

Hopkins Ecology

Site: Proposed Quarry at Brockley
Wood, Belstead

Item: Ecology Assessment

Client: Brockley Wood Ventures Ltd

Author: Dr GW Hopkins FRES CEnv MCIEEM

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Hopkins Ecology Ltd, St George's Works, 51 Colegate, Norwich NR3 1DD

T. 01603 435598 M: 07481 477103 E: graham@hopkinsecology.co.uk W: www.hopkinsecology.co.uk

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SUMMARY

Hopkins Ecology Ltd was appointed by NWA Planning on behalf of Brockley Wood Ventures Ltd to prepare an ecology assessment for the Proposed Quarry at Brockley Wood, Belstead. The Site is ~34.3 ha in area. This report represents the baseline description, evaluation and assessment of impacts for the proposals.

In 2021 a comprehensive suite of ecological surveys were undertaken, covering the main habitat and species-groups of potential relevance.

A key feature of the Site is that it abuts two County Wildlife Sites (CWS): Brockley Wood and Old Hall Wood. These are both ancient woodlands with the listed features being primarily for vegetation and some named plant species. The part of Brockley Wood CWS that abuts the site comprises both ancient woodland and also priority but non-ancient woodland. Old Hall Wood CWS where it abuts the Site is coniferous plantation on ancient woodland.

Much of the Site is arable farmland with hedgerows. Other on-Site habitats are small areas of scrub and a stream. Key points of the habitat and botanical survey are:

- Fifteen lengths of hedgerow are present, of which six are both priority habitat and Important Hedgerows under the Hedgerow Regulations. Another six are priority habitat but not Important Hedgerows. Three lengths are classed as defunct without conservation classification. Several hedgerows including defunct hedgerows have standard trees including veteran trees.
- An arable herb survey identified two species of note, namely common cudweed (which is declining nationally) and sharp-leaved fluellen (a species of restricted occurrence nationally). Both are widespread in Suffolk.

Bat surveys identified six species foraging on-Site (*Myotis* species, noctule, serotine, common pipistrelle, soprano pipistrelle and brown long-eared). No roosts were identified, through a combination of direct inspection from a ladder and activity surveys. However, woodland edge areas of Brockley Wood should be assumed to support roosts to ensure a conservative assessment.

██████████ are scoped out on the basis of there being no potentially relevant breeding ponds in the vicinity.

Dormice are known from Brockley and Old Hall Woods, but the data search records are from 2002-03. The plantation of Old Hall Wood abutting the Site is not suitable for dormice. Direct surveys using nesting tubes and boxes were undertaken along hedgerows and within Brockley Wood. None were recorded.

Reptile surveys were undertaken but none were recorded.

Badgers are present off-Site as a small sett.

Bird surveys reported a small assemblage of breeding and wintering species. The species breeding on-Site or within woodland edge areas off-Site (confirmed, probable or possible) comprise ten with either Red- or Amber-listed status: skylark, song thrush, yellowhammer, linnet, greenfinch, whitethroat, mistle thrush, dunnoek, wren, and nightingale.

Brown hares were seen as a peak count of 13 individuals and hedgehogs are probably present.

Invertebrates are likely to be present as small assemblages of dead wood species and widespread but declining moths associated with semi-natural vegetation.

These species and species groups are assessed as being of value at the local scale, rather than being of district or county value.

An assessment of impacts is presented considering relevant pathways of potential impact through the phases of the scheme. Key points within the assessment are:

- In relation to Brockley Wood and Old Hall Wood CWSs, and hedgerows and trees, the direct impacts are considered in relation to arboricultural guidance with adequate separation from excavation and other disruptive works. Other potential impacts are from dust and disturbance from workers.
- Habitat loss is relevant to hedgerows and trees, and while for most species the significance is considered to be minor there should be consideration for the risk of destroying active birds' nests.
- Other impacts on woodland edge areas are considered in relation to lighting, noise and general disturbance. Key points are the absence of dormice in nearby woodland and the limited extent of light spill. In relation to noise it is likely there will be attenuation displayed by roosting bats, but there may be an impact on nesting birds.
- There may also be disturbance to a badger sett, but mitigation is entirely feasible and realistic for this, probably under licence.

In summary, the pathways and receptors where impacts are assessed as minor rather than negligible are:

- Dust generation and woodland.
- Disturbance of woodland habitat by workers.
- Habitat removal in relation to hedgerows and trees.
- Habitat removal for nesting birds.
- Noise in relation to roosting bats and breeding birds.
- Disturbance to badgers.

