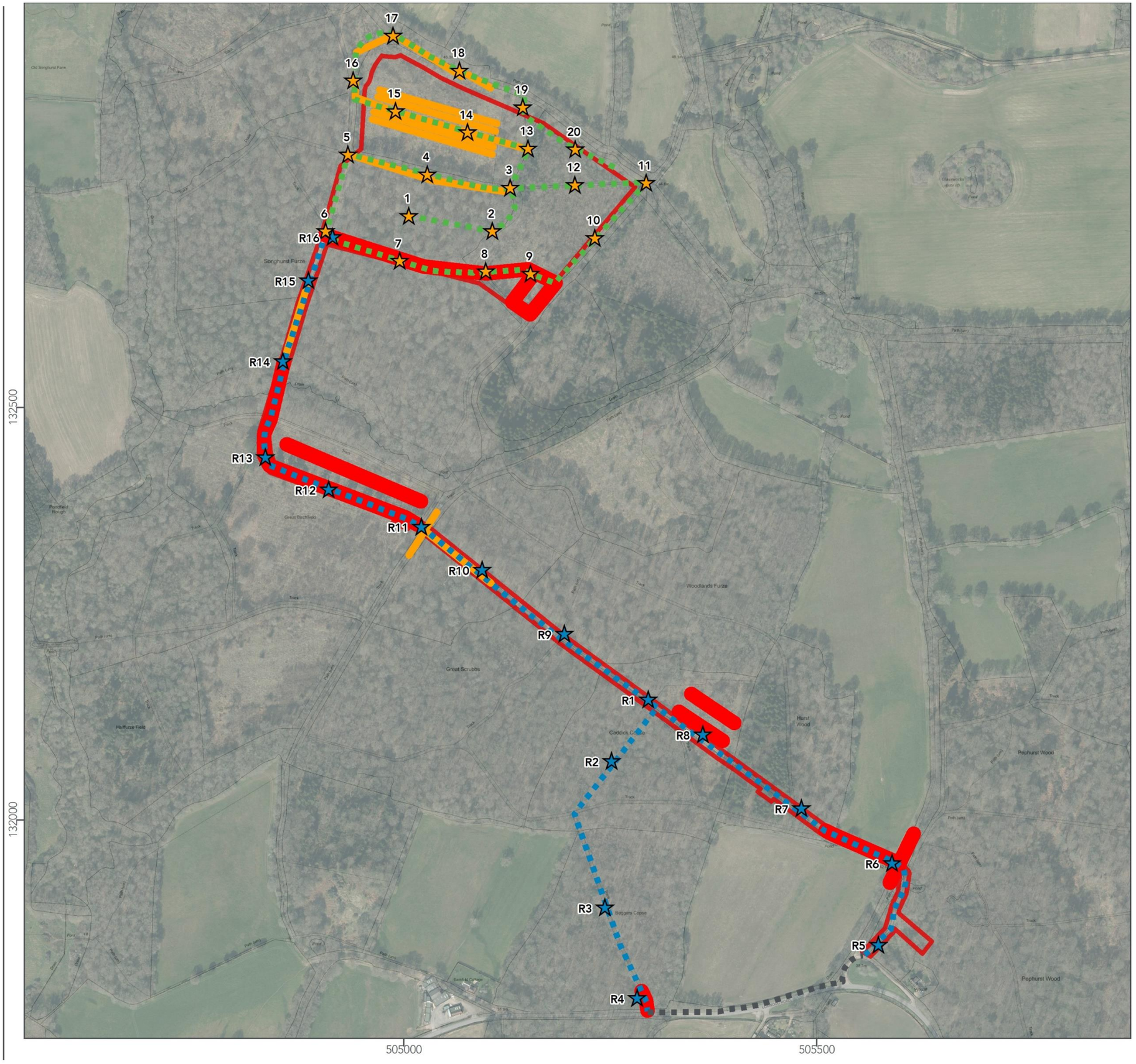
Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

Loxwood Clay Pits, West Sussex

- Red line boundary
- Bat transect point: main site
- Bat transect point: access
- Bat transect: main site
- Bat transect: access
- Bat transect: access (not surveyed)
- Bat transect: high activity
- Bat transect: moderate activity



0 190 380

Meters

N

Scale: 1:5,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BatSurveyTransectsPeakActivity210524

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Loxwood Clay Pits, West Sussex

Red line boundary

Species composition & abundance, remote detector locations

460

Equivalent chart size represents 64 bpph

- PIPI
- PIPY
- MYSP
- BABA
- NYNO
- MYBE/DA
- EPSE
- MYMY/BR
- NYLE
- NYSP
- PLAU
- PINA

0 225 450

Meters

N

Scale: 1:6,000 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-BatSurveyRemoteDetectorsResults210521

URBAN EDGE ENVIRONMENTAL CONSULTING

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Appendix IX: Bat Survey Results

Abbreviations:

BABA	Barbastelle	EPSE	Serotine	MYBE	Bechstein's
MYBR	Brandt's	MYDA	Daubenton's	MYMY	Whiskered
MYNA	Natterer's	MYsp	*Myotis* sp.	NYLE	Leisler's
NYNO	Noctule	PINA	Nathusius' pipistrelle	PIPI	Common pipistrelle
PIPY	Soprano pipistrelle	PIsp	Pipistrelle sp.	PLAU	Brown long-eared
RHFE	Greater horseshoe	RHHI	Lesser horseshoe		

April 2020: dusk

Survey 1: Dusk, 20/04/20			
Sunset/sunrise: 20:07	**Start time:** 20:05	**End time:** 22:05	**Precipitation:** None
Air temp start: 13°C	**Air temp end:** 11°C	**Wind:** Moderate NE	**Cloud cover:** 0%
Equipment: Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R1	20.06–20.10								No bats
R2	20.13–20.17								No bats
R3	20.20–20.24								No bats
R4	20.27–20.31	PIPI	2	15+		F		S	Foraging continuously at canopy height over clearing
R5	20.37–20.41								No bats
R5-6	20.37	PIPY	1	1		C		N	
R5-6	20.38–20.41	PIPY	1	18		F		N	
5-6	20.41	BABA	1	1		C		N	
5-6	20.42	PIPY	1	2		F		N	
R6	20.43	PIPY	1	1		F		S	Along ride
R6	20.45-20.46	PIPI	2	12		F		S	Along ride
R6	20.46	PIPY	1	1		F		S	Along ride

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R6-7	20.48-20.50	PIPI	1	7		F		S	Along track over field
R7	20.51-20.55								No bats
R7	20.54	MYDA	1	1		C		N	Brief
R7	20.54	PIPI	1	1		C		N	Brief
R8	21.00-21.04								No bats
R1	21.10	PIPI	1	1		C		N	
R9	21.14-21.18	PIPY	1?	13		C	Y	N	Regularly spaced passes, possible commuting route
R9-10	21.19	PIPY	1?	5		C+F	Y	N	Possible commuting route
R10	21.20-21.24	PIPY	1?	7		C+F	Y	N	
R11-12	21.30	BABA	1	1		C		N	Not recorded
R12	21.33	BABA	1	1		C		N	
R13	21.36-21.40								No bats
R14	21.42	BABA	1	2		C		N	
R14	21.44	BABA	1	1		C		N	
R14	21.45	BABA	1	1		C		N	
R14	21.46	PIPI	1	1		C		N	
R14	21.47	PLAU	1	1		C		N	
R14	21.47	BABA	1	1		C		N	
R14	21.48	BABA	1?	4		C		N	
R14-15	21.49	BABA	1	1		C		N	
R15	21.51	BABA	1	1		C		N	
R15	21.52	BABA	1	1		C		N	
R15	21.54	BABA	1	1		C		N	
R15	21.55	BABA	1	2		C		N	
R15	21.55	PIPI	1	1		C		N	
R16	21.57-21.59	PIPY	1?	Many		F	Y	N	
R16	21.59	BABA	1	1		C		N	
R16	22.00	MYSP	1	1		C		N	
R16	22.00	PIPY	1?	Many		F		N	
R16	22.00	BABA	1	1		C		N	
R16	22.01	PIPI	1	1		C		N	
R16	22.01	PIPY	1?	Many		F		N	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
1	20.05-20.09	None							No bats
2	20.13-20.17	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
3	20.20-20.24	None							No bats
4	20.26-20.30	None							No bats
5	20.32-20.36	None							No bats
6	20.38	PIPY	1	1		C		S	Commuting along track
6	20.39	PIPY	1	1		C		S	Commuting along track
6	20.40	PIPY	1	1		C+F		S	Foraging along track
6	20.42	PIPY	1	1		C+F		S	Commuting along track
6	20.43	PIPY	1	1		F		S	Foraging out of woodland
7	20.44	PIPY	1	1		F		NS	
7	20.45	PIPY	1	3		F		S	Foraging up and down tree line
8	20.50-20.54	None							No bats
9	20.58-21.02	None							No bats
10	21.04-21.08	None							No bats
11	21.14	PIPY	1	1				NS	
11	21.15	MYSP	1	1				NS	
12	21.18-21.20	PIPY	1	5			Y	NS	
12	21.22	PIPI	1	1				NS	
13	21.23	PIPI	1	1				NS	
13	21.24	PIPI	1	3				NS	
13	21.25	PIPI	1	1				NS	
13	21.27	PIPI	1	2				NS	
14	21.30-21.34	None							No bats
15	21.37-21.41	None							No bats
16	21.44	BABA	1	1				NS	
16	21.45	BABA	1	1				NS	
16	21.46	PIPY + MYSP	1	2				NS	
16	21.47	PIPY	1	1		C		NS	
17	21.50-21.54	None							No bats
18	21.56-22.00	None							No bats
19	22.02	PIPY	1	1				NS	
19	22.04	PIPI	1	1				NS	
20	22.09	PIPI	1	1				NS	

May 2020: dusk

Survey 2: Dusk 11/05/20			
Sunset/sunrise: 20.39	**Start time:** 20.39	**End time:** 22.39	**Precipitation:** None
Air temp start: 10°C	**Air temp end:** 9°C	**Wind:** B1 NE	**Cloud cover:** 60%
Equipment: Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R16	20.39-20.43	None							No bats
R15	20.44-20.48	None							No bats
R14	20.50-20.54	None							No bats
R13	20.57-21.01	None							No bats
R12	21.03-21.07	None							No bats
R11	21.13	PIPI	1	1		C		NS	
R10	21.17	PIPI	1	1		C		S	W-E Along track
R10	21.18	PIPI	1	1		C		S	W-E Along track
R10	21.20	MYSP	1	2		C		NS	
R10-9	21.20-21.23	PIPI + PIPY	1?	6		F		S	Over track
R9	21.24	MYSP	1	1		C		NS	Distant
R9	21.25-21.26	PIPI	1+	3		F+C		NS	
R9-R1	21.29	PIPI	1	1		C		NS	
R1	21.30	PIPI	1	1		C		NS	
R1	21.32	PIPI	1	1		C		NS	
R8	21.36-21.40	None							No bats
R7	21.45	MYSP	1	1		C		NS	
R6	21.51	PIPI	1	1		C		NS	
R6	21.52	PIPY	1	1		C		NS	
R5	21.56	PIPY	1	1		C		NS	
R5	21.59	PIPI	1	1		C		NS	Distant
R5	22.00	PIPI	1+	2		F		NS	
R4	22.06	PLAU	1	1				NS	
R4	22.10-22.11	MYSP	1+	3		C		NS	
R4-R3	22.12	PIPI	1	1		C		NS	
R3	22.15	PIPY	1	1		C		NS	

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R2	22.26	PIPI	1	1		F		NS	
R1	22.34-22.37	PIPI	1+	7		F		NS	
R1	22.36	MYSP	1	1		C		NS	
R1	22.37	PIPY	1+	3		F		NS	
R1	22.37	PIPI	1+	2		F		NS	
R1	22.38-22.39	PIPY	1+	2		F		NS	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
20	20.40-20.43	None							No bats
19	20.45-20.48	None							No bats
18	20.51-20.54	None							No bats
17	20.56-20.59	None							No bats
16	21.01-21.04	None							No bats
15	21.06-21.09	None							No bats
14	21.11-21.14	None							No bats
13	21.18	PIPI	1	1				NS	
13	21.18	PIPI	1	1				NS	Distant
13	21.19-21.21	PIPI	1	6		F		S	Foraging in canopy
13	21.22	PIPY	1	3				NS	
13	21.24	PIPI	1	1				NS	
12	21.26	MYSP	1	1				NS	Distant
12	21.29	PIPI	1	4				NS	
12	21.31	PIPI	1	1				NS	
11	21.34-21.35	PIPI	1	5+				NS	Constant
10	21.37-21.38	PIPI	1	3				NS	
10	21.39	PIPI	1	1				NS	
9	21.41	PIPI	1	1				NS	
9	21.43	PIPI	1	1				NS	
8	21.45	PIPI	1	1				NS	
8	21.47	PIPI	1	5				NS	
8	21.48	MYSP	1	1				NS	
8	21.48	PIPI	1	1				NS	
8	21.49	PIPY	1	1				NS	
8	21.51	PIPI	1	3				NS	
7	21.53	MYSP	1	1				NS	
7	21.54	PIPY	1	1				NS	
7	21.55	PIPI	1	3				NS	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
7	21.56	PIPI + MYSP	1	3				NS	Constant
6	21.57	PIPI	1	3				NS	
6	21.57	PIPI	1	3				NS	
6	21.58	PIPI	1	1				NS	Up and down track
6	21.59	PIPI	1	2				NS	
6	22.00	PIPI	1	1				NS	
6	22.01	PIPI	1	1				NS	
5	22.04	MYSP + PIPI	1	1				NS	
5	22.06-22.07	MYSP + PIPI	2	5				NS	
4	22.08-22.09	PIPI	1	3				NS	
4	22.11	PIPI	1	2				NS	
3	22.15-22.18	PIPI	1	5+				NS	Constant
2	22.22	PIPI	1	5+				NS	Many calls but distant
2	22.23	PIPI	1	4				NS	
1	22.26-22.27	PIPI + PIPY	1	5+				NS	Constant
1	22.27	MYSP	1	4				NS	

June 2020: dusk

Survey 3: Dusk, 15/06/20			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
21:19	21:19	23:19	None
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
17°C	15°C	0	20%
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats

No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R5	21.19-21.23	None							No bats
R6	21.25-21.29	None							No bats
R6-R7	21.31	PIPI	1	1		F		S	Over track
R7	21.33-21.37	None							No bats
R7-R8	21.39	PIPY	1	4		F		S	Up and down track.
R8	21.40-21.44	None							No bats

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R1	21.49	MYSP	1	1				NS	
R1	21.50	PIPY	1	1				NS	
R2	21.54-21.58	None							No bats
R2-R3	21.59	MYSP	1+	2		C		NS	
R2-R3	22.00	PLAU	1	1					
R2-R3	22.00	MYSP	1+	3		C		NS	
R3	22.04-22.08	None							No bats
R4	22.10-22.14	None							No bats
R9	22.30-22.34	None							No bats
R9-R10	22.37	MYSP	1+	2		C		NS	
R10	22.41	PIPI	1+	2		C		NS	
R10	22.42	MYSP	1+	2		C		NS	Distant
R11	22.45-22.49	None							No bats
R12	22.51-22.55	None							No bats
R13	22.59	PIPI	1	1		C		NS	
R13	23.01	PIPY	1	2		C		NS	
R14	23.03	PIPY	1	1		F		NS	
R14	23.04	MYSP	1	1		C		NS	
R14	23.05	PIPI	1+	3		F	Y	NS	
R14	23.05	NYNO	1	1		C		NS	
R14	23.06	PIPI	1+	3		F		NS	
R14	23.07	PIPI	1+	2		F		NS	
R14-R15	23.08	PIPY	1+	3		F		NS	
R14-R15	23.10	PIPY	1	1		F		NS	
R15	23.10-23.14	PIPI	1	14		F		NS	
R15	23.14	BABA	1	1		C		NS	
R16	23.15-23.19	PIPI	1+	9		F		NA	
R16	23.17	PIPY	1	3		F		NS	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
10	21.19-21.22	None							No bats
11	21.28	PIPI	1	1		C		NS	
12	21.34	PIPY	1	1		C		NS	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
13	21.37	PIPY	1	3		F		S	Foraging between trees. Constant.
14	21.43-21.46	None							No bats
14-15	21.47-21.49	PIPY	1	5		F		S	Between transect points
15	21.49	PIPI	1	5+		F		S	Foraging over grassland
15	21.50-21.52	PIPI	1	5		F		S	Foraging over grassland
15	21.52-21.53	PIPY	1	3		F		S	Foraging over grassland
16	21.55-21.58	None							No bats
17	22.03	MYSP	1	1		C		NS	
17	22.04	MYSP	1	1		C		NS	Between transect points
18	22.06	MYSP	1	1		C		NS	Very fast
19	22.10-22.13	None							No bats
20	22.17	MYSP	1	1		C		NS	
1	22.23-22.26	None							No bats
2	22.29-22.32	None							No bats
3	22.36	PIPY	1	1				NS	
3	22.38	MYSP	1	1				NS	
3	22.39	MYSP	1	1				NS	
4	22.43	MYSP	1	2		C		NS	
5	22.49	PIPI	1	3		F		NS	
6	22.51-22.53	PIPI	1	10+		F		NS	Constant
6	22.54	PIPI	1	5		F		NS	
7	22.56	PIPI	1	1		F		NS	
7	22.57	PIPY	1	2		F		NS	
7	22.58-22.59	PIPI	1	5		F		NS	
8	23.01	PIPI	1	2		F		NS	
8	23.02	PIPI	1	2		F		NS	
8	23.05-23.06	PIPI + PIPY	2	7		F		NS	Between transect points
9	23.08	PIPI	1	2		F		NS	
9	23.09	MYSP + PIPI	2	3		F		NS	
9	23.10	PIPI	1	2		F		NS	

July 2020: dusk

Survey 4: Dusk, 23/07/20			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
21.01	21.01	22.56	None

Survey 4: Dusk, 23/07/20			
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
18°C	17°C	None	80-100%
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R1	21.01-21.05	None							No bats
R2	21.07-21.11	None							No bats
R3	21.16-21.20	None							No bats
R4	21.22-21.24	PIPI	2	14		F		S	R4: Recent woodland clearance. Foraging over road and wood at canopy height.
R4	21.23	PIPY	1	1		F	Y	S	Sub canopy
R4	21.24	PIPY	2	20					
R5	21.32	PIPY	1	1		F		NS	
R5	21.32	PIPI	1	1		F		NS	
R5	21.35	MYSP	1	1				NS	Very distant and brief
R6	21.38	MYSP	1	1		C		S	Along link road and north up bridleway
R6	21.38-21.39	PIPY	1	3		F		NS	
R6	21.40-21.42	PIPI	2	7		F	Y	S	Up and down link road.
R6-R7	21.45	PIPY	1+	3		F		S	Up and down link road.
R6-R7	21.45	PIPI	1+	4		F		S	Up and down link road.
R7	21.46-21.50	None							No bats
R8	21.53-21.59	EPSE	1	35		F		S	Feeding over clearing.
R8	21.55	MYSP	1	1		F		S	Travelling N-S.
R8	21.59	PIPI	1	3		F		NS	
R8-R9	22.04-22.05	PIPI	1+	5		F		NS	
R9	22.07-22.11	None							No bats
R9-R10	22.15	PIPI	1	2		F		NS	
R10	22.15-22.16	PIPI	1+	6		F		NS	
R10	22.17	MYSP	1	1		F		NS	
R10	22.17-22.18	NYNO	1	2		C		NS	

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R10	22.18	PIPI	1	1		F		NS	
R10 - R11	22.19	PIPI	1	2		F		NS	
R10 - R11	22.19	PIPY	1	1		F		NS	
R11	22.21	PIPI	1+	4		F		NS	
R11	22.21	PIPY	1	2		F		NS	
R11	22.22	MYSP	1	1		C		NS	
R11	22.23	PIPI	1	1		F		NS	
R12	22.26-22.31	PIPI	2+	15		F		NS	
R12	22.26-22.31	MYSP	1+	8		F		NS	
R12	22.26-22.31	EPSE	1+	7		F		NS	
R13	22.33-22.38	PIPI	1+	18		F	Y	NS	
R13	22.33-22.38	NYNO	1+	2		F		NS	
R13	22.33-22.38	EPSE	1+	3		F		NS	
R13	22.33-22.38	MYSP	1+	3		F		NS	
R13 - R14	22.38-22.41	MYSP	1+	5		F		NS	
R13 - R14	22.38-22.41	PIPI	1+	5		F		NS	
R14	22.41-22.45	PIPY	1+	12		F	Y	NS	
R14	22.41-22.45	PIPI	1+	12		F	Y	NS	
R14	22.41-22.45	NYNO	1	1		F		NS	
R15	22.47-22.51	PIPI	1+	12		F	Y	NS	
R15	22.47-22.51	PIPY	1+	13		F	Y	NS	
R15	22.47	PLAU	1	1		F		NS	
R15	22.50	PLAU	1	1		F		NS	
R15	22.50	PIPI + EPSE	2+	4					With harmonics
R15	22.51	MYSP	1	1		C		NS	
R16	22.52	PIPI	1+	6		F	Y	NS	
R16	22.52-22.56	EPSE	1+	4		F		NS	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
6	21.00-21.03	None							No bats
5	21.07-21.10	None							No bats
4	21.11	NYNO	1	1		C		NS	
4	21.13	NYNO	1	1		C		NS	
4	21.15	NYNO	1	1		C		NS	
3	21.17	PIPI	1	2		F		NS	Foraging high up in canopy
2	21.21	PIPI	1	1		C		NS	
2	21.22	PIPI	1	1		C		NS	
1	21.27	NYNO	1	1		C		NS	
8	21.36	PIPI	1	1				NS	
9	21.40-21.43	None							No bats
10	21.45	BABA	1	1		C		NS	
11	21.50-21.53	PIPI	1	1		C		NS	
12	21.55-21.58	None							No bats
13	22.03-22.06	None							No bats
14	22.09	NYNO	1	1				NS	Faint call
15	22.18	NYNO	1	1				NS	
15	22.18	PIPY	1	2				NS	
16	22.23	EPSE	1	1				NS	
17	22.26	MYSP	1	1				NS	
18	22.30	MYSP	1	1				NS	
18	22.30	MYSP	1	1				NS	
19	22.36-22.39	None							No bats
20	22.41	PIPI	1	1		C		NS	Faint
13	22.46-22.48	PIPI	1	20+		F		NS	
13	22.47	NYNO	1	3		F		NS	
4	22.51	MYSP	1	1				NS	
4	22.52	MYDA	1	3				NS	
4	22.52	MYSP	1	2				NS	
4	22.53	MYSP	1	1				NS	
5	22.54	MYSP	1	2				NS	
5	22.56	PIPI	1	2				NS	
5	22.57	PIPI	1	2				NS	