Mitigation is proposed for these pathways either during works or on completion and impacts can be reduced to negligible. During operation the disturbance to birds and roosting bats from noise is assessed as a minor negative residual impact.

In advance of each phase of works re-survey is likely to be required to ensure legal compliance with respect to badgers, roosting bats in trees and possibly also dormice. The interval before works and surveys should not be greater than two years.

As part of landscape restoration, new planting should be discussed towards creating new areas of habitat for dormice, to form a connected network of suitable habitat. The landscaping proposals include new blocks of woodland planting which are connected to Brockley Wood via hedgerows which will be reinforced as part of the restoration the Site. Tree planting should also include provision for well-spaced trees with the aim for these to develop open growth forms and veteran characteristics in the long-term.

1. INTRODUCTION

BACKGROUND

- 1.1 Hopkins Ecology Ltd was appointed by NWA Planning on behalf of Brockley Wood Ventures Ltd to prepare an ecology assessment for the Proposed Quarry at Brockley Wood, Belstead. The Site is ~34.3 ha in area. This report represents the baseline description, evaluation and assessment of impacts for the proposals.

SITE CONTEXT

- 1.2 The Site comprises a tract of arable farmland, with the A12 running adjacent to the western boundary. Two blocks of ancient woodland abut much of the eastern and southern boundaries of the main quarry area. Access will be along an existing track from the south.
- 1.3 The wider landscape is arable, and the Site straddles two National Character areas:
- The *Suffolk Coasts and Heaths National Character Area*¹ to the east, which is described as being low-lying, often tree-ed, and with fragments of heathland.
 - The *South Suffolk and North Essex Claylands National Character Area*² to the west, which is characterised as a gently undulating, chalky boulder clay plateau, with a network of old species-rich hedgerows, ancient woods and parklands, meadows with streams and rivers that flow eastwards.

LEGISLATION AND PLANNING POLICY

- 1.4 The following key pieces of nature conservation legislation are relevant to legally protected species (with a more detailed description in Appendix 6):
- The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations); and
 - The Wildlife and Countryside Act, 1981 (as amended).
- 1.5 Also relevant is the of the National Parks and Access to the Countryside Act 1949 (as amended), which provides the statutory designation for Local Nature Reserves (LNR). Although LNRs are statutory sites in this regard, their protection is site specific via local planning policies.
- 1.6 The National Planning Policy Framework (MHCLG, 2021³) requires local authorities to avoid and minimise impacts on biodiversity and, where possible, to provide net gains in biodiversity when making planning decisions. A substantial number of species are of conservation concern in the UK. A small number of these species are fully protected under the legislation listed above, but others in England are recognised as Species of Principal Importance under the Natural Environment and Rural Communities Act 2006 and reinforced by the National Planning Policy Framework. For these species local planning authorities are required to promote the “*protection and recovery*” via planning and development control. Examples include the widespread reptiles, house sparrows and soprano pipistrelle and noctule bats.

¹ Natural England (2014) *NCA Profile 82: Suffolk Coasts and Heaths*. Available from: <http://publications.naturalengland.org.uk/publication/5626055104659456?category=587130>

² Natural England (2014) *NCA Profile 89: South Suffolk and North Essex Claylands*. Available from: <http://publications.naturalengland.org.uk/publication/5095677797335040?category=587130>

³ MHCLG (2021) *National Planning Policy Framework*. Ministry for Housing, Communities and Local Government, London.

1.7 Although the NPPF has an overarching aim of minimising impacts to biodiversity, the majority of species of conservation concern are not specifically recognised by legislation or planning policy. The level of protection afforded to these is undefined and should be considered within this overall aim. Within this report these species are referred to as Red-and Amber-listed (birds) and Nationally Scarce (invertebrates).

2. METHODS

PERSONNEL

- 2.1 This ecological assessment was prepared by Dr Graham Hopkins CEnv MCIEEM FRES, who holds full survey licences for [REDACTED] and bats and has particular expertise in entomology. Additional support on the surveys was provided by Will Hoare (birds), Danny Thomas (dormice, under his personal licence) and Richard Elis (Botany).

DATA SEARCH

- 2.2 A data search for a 2km radius around the Site was commissioned from the Suffolk Biodiversity Information Service and additional information was extracted from various sources as appropriate (Table 1).

Table 1. Overview of desk study data sources.

Source	Information
Suffolk Biodiversity Information Service	Designated sites, species of conservation concern; 2km search radius.
MAGIC (https://magic.defra.gov.uk/)	Additional information on statutory sites, habitats of principal importance and wider countryside information.
Various literature and web-based searches	Information on local projects and initiatives of potential relevance as well as some species-level data.
Google Earth and OS maps	Aerial photographs and maps from various on-line sources.

SURVEYS

- 2.3 A walkover survey was undertaken in April 2021 to determine the level of survey work required. The surveys undertaken are summarised in Table 2 (with additional detail within the appendices, as required).

Table 2. Summary of survey methods.

Taxon	Summary	Survey standard / guidelines followed
Phase 1 and botany	19 May 2021.	JNCC (2010 ⁴ and DEFRA (2007) ⁵
Deadwood	Semi-quantitative estimated of deadwood resources, as 'poor', 'medium' or 'high'	Hubble and Hurst (2007) ⁶
[REDACTED]	Visual assessment of on-Site ephemeral waterbodies to determine duration they are likely to hold water, with direct surveys if necessary.	English Nature (2001) ⁷ and ARG (2010) ⁸
Bats: roost	Direct inspections from ladders in April 2022.	Collins (2016) ⁹
Bats: foraging	Monthly transect and static detector surveys (five recorders) May to October.	Collins (loc. cit.)

⁴ JNCC (2010) *Handbook for Phase 1 Habitat Surveys*. Joint Nature Conservation Committee, Peterborough.

⁵ DEFRA (2007) *Hedgerow Survey Handbook*. DEFRA, London

⁶ Hubble, D. And Hurst, D. (2007) Rapid dead wood assessment. *In Practice* June 2007, 4-6.

[REDACTED]

⁹ Collins, J. (2016) *Bat Surveys for Professional Ecologists*. Bat Conservation Trust, London.

Taxon	Summary	Survey standard / guidelines followed
Dormice	100 nest tubes put out in May and checked June to November.	Bright et al., 2006 ¹⁰
Breeding birds	Five breeding bird survey visits 03 May to 14 June 2021.	BTO (undated) ¹¹
Reptiles	Seven survey visits to inspect 50 refuge felts, September and October.	Froglife (1999) ¹²
Badgers	Visual inspection for burrows, other digging or latrines, May and October.	Harris et al. (1989) ¹³
Invertebrates	Visual appraisal of microhabitats and resources, May 2021.	English Nature (2005) ¹⁴ , Drake et al. (2007) ¹⁵

EVALUATION

- 2.4 The evaluation methods are outlined within the text as appropriate. However, for bats a more detailed scheme is used, as produced by Wray et al. (2010)¹⁶. This considers the rarity of the species encountered, numbers of individuals roosting potential at a locality and the landscape character.
- 2.5 Briefly:
- Rarity is scored as 2, 5 or 20 (for common, rare and rarest species).
 - The number of bats as 5, 10 or 20 (individuals, small numbers or large numbers).
 - Roosting potential as 1, 3, 4, 5 or 20 (none, low potential, moderate, large number of roosts; or close to a Special Conservation Area for the species).
 - Landscape value of 1, 2, 3, 4 or 5 (limited habitat, large fields with poor hedges; moderate field sizes and gappy hedgerows of isolated tall hedgerows, small fields with many hedgerows and a high value landscape with small fields, streams and many hedgerows).
- 2.6 For each criterion a score is assigned and the sum of scores is used as the value score thus: 1-10, zone of influence only; 11-20, Local; 21-30, County; 31-40, Regional; 41+, National or International.

¹⁰ Bright, P., Morris, P. and Mitchell-Jones, T. (2006) *The Dormouse Conservation Handbook*. English Nature, Peterborough.

¹¹ BTO (undated) *British Trust for Ornithology website*: Available from: www.bto.org/about-birds/birdtrends/2014/methods/common-birds-census

¹² Froglife (1999) *Reptile Survey. Froglife Advice Sheet 10*. Froglife, Halesworth.

¹³ Harris, S., Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. Mammal Society, Aberdeen.

¹⁴ English Nature (2005) *Organising Surveys to Determine Site Quality for Invertebrates A Framework Guide for Ecologists*. Available from: <http://publications.naturalengland.org.uk/file/116024>

¹⁵ Drake C.M., Lott, D.A., Alexander, K.N.A. & Webb, J. (2007) *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation*. Natural England, Sheffield.