July 2020: dawn

Survey 5: Dawn, 24/07/20			
Sunset/sunrise: 05.17	**Start time:** 03.15	**End time:** 05.17	**Precipitation:** None
Air temp start: 16°C	**Air temp end:** 15°C	**Wind:** None	**Cloud cover:** 100%

Survey 5: Dawn, 24/07/20			
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats

No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R16	03:13-03:17	PIPI	1+	11		F+C	Y	NS	
R15	03:18-03:22	PIPI	1+	5		F+C		NS	
R14	03:28	MYsp	1	1		C		NS	Brief
R13	03:35	PLAU	1	1				NS	Distant and brief
R13	03:35	MYsp	1	1				NS	Distant and brief
R12	03:41	PIPI	1	1		C		NS	
R12	04:41	MYsp	1	1		C		NS	
R12-11	03:43	PIPI	1	3		F		NS	
R12-11	03:44	MYsp	1	1		C		NS	
R12-11	03:44	PIPY	1	2		C		NS	
R12-11	03:47	PIPI	1	1		F		NS	
R11-10	03:49	PIPI	1+	1		F		NS	
R11-10	03:49	MYsp	1	1		F		NS	
R10	03:50	PIPI	1	1		F		NS	
R10	03:55	PLAU	1	2		F		NS	
R10	03:55	PIPY	1	1		F		NS	
R9	03:58	PIPY	1	2		F		NS	
R9	04:00	PIPI	1	1		C		NS	
R9	04:01	MYsp	1	1		C		NS	
R9	04:02	PIPI	1	1		F		NS	
R1	04:06	BABA	1	1		C		NS	
R1	04:09	MYsp	1	1		F		NS	
R1	04:09	PIPI	1	2		F		NS	
R8	04:14	BABA	1	1		C		NS	
R8	04:15-04:16	EPSE	1	4		F		S	Over clearing
R7	04:24	PIPI	1	1		F		S	S-N over track
R8-7	04:26	PIPI	1	1		C		NS	Brief
R6	04:27	PIPI	1	1		F		S	Up and down link road
R6	04:28	PIPY	1	1		F		S	Up and down link road
R6	04:29	MYsp	1	1		F		S	Up and down link road
R6	04:31	MYDA	1	2		F		NS	
R6-5	04:32	PIPI	1	2		F		NS	

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R6-5	04:32	PIPY	1	1		C		NS	
R5	04:36	PIPI	1	2		F		NS	
R5	04:36	PIPY	1	1		F		NS	
R4	04:42-04:45	PIPI	2	20		F		S	Canopy height over clearing and road
R3	04:50-04:54	None							No bats
R2	04:58-05:02	None							No bats
R1	05:08	PIPY	1	1		C		NS	
R12	05:13-05:17	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
20	03:16	PIPI	1	1				NS	
20	03:19	MYsp	1	1				NS	
19	03:22	MYsp	1	1				NS	Brief call
19	03:24	PIPI	1	1				Ns	
19	03:25	PIPI	1	5				NS	Up and down pathway
18	03:26	PIPI	1	2				NS	Up and down pathway
18	03:27	PIPI	1	7				NS	Up and down pathway
18	03:28	PIPI	1	5			Y	NS	Up and down pathway
18	03:30	PIPI	1	2			Y	NS	Up and down pathway
18	03:31	MYsp	1	2				NS	Up and down pathway
17	03:33	MYsp	1	1				NS	Along trackway
17	03:34	PIPI	1	3				NS	Quiet call getting louder
16	03:37-03:40	None							No bats
15	03:44-03:47	None							No bats
14	03:50-03:53	None							No bats
13	03:57	PIPI	1	1				NS	
13	03:58	PIPI	1	5				NS	
13	03:59	PIPI	1	1			Y	NS	
13	04:00	PIPI	1	4				NS	
13	04:02-04:03	PIPI	1	5				NS	Very loud
12	04:07	PIPI	1	2				NS	
11	04:11	PIPI	1	2				NS	
11	04:13	PIPY	1	1				NS	
10	04:17	PIPI	1	1				NS	
10	04:18	PIPI	1	3				NS	
10	04:19	PIPI	1	4				NS	
10	04:21	MYsp/ PLAU	1	2				NS	Between transect points on trackway
9	04:24	PIPY	1	3					

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
9	04:29	PIPY	1	2				NS	Trackway between transect points
8	04:31-04:34	None							No bats
7	04:35	PIPY	1	4				NS	Far away
7	04:36	PIPY	1	5		C+F		S	Commuting up and down tree line
6	04:40-04:43	None							No bats
5	04:45-04:48	None							No bats
4	04:49-04:52	None							No bats
3	04:55	MYsp	1	1				NS	
2	04:59-05:02	None							No bats
1	05:06-05:09	None							No bats

August 2020: dusk

Survey 6: Dusk, 27/08/20			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
19:58	19:58	22:00	None (rain earlier)
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
15°C	15°C	B3	100—60%
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats

No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R1	20:00-20:04								No bats
R1	20:04	PIPY	1	1		C		NS	
R2	20:07-20:11	None							No bats
R3	20:17-20:22	None							No bats
R4	20:25-20:29	None							No bats; walking along road
R5	20:38	MYDA	1	1		C		NS	Distant
R5	20:38	PIPI	1	1		C		NS	Distant
R5	20:39	PIPY	2?	2		C		NS	
R6	20:41	PIPY	1+	24		F	Y	S	Up and down connecting road
R6	20:43	MYsp	1	1		C		NS	
R6	20:44	PIPI	1+	4		F	Y	NS	Up and down track –

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R6-7	20:45-20:47	PIPY	1+	4		F		S	Up and down track – between transect points
R6-7	20:45-20:47	PIPI	1+	2		F		S	Up and down track – between transect points
R7	20:51	NYNO	1	1		C		NS	Distant
R8	20:54	PIPI	1	1		C		NS	
R8	20:55	PIPI	1+	2		F		NS	
R8	20:58	PIPI	1	1		C		NS	Distant
R8-9	21:00	MYDA	1	1		C		NS	Brief
R9	21:02-21:06	None							No bats
R9-10	21:08	PIPI	1	1		C		NS	Distant - between transect points
R10	21:11-21:14	BABA	1+	6		C?		NS	Faint
R11	21:17	PIPI	1	1		C		NS	
R11-12	21:23-21:24	PIPI	1+	3		C+F		NS	Between transect points
R12	21:25	PIPI	1	3+		C		NS	
R13	21:37	PIPI	1	1		F	Y	NS	
R13	21:38	PLAU	1	1		F		NS	Relatively loud
R13	21:38	PIPI	1	1		F		NS	
R13-14	21:40	PIPI	1	1		C		NS	Between transect points
R14	21:46	MYsp	1	1		C		NS	
R15	21:49	MYsp	1	1		C		NS	Brief
R15	21:53	MYsp	1	1		C		NS	
R16	21:55-21:59	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
8	19:57-20:00	None							No bats
9	20:02-20:05	PIPY	1	3		F		S	Foraging over open area
9	20:06	PIPY	1	3		F		S	Foraging over open area and track
10	20:09-20:12	None							No bats
11	20:14-20:17	None							No bats
12	20:18-20:21	None							No bats
20	20:22-20:25	None							No bats
3	20:27-20:30	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
2	20:31-20:34	None							No bats
1	20:40-20:43	None							No bats
4	20:45-20:48	None							No bats
15	20:51-20:54	None							No bats
14	20:55-21:01	None							No bats
13	21:04-21:08	None							No bats
19	21:09-21:12	None							No bats
18	21:17-21:20	None							No bats
17	21:23-21:26	None							No bats
16	21:29	PIPI	1	1				NS	Very faint calls
5	21:34	PIPI	1	1				NS	
6	21:39	PIPI	1	1				NS	
6	21:40	PIPY	1	1				NS	
6	21:41	PIPY	1	1				NS	
7	21:45	PIPI	1	1				NS	

September 2020: dusk

Survey 7: Dusk, 16/09/20			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
19:14	19:14	21:04	None
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
22°C	19°C	B2	0%
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R16	19:17	NYNO	1	1		F		S	NE to SW near main site
R15	19:14-19:17	PIPY	1	Many		F		S	Constant foraging at canopy height by track
R14	19:25	PIPY	1+	Many		F		NS	Distant
R14-13	19:30	PIPY	1+	Many		F		S	Foraging over stream – between transect points
R13	19:31-19:35	None							No bats

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R12	19:38-19:42	None							No bats
R12-11	19:44	PIPI	1	1		F		S	Canopy height over track between transect points
R11	19:46	PIPI	1	1		F		S	Canopy height over track
R11	19:48	PIPY	1	1		F	Y	S	Canopy height over track
R10	19:50	PIPI	1	1		C		S	Canopy height over track – W to E
R9	19:58	BABA	1	1		C		NS	
R9	19:59	PIPI	1	1		C		NS	
R8	20:06-20:10	None							No bats
R7	20:17	PIPY	1	1		C	Y	NS	
R7	20:17	PLAU	1	1		C		NS	
R6	20:20	BABA	1	1		C		NS	
R6	20:21	MYsp	1+	Many		F		NS	
R6	20:22-20:24	Plsp	1+	Many			Y	NS	Distant social calls only
R5	20:26-20:28	PIPY	1	Many		F	Y	NS	Probably same bat as previous Plsp
Road	20:30-20:38								
R4	20:36	PIPY	1	1		C	Y	NS	
R3	20:44	PLAU	1	1				NS	Brief
R3	20:45	PIPY	1	1		C	Y	NS	
R3	20:47	PIPY	1	1		C	Y	NS	
R2	20:53-20:57	None							No bats
R1	21:00-21:04	None							END – but still recording as surveyor walks back to main site
	21:05	PIPY	1	1		C		NS	
	21:10	PIPY	1+	2		F		NS	
	21:17	PIPI	1	1		C		NS	
	21:18	PIPI	1	1		C		NS	