¹⁶ Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010) Valuing bats in ecological impact assessment. *In Practice* 70, 23-25.

GUIDANCE

- 2.7 The ecological assessment has been prepared with reference to best practice guidance published by the Chartered Institute for Ecology and Environmental Management (CIEEM) and as detailed in British Standard 42020:2013 Biodiversity - Code of Practice for Biodiversity and Development.

CONSTRAINTS

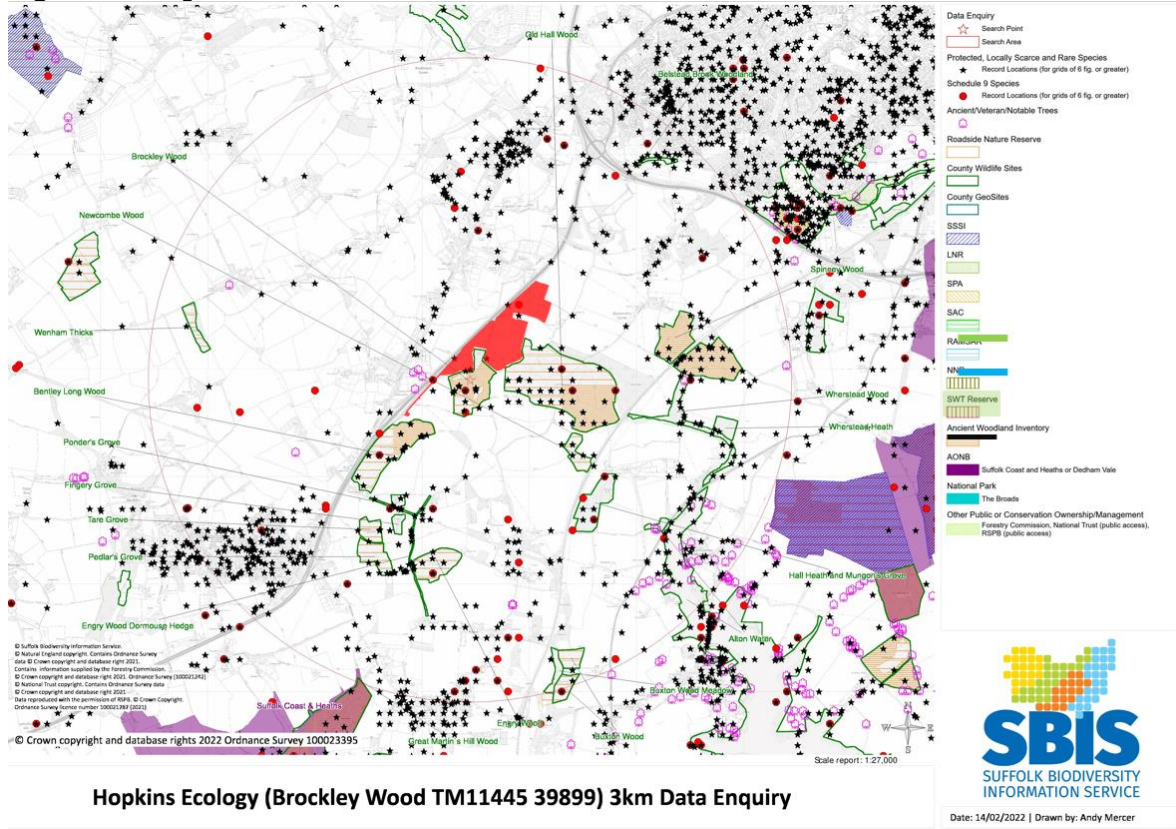
- 2.8 There are no substantial constraints to the survey and assessment as described.

3. DESIGNATED SITES

OVERVIEW

3.1 The Site is ~2km to the south-west of Ipswich, in an open arable landscape. The wider landscape has a relatively high density of designated sites, most of which are ancient woodlands.

Figure 1. Designated sites within 3km of the centra of the Site.



DESIGNATED SITES

Statutory

3.2 There are no statutory sites within 2km.

Non-Statutory

3.3 Twelve non-statutory County Wildlife Sites (CWSs) lie within 2km of the Site (Table 3), of which two abut the Site with their full citations presented in Table 4.