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(l)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
16	19:14-19:17	None							No bats
17	19:19-19:22	None							No bats
18	19:24-19:27	None							No bats
15	19:29-19:32	None							No bats
14	19:54-19:37	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
13	19:40-19:43	None							No bats
19	19:44-19:47	None							No bats
20	19:48-19:51	None							No bats
12	19:55	PLAU	1	1				NS	
12	19:55	PIPI	1	2				NS	
11	19:57-20:00	None							No bats
10	20:02-20:05	None							No bats
9	20:06-20:09	None							No bats
8	20:12-20:15	None							No bats
2	20:17-20:20	None							No bats
3	20:21-20:24	None							No bats
4	20:26-20:29	None							No bats
1	20:36	NYNO	1	1				NS	Up and down track
5	20:37-20:40	None							No bats
6	20:43-20:46	None							No bats
7	20:51	PLAU	1	1				NS	Faint call
7	20:52	NYNO	1	2				NS	

September 2020: dawn

Survey 8: Dawn, 17/09/20			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
06:41	04:41	06:41	None
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
14°C	13°C	B1	0%
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R5	04:44	PIPI	1	1		F		NS	Feeding buzz
R6	04:46-04:51	PIPI	1+	Many		F	Y	NS	
R6-7	04:52	PIPI	1+	5		F	Y	NS	Between transect points

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R7	04:53-04:57	None							No bats
R7-8	04:57	PIPI	1	1		F		NS	Between transect points
R7-8	04:57	PIPY	1	1		C		NS	Between transect points
R8	05:01	PIPY	1	2		F		NS	
R8	05:04	PLAU	1	1		C		NS	
R1	05:12	PIPY	1	2		F		NS	
R1	05:12	PIPY	1	1		C		NS	
R2	05:16-05:20	None							No bats
R3	05:24-05:28	None							No bats
R4	05:30	PIPY	1	1		C		NS	
R5	05:40	PIPY	1+	4		F		NS	Walk back to start observations
R6	05:43	PIPI	1+	3		F		NS	"
R6	05:45	PIPY	1	2		F		NS	"
R1	05:50	PIPY	1	1		C		NS	"
R9	05:51								Continue transect again
R9	05:52	PLAU	1	1		C		NS	Brief
R9	05:52	PIPI	1	1		C		NS	Distant
R9	05:53	PIPI	1	1		F		NS	
R10	06:02	PIPI	1	1		F		S	East to West along track at canopy height
R11	06:04-06:08	None							No bats
R12	06:10-06:14	None							No bats
R13	06:16-06:20	None							No bats
R14	06:24	PIPY	1	1		C		NS	Brief and distant
R14	06:26	PIPY	1	1		F		S	Canopy height over stream
R15	06:28-06:32	None							No bats
R16	06:34-06:41	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
6	04:41-04:45	None							No bats
7	04:47-04:51	None							No bats
8	04:52-04:56	None							No bats
9	04:58-05:02	None							No bats

Surveyor 2 (AD): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
10	05:05-05:09	None							No bats
11	05:12-05:16	None							No bats
12	05:18-05:22	None							No bats
20	05:23-05:27	None							No bats
13	05:31-05:35	None							No bats
3	05:37-05:41	None							No bats
4	05:44-05:48	None							No bats
5	05:50-05:54	None							No bats
15	05:57-06:01	None							No bats
16	06:05-06:09	None							No bats
17	06:10-06:14	None							No bats
18	06:17-06:21	None							No bats
14	06:22-06:26	None							No bats
2	06:29-06:33	None							No bats
1	06:37-06:41	None							No bats

October 2020: dusk

Survey 9: Dusk, 07/10/20			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
18.25	18.25	20.25	Light at 19.20 Moderate from 19:45
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
13°C	12°C	B1 SW	60-100%
Equipment:			
Wildlife Acoustics EchoMeter Touch & Touch2 Pro full spectrum detectors			

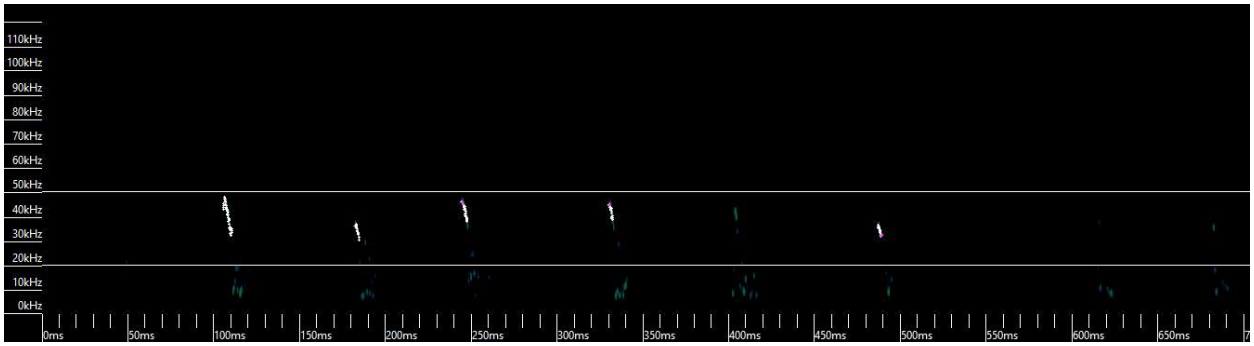
TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R1	18.29-18.33	None							No bats
R2	18.36	PIPI	1	1		F		NS	Brief

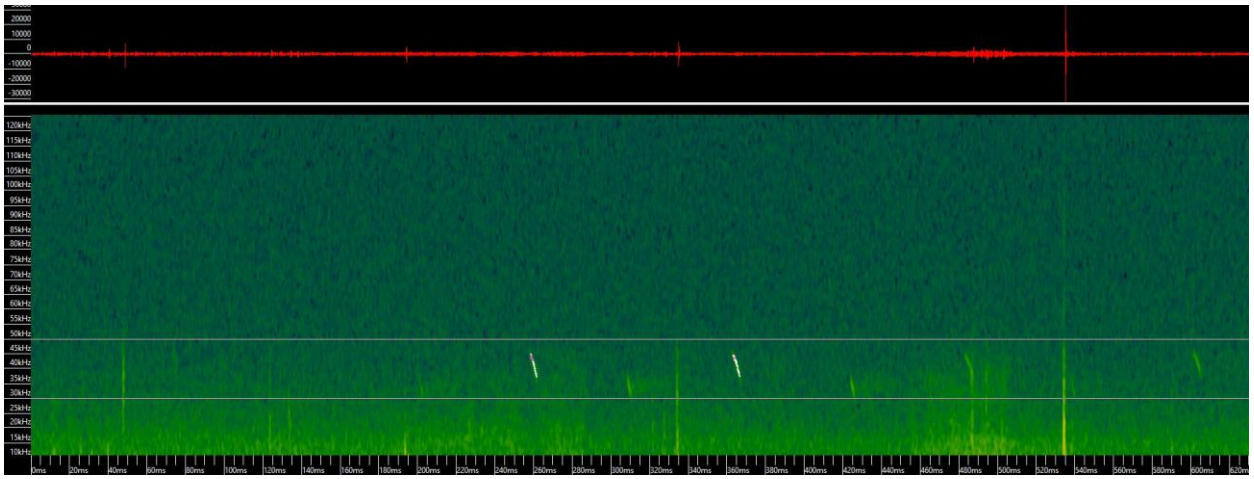
Surveyor 1 (NP): Access route transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
R3	18.44-18.48	None							No bats
R4	18.51-18.55	None							No bats
-	Road								Always lots of bats flying over road at cow field; possible roost in barn to the south?
R5	19.01	MYSP	1	1		C		NS	
R5	19.04	MYSP	1	1		C		NS	
R5	19.04-19.05	PIPY	1?	3		F		NS	
R5-R6	19:06	MYSP	1?	4		F		NS	Feeding buzz
R6	19:07-19:11	PIPY	1+	27		F	Y	S	Up and down connecting road.
R6	19:07-19:11	PIPI	1+	5		F	Y	S	Up and down connecting road.
R7	19:15	PIPI	1	1		C		NS	Distant
R7	19:18	PIPI	1	1		C		NS	Distant
R8	19.22	MYSP	1	1		C		NS	Distant
R9	19.33	NYNO	1	1		C		NS	Distant
R9	19.35	PIPI	1	1		F		NS	Distant
R10	19.41	MYSP	1	1		C		NS	
R11	19.49	PIPI	1	1		C	Y	NS	
R11	19.49	PIPY	1	1		C		NS	Loud and fast
R12	19.54-19.58	None							No bats
R13	20.00-20.05	None							No bats
R14	20.06-20.11	None							No bats
R15	20.13-20.18	None							No bats
R16	20.19-20.23	None							No bats

Surveyor 2 (JT): Site transect									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
3	18.42	NYNO	1	1		C		NS	
4-5	19.51	PIPI	1	1		C		NS	
5	18.52	PIPY	1	1		C		NS	
6	19.00	PIPI	1	1		C		NS	Distant and quiet
7	19.08	MYSP	1	1		C		NS	
7	19.09	NYNO	1	1		C		NS	Distant and quiet
9	19.19	PIPI	1	1		C		NS	
11	19.31	PIPY	1	1		C		NS	
11	19.31	PIPI	1	1		C		NS	
11	19.35	PIPI	1	1		C		NS	
12-13	19.46	PIPI	1	1		C		NS	