Table 3. County Wildlife Sites within a 2km distance of the boundary.

Name (reference)	Distance and orientation	Description
Brockley Wood (Babergh 17)	Abutting	Ancient woodland.
Old Hall Wood (Babergh 7)	Abutting	Ancient woodland.
Spinney / Wherstead Wood (Babergh 9 and 12)	1.2km east	Ancient woodland site.
Wherstead Heath (Babergh 132)	1.99km east	Woodland and heathland.

Name (reference)	Distance and orientation	Description
Engry House Dormouse Hedge (Babergh 12)	0.89km south	An extension of Engry Wood to include ancient woodland with dormice along Pond Hall Lane.
Engry Wood (Babergh 16)	1.2km south	Ancient woodland.
Hall Heath and Mungon's Gorve (Babergh 155)	1.35km south-east	Mixed woodland.
Bentley Long Wood (Babergh 15)	0.05km south	Ancient woodland.
Ponder's Grove (Babergh 14)	0.71km south	Ancient woodland.
Wenham Thicks (Babergh 129)	1.87km west	Ancient woodland.
Fingery Grove (Babergh 183)	0.87km south	Ancient woodland within a network of woodlands and hedgerows.
Tare / Pedlar's Groves (Babergh 12)	0.97km south	Ancient woodland.

Table 4. Full citations for Brockley Wood and Old Hall Wood County Wildlife Sites.

Brockley Wood (Babergh 17)
Brockley Wood is one of a number of ancient woodlands in the parish of Bentley listed in Natural England's Inventory of Ancient Woodland. The parish boundary between Bentley and Copdock runs along the northern boundary of the wood. A number of old oak and elm pollards, a characteristic feature of ancient woodlands, are located on the woodland boundaries. A large proportion of the wood is composed of neglected hornbeam coppice. A smaller section in the western half of the wood is a fenced plantation consisting mainly of softwoods. A cleared section in the northern half has been colonised by a dense growth of birch scrub. Bluebell, interspersed with bramble and bracken are the dominant plants in the ground flora. Less common plants, for example wood sorrel and wood anemone, can be found in smaller quantities where the canopy is more open. A pond situated on the site of an old building on the southern boundary of the wood provides an important additional habitat for dragonfly and amphibian larvae. 14.73ha.
Old Hall Wood (Babergh 7)
Old Hall Wood is one of a number of ancient woodlands (priority habitat) situated around the village of Bentley and close to Holbrook Park (Site of Special Scientific Interest). Studies of the complex earthwork system, carried out by the historical botanist Dr Oliver Rackham showed that the wood was at one time divided into three separate woods; Old Hall Wood, Baldrough Wood and Howe Wood. It is thought that an important routeway linking Belstead to Bentley ran between Old Hall and Howe Woods in pre-Roman times. The original woodland was replanted with mainly oak, beech and conifer, with spindle, small -leaved lime and rowan also present.
Bracken is dominant in the ground flora interspersed with patches of bluebell and other woodland species including wood sorrel, early purple orchid, wood melick, narrow buckler fern and wood anemone. The ditch along the northern boundary is particularly species-rich. The felling of part of the plantation has provided suitable conditions for a number of plants associated with acid soils, such as heath bedstraw, foxglove and sheep's sorrel. The wood is noted for the presence of northern hard fern, a rare Suffolk species which was recorded by Francis Simpson. A disused sand pit situated adjacent to the footpath which runs along the northern boundary, adds considerable habitat diversity to the wood. It is colonised by gorse scrub and a range of acid grassland plants for example mouse-ear hawkweed and the scarce plant, shepherd's cress. 51.93 ha.

LANDSCAPE-SCALE INITIATIVES

- 3.4 Roughly 5km east of the Site, running along the Suffolk coast and also inwards from the coast is a B-Line ('bee-line'). B-Lines are an initiative overseen by Buglife – The Invertebrate Conservation Trust¹⁷ and are part of the National Pollinator Strategy (DEFRA, 2015¹⁸). They are described as:

“The B-Lines are a series of ‘insect pathways’ running through our countryside and towns, along which we are restoring and creating a series of wildflower-rich habitat stepping stones. They link existing wildlife areas together, creating a network, like a railway, that will weave across the British landscape. This will provide large areas of brand new habitat benefiting bees and butterflies– but also a host of other wildlife”.

¹⁷ <https://www.buglife.org.uk/b-lines-hub>

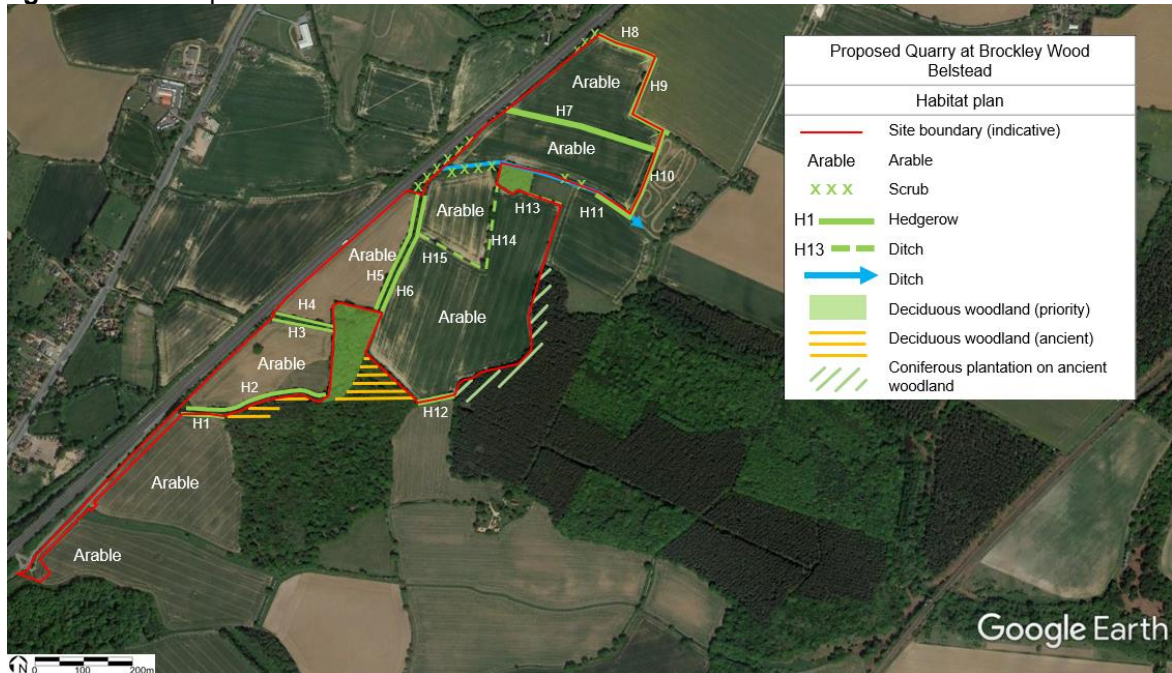
¹⁸ DEFRA (2015) *National Pollinator Strategy: Implementation Plan*. Available from; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/474386/nps-implementation-plan.pdf

4. SITE DESCRIPTION

OVERVIEW

- 4.1 The natural soil type of the locality is shown on MAGIC as 'freely draining slightly acid loamy soil'.
- 4.1 As viewed on historic OS maps, the layout of the Site is unchanged certainly from the 1920s in terms of hedgerow and woodland arrangement, other than for the construction of the A12. The off-site woodland near the northern boundary is not shown on the OS map for the 1940s. Most of the Site therefore largely comprises arable cropland with hedgerows (Figure 2).

Figure 2. Habitat plan.



PHASE 1 HABITATS: ON-SITE

Arable

- 4.2 The main fields are under active arable cultivation, under cereals at the time of survey.

Arable Margin Flora

- 4.3 The arable margins are generally narrow and cropped to the field verges of permanent grass sward. Included within this broad habitat is the trackway from the A12 roundabout to the south-west, which has a compacted surface with a sparse ephemeral flora. The species of note are listed under botany (namely common cudweed *Filago vulgaris* and sharp-leaved fluellen *Kickxia elatine*), but otherwise the flora comprises common and widespread species.

Hedgerows

- 4.4 Fifteen hedgerow lengths are identified, and six lengths qualify as Important Hedgerows under the Hedgerow Regulations and a total of 12 as priority Hedgerow Habitat of Principal Importance (including the Important Hedgerows) (Table 5). Three lengths of hedgerow are classed as defunct.

4.5 The Important Hedgerows are associated with former farm trackways, one to the west of Brockley Wood and one running north from Brockley Wood. Standard mature and veteran pollards are present in several hedgerows, mostly oak but also ash.