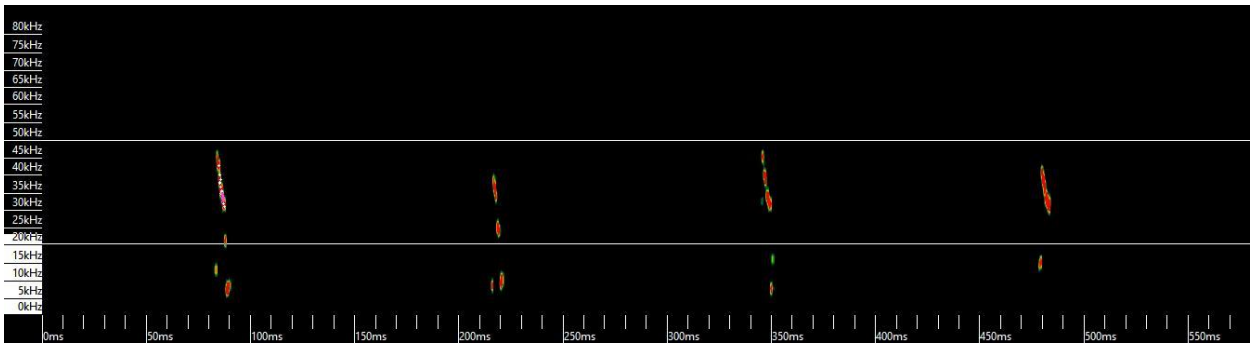
Appendix X: Bat Sonograms



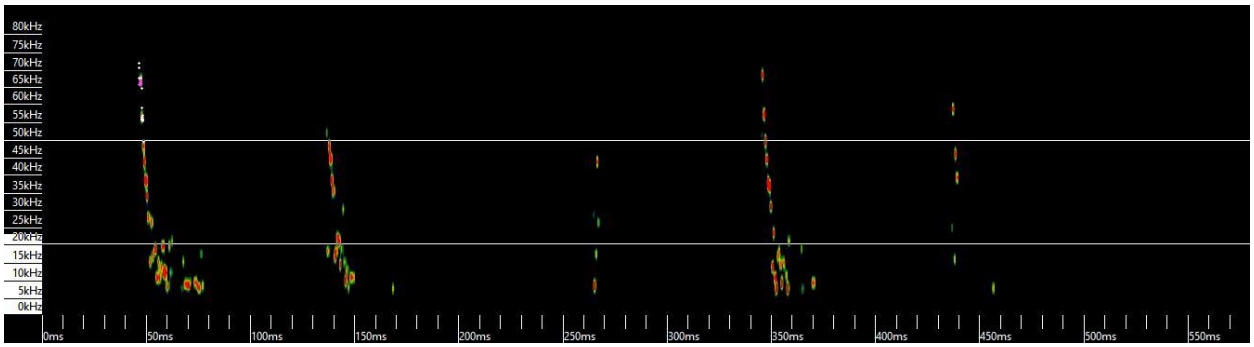
Barbastelle recorded by passive detector 29/08/20 at 20.44



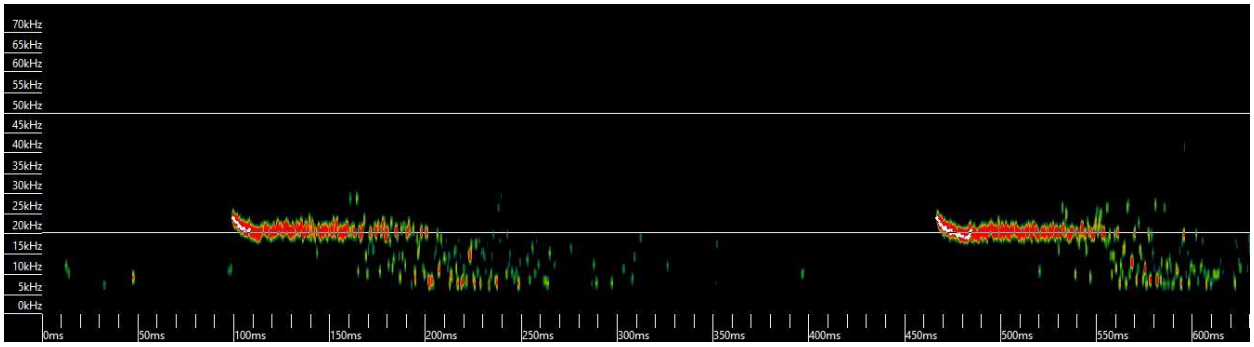
Barbastelle recorded during transect survey 20/04/20 at 20.41



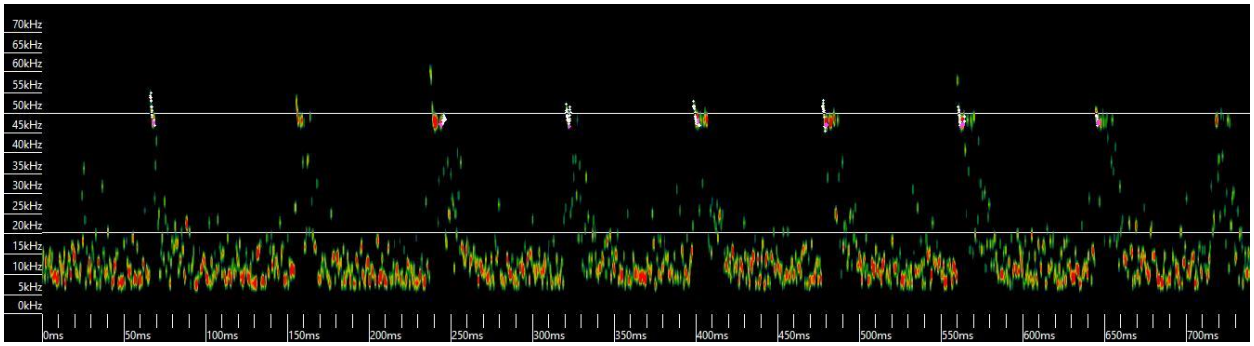
Serotine recorded by passive detector 23/04/20 at 02.43



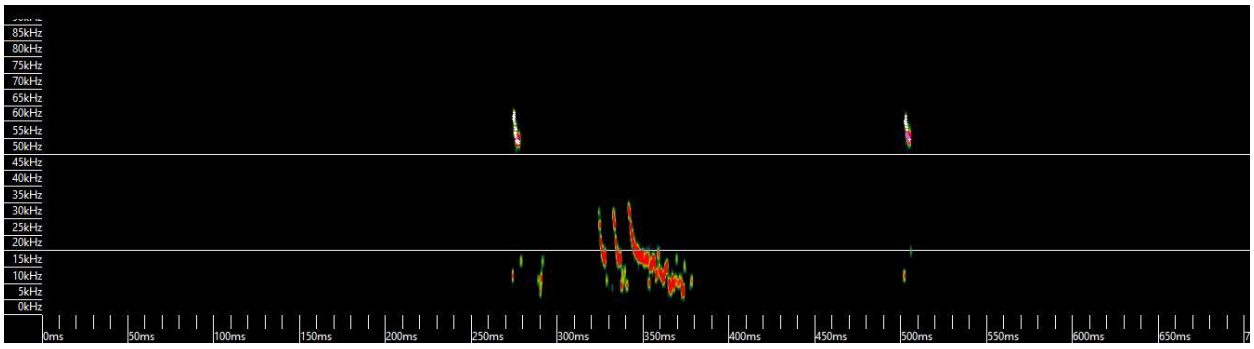
Myotis bat recorded by passive detector 23/04/20 at 02.27



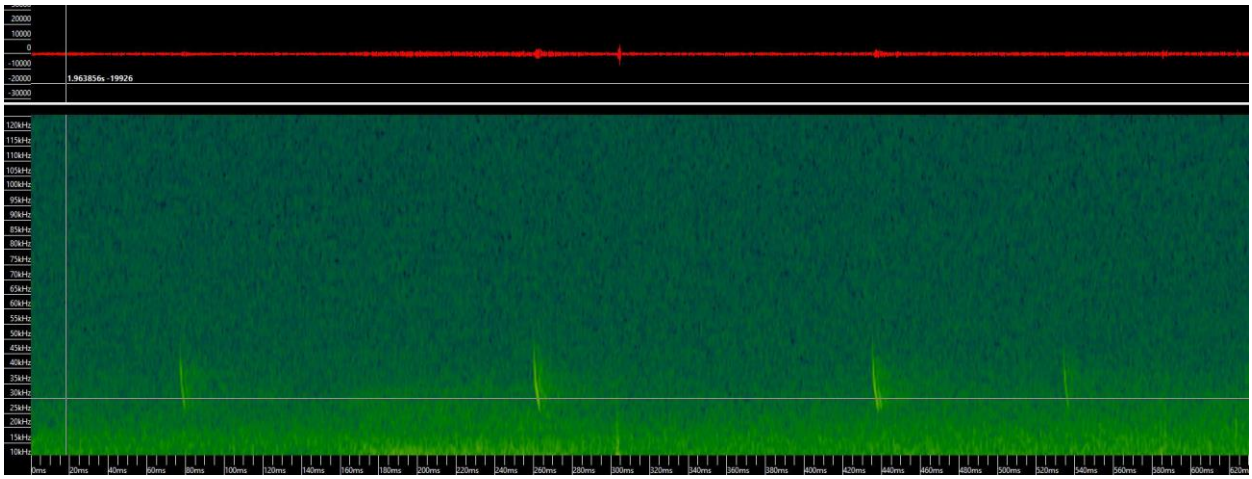
Noctule recorded by passive detector 04/07/20 at 22.27



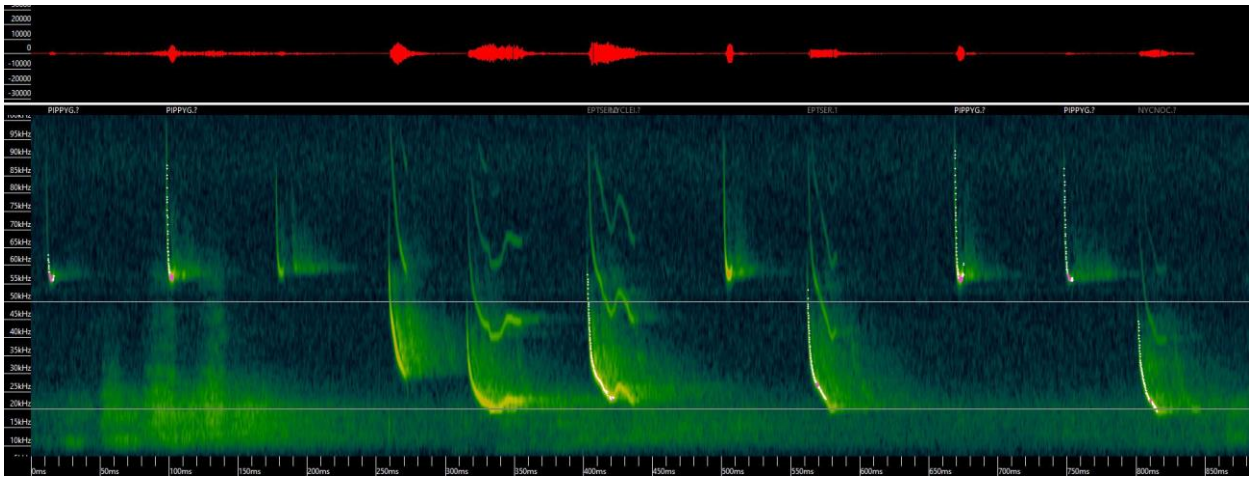
Common pipistrelle recorded by passive detector 04/07/20 at 02.47