Table 5. Descriptions of hedgerow lengths.

Reference	Description	Attributes relevant to Hedgerow Regulations		Status	
		Species richness in 30m	Additional features	Priority habitat	Important Hedgerow
H1	<p>A double hedgerow with H2, with a dry ditch to the south. H1 does not extend the full length of H2 but has woodland to the south for its eastern part.</p> <p>Unmanaged, with shrubs to 5m+ and standards above. Woody vegetation comprises hawthorn <i>Crataegus monogyna</i> with oak <i>Quercus robur</i>, holly <i>Ilex aquifolium</i> and hazel <i>Corylus avellana</i>.</p> <p>Standards of: oak and ash.</p> <p>Ground flora including: dogs' mercury <i>Mercurialis perennis</i>, lords and ladies <i>Arum maculatum</i>, herb Bennett <i>Geum urbanum</i> and wood sage <i>Teucrium scorodonia</i>.</p>	6	<p>Ditch</p> <p>Parallel hedgerow</p> <p>Footpath</p> <p>Standard trees</p> <p>Ground flora >3 species</p>	Yes	Yes
H2	<p>A double hedgerow with H1, with a dry ditch.</p> <p>Unmanaged with shrubs to 5m+ and as standards above. Woody vegetation comprises hawthorn with oak and holly.</p> <p>Standards of: oak and ash.</p> <p>Ground flora including: dogs' mercury, lords and ladies, herb Bennett and wood sage.</p>	6	<p>Ditch</p> <p>Parallel hedgerow</p> <p>Footpath</p> <p>Standard trees</p> <p>Ground flora >3 species</p>	Yes	Yes
H3	<p>A double hedgerow with H4, with a dry ditch.</p> <p>Standards of: oak and ash.</p> <p>Ground flora including: dogs' mercury, lords and ladies, herb Bennett and wood sage.</p>	6	<p>Ditch</p> <p>Parallel hedgerow</p> <p>Footpath</p> <p>Standard trees</p> <p>Ground flora >3 species</p>	Yes	Yes
H4	<p>A double hedgerow with H3, on a low bank.</p> <p>Unmanaged and up to ~5m in height, with taller standards.</p> <p>Woody vegetation comprising: hawthorn, hazel, ash, elm <i>Ulmus minor</i>, oak, field maple <i>Acer campestre</i>, and dog rose <i>Rosa canina</i>.</p>	7	<p>Bank</p> <p>Parallel hedgerow</p> <p>Footpath</p> <p>Standard trees</p> <p>Ground flora >3 species</p>	Yes	Yes

Reference	Description	Attributes relevant to Hedgerow Regulations		Status	
		Species richness in 30m	Additional features	Priority habitat	Important Hedgerow
	Standards of: oak and ash. Ground flora including: dogs' mercury, lords and ladies, herb Bennett and wood sage.				
H5	A double hedgerow with H6. On a low half bank with a shallow ditch. Becoming gappier on moving north. Woody vegetation comprising: hawthorn, blackthorn, ash, hazel, oak, field maple, field rose <i>Rosa arvensis</i> and holly. Standards of: oak Ground flora including: dogs' mercury, lords and ladies, and herb Bennett.	6	Bank Parallel hedgerow Footpath Standard trees Ground flora >3 species	Yes	Yes
H6	A double hedgerow with H5, on a low half bank with a shallow ditch. Becoming gappier on moving north. Woody vegetation comprising: hawthorn, blackthorn <i>Prunus spinosa</i> , ash, hazel, oak, field maple, field rose, cherry <i>Prunus</i> species and gorse <i>Ulex europaeus</i> . Standards of: oak and ash. Ground flora including: dogs' mercury, lords and ladies, and herb Bennett.	6	Bank Parallel hedgerow Footpath Standard trees Ground flora >3 species	Yes	Yes
H7	This lies on a half bank sloping south. The shrubby layer is trimmed to ~1.5m and this comprises holly, hawthorn, blackthorn and oak Standards of: oak and holly.	4	Bank Standard trees Gaps <10%	Yes	-
H8	This is a gappy hedgerow, although probably not enough to constitute being classed as defunct. The vegetated is 2-3m in height and comprises hawthorn with blackthorn oak and ash. Standards of: oak.	3	Standard trees	Yes	-
H9	This is a gappy hedgerow, but not sufficiently so to be classed as defunct. The shrubs are 2-4m in height and comprises hawthorn with blackthorn and ash. Standards of: oak and ash.	4	Standard trees	Yes	-
H10	This hedgerow straddles a dry ditch with a low bank. The vegetation is 5m+ in height, mainly hawthorn	3	<10% gaps	Yes	-