Soprano pipistrelle recorded by passive detector 20/04/20 at 21.57



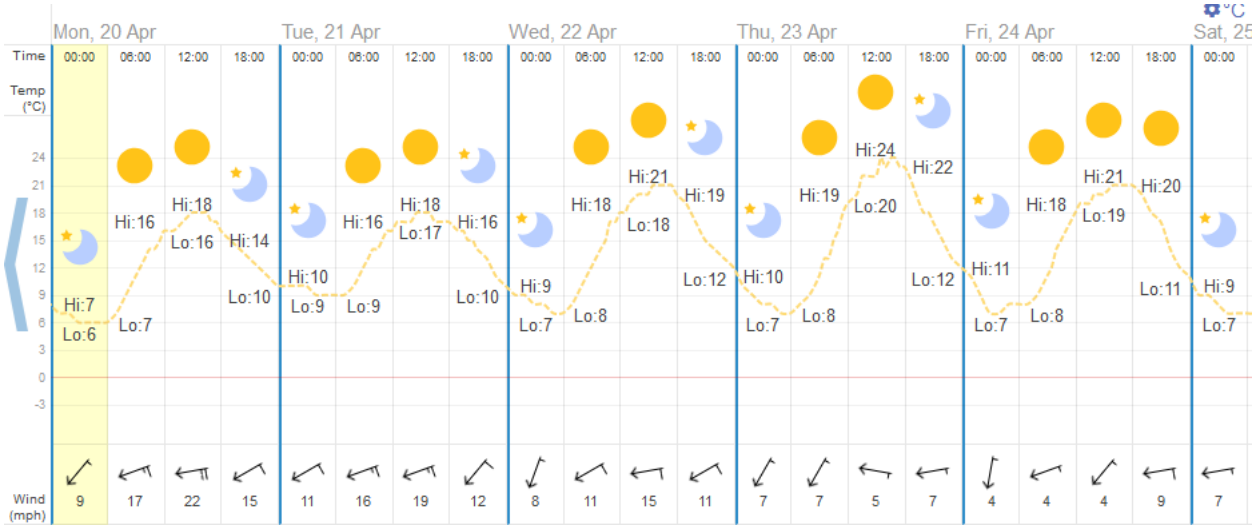
Brown long-eared recorded during transect survey 11/05/20 at 21.47



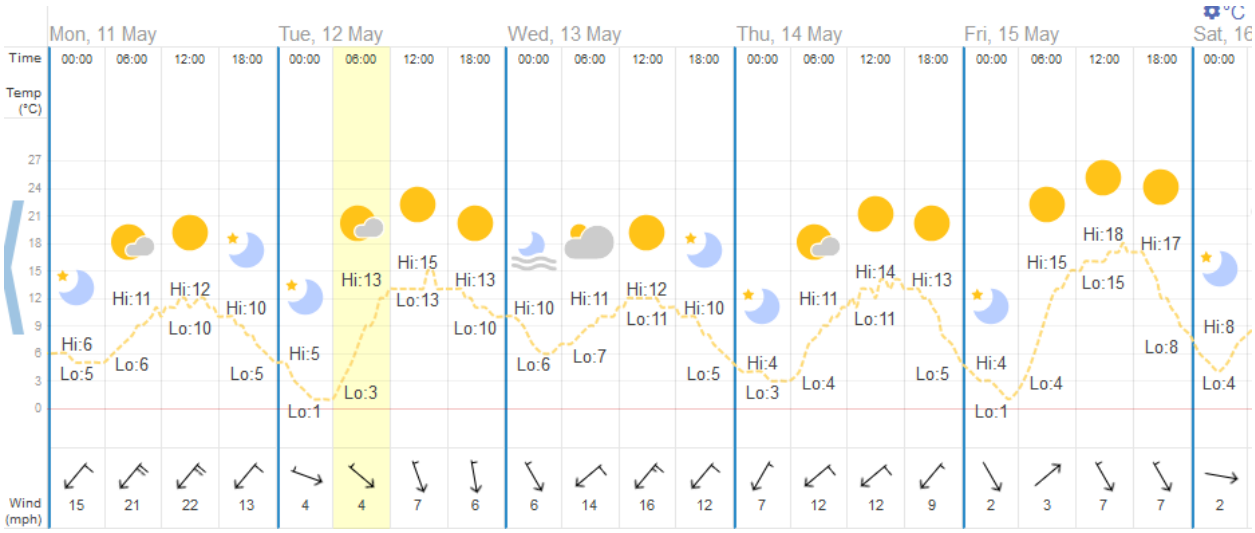
Serotine with harmonics and soprano pipistrelle recoded together during transect survey 23/07/20 at 22.49

Appendix XI: Weather Data

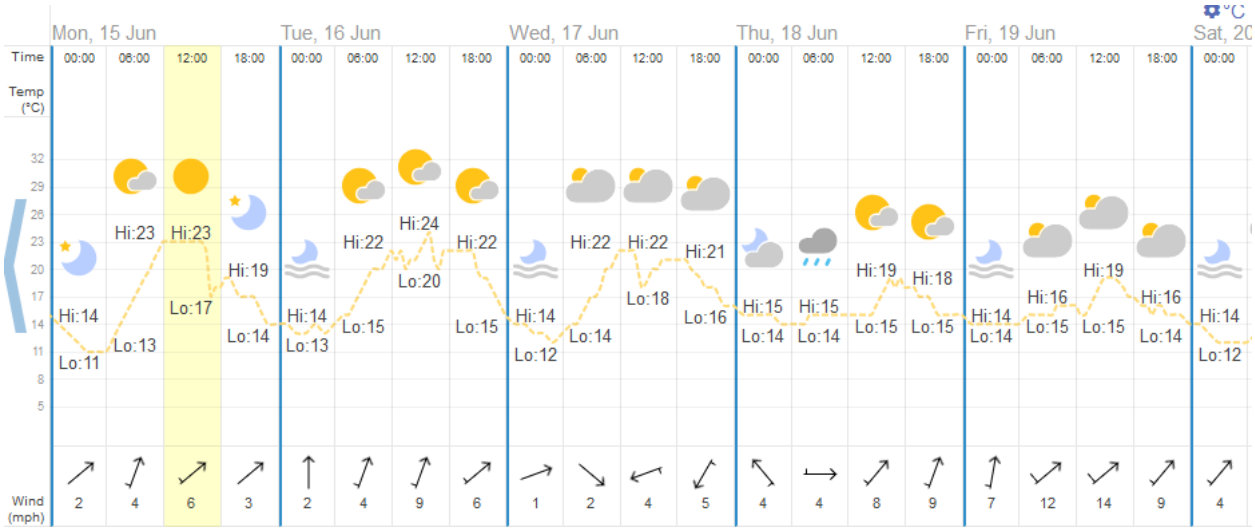
April 2020:



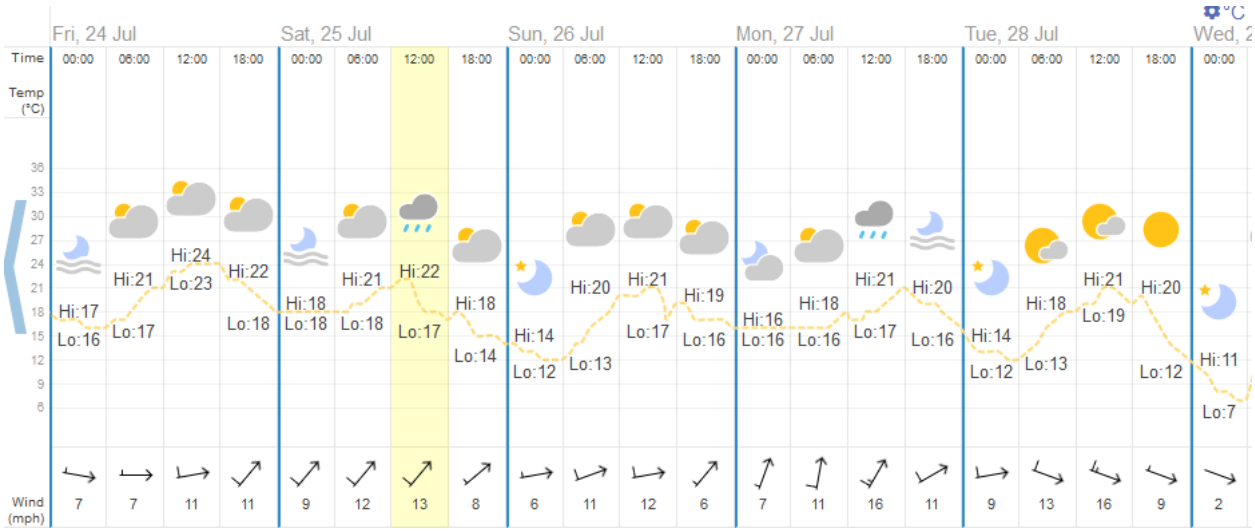
May 2020



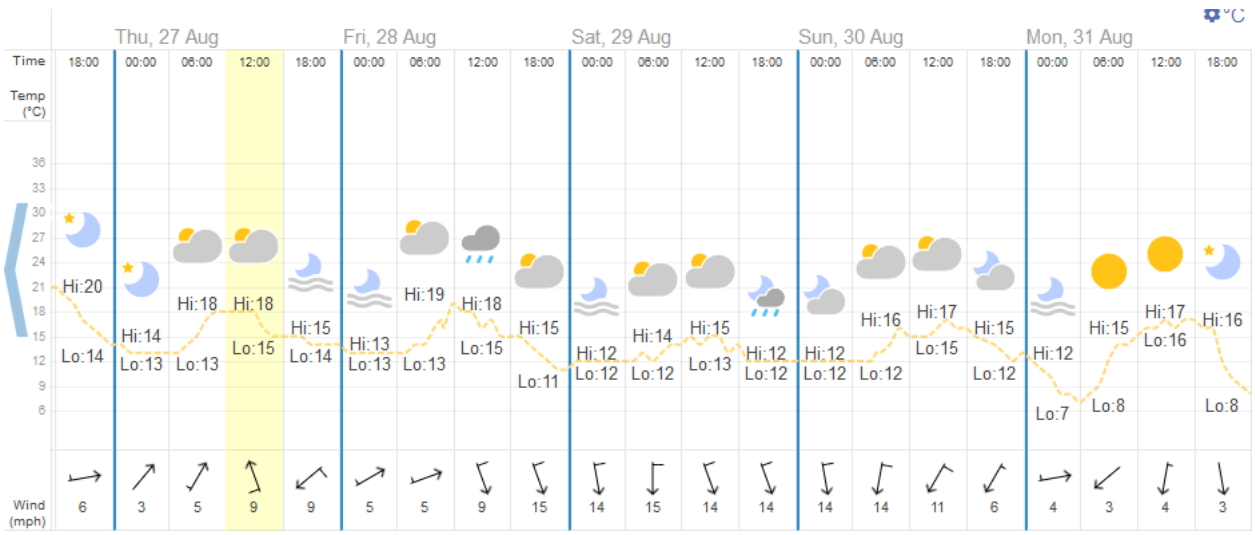
June 2020



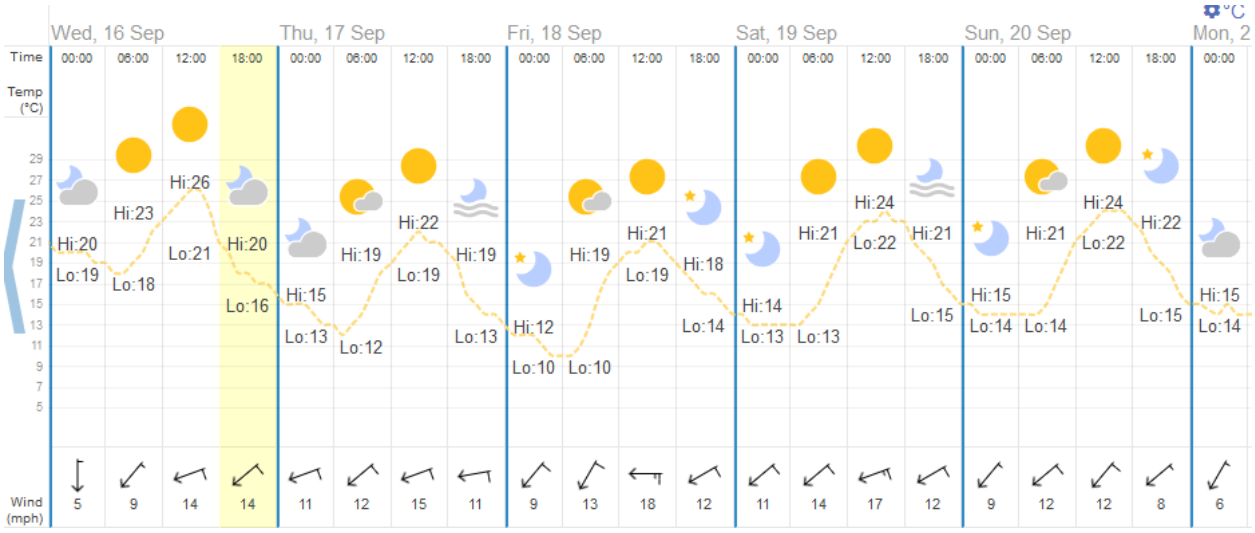
July 2020



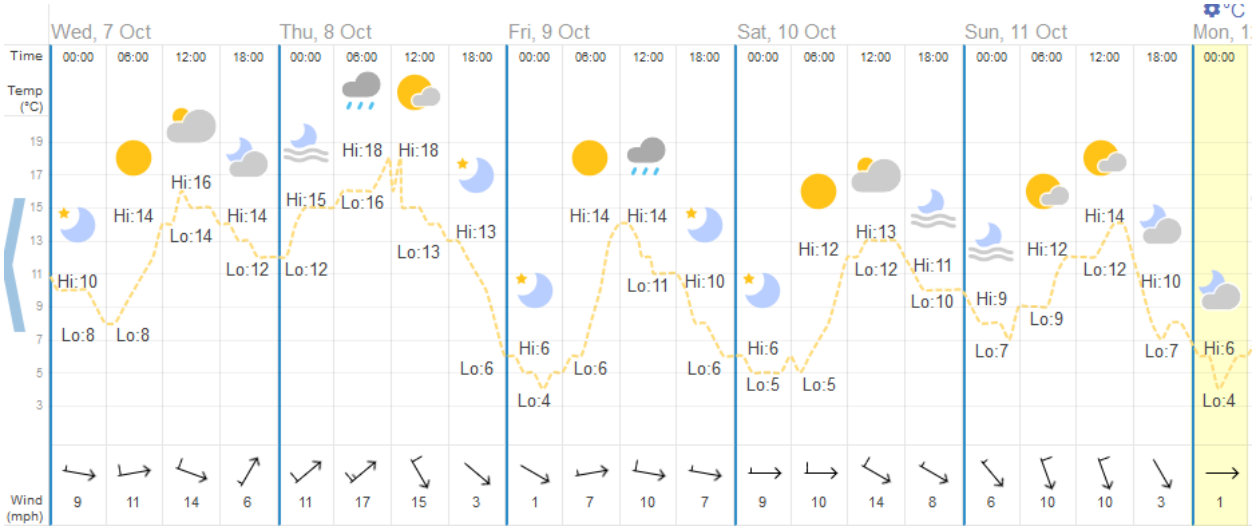
August 2020



September 2020



October 2020



Weather observations obtained from [12/01/2021]:

https://www.timeanddate.com/weather/@2643461/historic?month=4&year=2020

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Appendix XII: Hazel Dormouse Survey Plan

Please see insert.

Loxwood Clay Pits, West Sussex

Dormouse tubes

Survey transect

Red line boundary

0 60 120

Meters

N

Scale: 1:1,750 **Created by:** AD

Date: May2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-Dormouse210521

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
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Web: www.ueec.co.uk

Appendix XIII: Reptile Survey Plans

Please see inserts.

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Loxwood Clay Pits, West Sussex

- Red line boundary
- Semi natural broadleaf woodland
- Broadleaved plantation
- Coniferous plantation
- Ancient woodland
- Ancient re-planted woodland
- Reptile transects
- Common lizard
- Common lizard & slow worm
- Slow worm
- Slow worm & grass snake

0 60 120 Meters

N

Scale: 1:1,650 **Created by:** AD

Date: May 2021 **Reviewed by:** NP

Drawing number:

UE0363ECO-A3DevSiteReptiles_2_210521

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Access route, Loxwood, West Sussex

North west section

South east section

Songhurst Furze

Great Birchfield

Caddick Copse

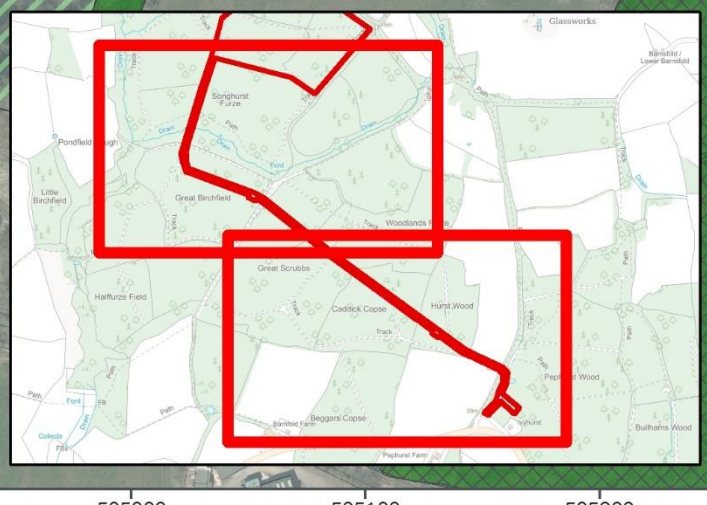
Hurst Wood

Beggars Copse

Pephurst Wood

H1

H2



132700
132600
132500
132400
132300
132200
132100
132000
131900
131800

504700 504800 504900 505000 505100 505200 505300 505400
505000 505100 505200 505300 505400 505500 505600 505700

- Red line boundary
- Semi natural broadleaf woodland
- Broadleaved plantation
- Broadleaved plantation
- Species-poor hedgerow
- Species-poor hedgerow with trees
- Extent marker
- Ancient woodland
- Ancient re-planted woodland
- Reptile transects
- Common lizard
- Common lizard & slow worm
- Slow worm

0 125 250 Meters

N

Scale: 1:3,400 **Created by:** AD
Date: May 2021 **Reviewed by:** NP
Drawing number:
UE0363ECO-A3AccessReptiles_2_210521

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Appendix XIV: Legislation and Planning Context

Legislation

General

The main legislative instruments for ecological protection in England and Wales are the Wildlife and Countryside Act 1981 (WCA; as amended), Countryside and Rights of Way Act 2000 (CRoW; as amended), Natural Environment and Rural Communities Act 2006 (NERC) and the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations; as amended). The Environment Bill (reintroduced to parliament in 2020) is expected to make significant changes to the legislative provisions when enacted.

WCA 1981 consolidated and amended pre-existing national wildlife legislation in order to implement the Bern Convention and the European Union Wild Birds Directive (Council Directive 2009/147/EC). It complements the Habitats Regulations, offering protection to a wider range of species than the latter. The Act also provided for the designation and protection of nationally important conservation sites of value for their floral, faunal or geological features, termed Sites of Special Scientific Interest (SSSI). Schedules of the act list protected species of flora and fauna, as well as invasive species, and detail the possible offences that apply to these species.

The CROW Act 2000 amended and strengthened existing wildlife legislation detailed in the WCA. It placed a duty on government departments & the National Assembly for Wales to have regard for biodiversity, provided increased powers for the protection and maintenance of SSSI, and created a right of access to parts of the countryside. The Act contained lists of habitats and species (Section 74) for which conservation measures should be promoted, in accordance with the recommendations of the Convention on Biological Diversity (Rio Earth Summit) 1992.

The NERC Act 2006 consolidated and replaced aspects of earlier legislation. Section 40 of the Act places a duty upon all local authorities and public bodies in England and Wales to have regard to the purpose of conserving biodiversity in exercising all of their functions, including by restoring or enhancing habitats and species populations. Sections 41 (England) and 42 (Wales) list habitats and species of principal importance to the conservation of biodiversity (otherwise known as priority habitats/species as listed in the now superseded UK Biodiversity Action Plan). These lists supersede Section 74 of the CRoW Act 2000. These species and habitats are a material consideration in the planning process.

The Habitats Regulations 2017 are the principal means by the European Union Habitats Directive (Council Directive 92/43/EEC) was transposed into English and Welsh law, and place a duty upon the relevant authority of government to identify sites which are of importance to the habitats and species listed in Annexes I and II of the Habitats Directive. Those sites which meet the criteria in Europe are designated as Sites of Community Importance by the European Commission, and subsequently identified as Special Areas of Conservation (SAC) by the European Union member states. Since the UK's departure from the European Union the European Commission no longer has a role in designating SACs in the UK. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 establish a single stage designation process, where the appropriate authority is the decision maker. The selection and designation of SACs is based on the criteria set out in Annex III of the Habitats Directive insofar as it applies to the UK, and having regard to the advice of the appropriate nature conservation body.

The 2019 Amendment Regulations have created a new national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes existing SACs, existing Special Protection Areas (SPA) originally designated as a result of Council Directive 2009/147/EC on the Conservation of Wild Birds, and any new SACs and SPAs designated under the 2019 Regulations. SACs and SPAs in the UK therefore no longer form part of the EU's Natura 2000 ecological network.

The Habitats Regulations also provide for the protection of individual species of fauna and flora of European conservation concern listed in Schedules 2 and 5 respectively (European Protected Species (EPS)). Schedule 2 includes species such as otter and great crested newt for which the UK population represents a significant proportion of the total European population. It is an offence to deliberately kill, injure, disturb or trade in these species. Schedule 5 plant species are protected from unlawful destruction, uprooting or trade under the regulations. Under the Habitats Regulations disturbance includes any activity which is likely to: impair the ability of a EPS to survive, breed, reproduce, or rear/nurture its young; impair the ability of a EPS to migrate or hibernate; or significantly affect the local distribution or abundance of the species.

When enacted, the Environment Bill is expected, among other things, to: establish an Office for Environmental Protection; require all new development requiring planning permission to achieve a net gain for biodiversity (expected to be at least 10%); amend the NERC Act duty to conserve biodiversity by explicitly adding a duty to enhance; and require local authorities to produce local nature recovery strategies.

Badgers (Meles meles)

Badgers are listed under Schedule 6 of the Wildlife and Countryside Act which grants them partial protection. This protection is extended by the Protection of Badgers Act 1992 (Badger Act) which makes it an offence to take, injure or kill a badger, interfere with a sett, sell or possess a live badger, or mark or ring a badger without a licence. Under the Act disturbance is illegal without a licence. Natural England has published guidelines to be adopted when determining whether an activity is 'disturbing' i.e. a licence is required when, for example, using heavy machinery (generally tracked vehicles) within 30m of any entrance to an active sett. Licences are not normally issued during the badger breeding season (December – June inclusive).

Bats (Chiroptera)

Bats and their roosts are fully protected by protected by the WCA and the Habitats Regulations, and seven species of bats are species of principal importance. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a bat.
- Possess or control a live or dead bat, any part of a bat, or anything derived from a bat.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a bat uses for shelter or protection. This is taken to mean all bat roosts whether bats are present or not.
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection.
- Make a false statement in order to obtain a licence for bat work.

Birds

Birds are protected by the Wildlife and Countryside Act, 1981 (as amended). This legislation makes it an offence to intentionally kill, injure or take away any wild bird. It is also an offence to take, damage or destroy the nest of any wild bird while it is in use or being built or to take or destroy the egg of any wild bird. In addition, certain species are listed

on Schedule 1 of the WCA (such as kingfisher *Alcedo atthis*). This makes it an additional offence to intentionally or recklessly disturb the adults while they are in and around their nest or intentionally or recklessly disturb their dependent young. Such species are considered to be in greater need of legal protection or of high nature conservation priority.

Birds of Conservation Concern ("BoCC4) are included on Red and Amber lists (Eaton *et al.*, 2015). Birds on the Red list are those of highest conservation priority due significant and sustained population decreases and/or range contractions (e.g. house sparrow *Passer domesticus* and starling *Sturnus vulgaris)*. Birds on the Amber list are the next most critical group and include species whose population/range have shown moderate declines, or which have recovered to some extent from historical decline, such as dunnock *Prunella modularis*.

Dormouse (Muscardinus avellanarius)

Dormouse is fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*:

- Intentionally kill, injure or take a dormouse.
- Possess or control a live or dead dormouse, any part of, or anything derived from a dormouse.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a dormouse uses for shelter or protection.
- Intentionally or recklessly disturb a dormouse while it is occupying a structure or place that it uses for shelter or protection.

Great crested newt (Triturus cristatus; GCN) (and natterjack toad Bufo calamita)

GCN is fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia,* to:

- Intentionally kill, injure or take a GCN (including its eggs).
- Possess or control a live or dead GCN, any part of, or anything derived from a GCN.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a GCN uses for shelter or protection.
- Intentionally or recklessly disturb a GCN while it is occupying a structure or place that it uses for shelter or protection.

Otter (Lutra lutra)

Otter is fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia,* to:

- Intentionally kill, injure or take an otter.
- Possess or control a live or dead otter, any part of, or anything derived from an otter.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that an otter uses for shelter or protection.
- Intentionally or recklessly disturb an otter while it is occupying a structure or place that it uses for shelter or protection.

Reptiles

The four common species (slow-worm *Anguis fragilis*, common lizard *Zootoca vivipara*, adder *Vipera berus* and grass snake *Natrix natrix*) are partially protected under the WCA. They are protected, *inter alia*, against intentional killing and injuring. The handling and translocation of these reptiles does not require a licence.

Smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis* are fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a smooth snake or sand lizard.
- Possess or control a live or dead smooth snake or sand lizard, any part of, or anything derived from a smooth snake or sand lizard.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a smooth snake or sand lizard uses for shelter or protection.
- Intentionally or recklessly disturb a smooth snake or sand lizard while it is occupying a structure or place that it uses for shelter or protection.

Water vole (Arvicola amphibious)

Water vole is fully protected by the WCA. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a water vole.
- Possess or control a live or dead water vole, any part of, or anything derived from a water vole.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a water vole uses for shelter or protection.
- Intentionally or recklessly disturb a water vole while it is occupying a structure or place that it uses for shelter or protection.

Weeds Act 1959 / Ragwort Control Act 2003

This legislation provides for orders to be made for control where notifiable weed species such as ragwort are said to be a problem. The act does not make it illegal to have ragwort (or other weed species) on your land, make it illegal to allow ragwort to spread, or force landowners automatically to control it. However, if DEFRA is satisfied that there are injurious weeds to which this Act applies growing upon any land it may serve upon the occupier of the land a notice in writing requiring them, within the time specified in the notice, to take such action as may be necessary to prevent the weeds from spreading.

Planning context

National Planning Policy Framework (Section 15: Conserving and enhancing the natural environment)

The National Planning Policy Framework (NPPF), published in February 2019, outlines the Government's commitment to the conservation of wildlife and natural features. It is concerned with:

- Protecting and enhancing valued landscapes, sites of biodiversity or geological conservation value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

- Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
- Maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
- Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current & future pressures;
- Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

The NPPF requires that local plans should "distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value…; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries".

To protect and enhance biodiversity and geodiversity, the NPPF states that planning policies should:

- Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and
- Promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

When determining planning applications, local planning authorities should aim to protect and enhance biodiversity by applying the following principles:

- if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;
- development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.

The following wildlife sites should be given the same protection as habitats sites:

- potential Special Protection Areas and possible Special Areas of Conservation;
- listed or proposed Ramsar sites; and
- sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site. The policies within the NPPF (and additional guidance contained within Circular 06/2005) are a material planning consideration.

UK/Local Biodiversity Action Plan Designations and Birds of Conservation Concern and Red Data Book Listings

Note that BAP designations and status as RSPB Birds of Conservation Concern or Red Data Book species does not offer any further legal protection, but planning authorities are required to prevent these species from being adversely affected by development in accordance with National Planning Policy and the CROW and NERC Acts. The United Kingdom Biodiversity Action Plan (UKBAP), first published in 1994 and updated in 2007, was a government initiative designed to implement the requirements of the Convention of Biological Diversity to conserve and enhance species and habitats. The UKBAP contained a list of priority habitats and species of conservation concern in the UK, and outlined biodiversity initiatives designed to enhance their conservation status.

However, as a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK BAP is now focussed at a country-level rather than a UK-level, and the UK BAP was succeeded by the 'UK Post-2010 Biodiversity Framework' in July 2012. The UK lists of priority habitats and species nonetheless remain an important reference source and were used to draw up statutory lists of priority habitats and species in England, Northern Ireland, Scotland and Wales. The priority habitats and species correlate with those listed on Section 41 and 42 of the NERC Act.

The UKBAP required that conservation of biodiversity be addressed at a County level through the production of Local BAPs. These are targeted towards species of conservation concern characteristic of each area. In addition, a number of local authorities and large organisations have produced their own BAPs. Where they exist, Local BAP targets with regard to species and habitats are a material consideration in the planning process.

Local Planning Policy

Chichester Local Plan: Key Policies 2014-2029

On 14th July 2015, the Council adopted the Chichester Local Plan: Key Policies 2014-2029. The Chichester Local Plan: Key Policies provides the broad policy framework and a long-term strategy to manage development, protect the environment, deliver infrastructure and promote sustainable communities within Chichester District (excluding the area within the South Downs National Park). Those policies of relevance to ecology are described below:

Policy 48 Natural Environment

Planning permission will be granted where it can be demonstrated that all the following criteria have been met:

1) There is no adverse impact on:

• The openness of the views in and around the coast, designated environmental areas and the setting of the South Downs National Park; and,

• The tranquil and rural character of the area.

2) Development recognises distinctive local landscape character and sensitively contributes to its setting and quality;

3) Proposals respect and enhance the landscape character of the surrounding area and site, and public amenity through detailed design;

4) Development of poorer quality agricultural land has been fully considered in preference to best and most versatile land; and,

5) The individual identity of settlements, actual or perceived, is maintained and the integrity of predominantly open and undeveloped land between settlements is not undermined.

Policy 49 Biodiversity

Planning permission will be granted for development where it can be demonstrated that all the following criteria have been met:

1) The biodiversity value of the site is safeguarded;

2) Demonstrable harm to habitats or species which are protected or which are of importance to biodiversity is avoided or mitigated;

3) The proposal has incorporated features that enhance biodiversity as part of good design and sustainable development;

4) The proposal protects, manages and enhances the District's network of ecology, biodiversity and geological sites, including the international, national and local designated sites (statutory and non-statutory), priority habitats, wildlife corridors and stepping stones that connect them;

5) Any individual or cumulative adverse impacts on sites are avoided;

6) The benefits of development outweigh any adverse impact on the biodiversity on the site. Exceptions will only be made where no reasonable alternatives are available; and planning conditions and/or planning obligations may be imposed to mitigate or compensate for the harmful effects of the development.

Appendix XV: Legal and Technical Limitations

- This report has been prepared by Urban Edge Environmental Consulting Ltd (UEEC Ltd) with all reasonable skill, care and diligence within the terms of the contract made with the Client to undertake this work, and taking into account the information made available by the Client. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by us.
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- The advice provided in this report does not constitute legal advice. As such, the services of lawyers may also be considered to be warranted.
- Unless otherwise stated in this report, the assessments made assume that the sites and facilities that have been considered in this report will continue to be used for their current planned purpose without significant change.
- All work carried out in preparing this report has utilised and is based upon UEEC Ltd's current professional knowledge and understanding of current relevant UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and may cause any conclusions to become inappropriate or incorrect. UEEC Ltd does not accept responsibility for advising the Client or other interested parties of the facts or implications of any such changes;
- Where this report presents or relies upon the findings of ecological field surveys (including habitat, botanical or protected/notable species surveys), its conclusions should not be relied upon for longer than a maximum period of two years from the date of the original field surveys. Ecological change (e.g. colonisation of a site by a protected species) can occur rapidly and this limitation is not intended to imply that a likely absence of, for instance, a protected species will persist for any period of time;
- This report has been prepared using factual information contained in maps and documents prepared by others. No responsibility can be accepted by UEEC Ltd for the accuracy of such information;
- Every effort has been made to accurately represent the location of mapped features, however, the precise locations of features should not be relied upon;
- Populations of animals and plants are often transient in nature and a single survey visit can only provide a general indication of species present on site. Time of year when the survey was carried out, weather conditions and other variables will influence the results of an ecological survey (e.g. it is possible that some flowering plant species which flower at other times of the year were not observed). Every effort has been made to accurately note indicators of presence of protected, rare and notable species within and adjacent to the site but the possibility nonetheless exists for other species to be present which were not recorded or otherwise indicated by the survey;
- Any works undertaken as a consequence of the recommendations provided within this report should be subjected to the necessary health & safety checks and full risk assessments.

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