Reference	Description	Attributes relevant to Hedgerow Regulations		Status	
		Species richness in 30m	Additional features	Priority habitat	Important Hedgerow
	with blackthorn, oak, and field maple. The northern 10m or so comprises Leyland cypress <i>Cupressus</i> species or similar.				
H11	This is to the south of the stream. It comprises woody vegetation 5m+ in height as a short length of hedgerow. It comprises hawthorn with a pollarded field maple. Standards of: field maple.	3	<10% gaps	Yes	-
H12	This is a short length of hedgerow on a low bank with a ditch to the south. It is gappy but not defunct. The woody vegetation comprises holly, oak, elder with a standard of oak. Standards of: oak.	3	Standard trees	Yes	-
H13	This is classed as adjacent hedgerow and is along the line of a former hedgerow. The woody vegetation is 2-3m in height, comprising hawthorn, elder, blackthorn and holly.	3	Standard trees	-	-
H14	This is a defunct hedgerow, albeit with the shrub layer largely removed and standard trees only remaining. Standards of: oak	1	Standard trees	-	-
H15	This is a defunct hedgerow, albeit with the shrub layer largely removed and standard trees only remaining. These trees are oak and ash. Standards of: oak and ash.	1	Standard trees	-	-

- Scrub is present on-Site in association with the stream, on both banks as moderately dense bracken interspersed by shrubs of hawthorn and hazel, with young and mature trees of field maple and ash.
- Stream. The stream is seasonal and without flow in the summer of 2021. Aquatic plants are absent.

BOTANY

4.6 Within the data search two groups of uncommon plants are reported:

- Woodland species, including wild service trees *Sorbus torminalis* from Brockley Wood.
- Arable herbs, such as Jersey cudweed *Gnaphalium luteoalbum* and common cudweed.

4.7 The only species of note were within the arable flora survey, which recorded a single species of conservation concern, namely common cudweed. This is a species that has declined nationally but is widespread in Suffolk and was present in several verges and areas of disturbed ground without intensive cultivation or dense grass swards. The only other species of note was sharp-leaved fluellen, a species of disturbed ground found along the eastern boundary.

PHASE 1 HABITATS: OFF-SITE

4.8 Deciduous woodland is present as three blocks abutting the Site boundary:

- Ancient woodland of Brockley Wood.
- Priority woodland of Brockley Wood.
- Priority woodland near the stream. Although not shown on the OS map of the 1920s, it is likely to be older. The canopy is mainly oak with hornbeam, and also Scots pine with hazel and hawthorn as a sparse shrub layer. The ground flora is sparse with widespread herbs such as red campion.

4.9 The deadwood resources of the three woodland blocks are summarized below (Table 6), with the key points being:

- The ancient woodland of Brockley Wood has medium diversity, poor volume and medium continuity.
- The priority woodland of Brockley Wood has poor diversity, poor volume and medium continuity.
- The priority woodland near the stream is rated as poor for all three metrics.

Table 6. Summary of dead wood assessment for the three woodlands (the on-Site woodland is Brockley Wood CWS, priority). For comparison, off-Site woodlands are presented here.

Woodland block	Diversity		Volume	Continuity
	Types	Rating		
Block near the stream	Sun-baked wood Fine branches and twigs (on the ground, below 5 cm diameter) Large fallen timber (above 5 cm diameter) Dead outer branches (still attached to the tree)	Poor: 4 types	Poor: score of 5	Poor
Brockley Wood CWS, ancient	Fungus-infected bark Fine branches and twigs (on the ground, below 5 cm diameter) Stumps Hollow trees (can be whole trunks or single branches) Large fallen timber (above 5 cm diameter) Dead outer branches (still attached to the tree) Rot-holes Standing dead trunks Rotten heartwood	Medium: 9 types	Poor: score of 13	Medium

Woodland block	Diversity		Volume	Continuity
	Types	Rating		
Brockley Wood CWS, priority	Fine branches and twigs (on the ground, below 5 cm diameter) Hollow trees (can be whole trunks or single branches) Large fallen timber (above 5 cm diameter) Dead outer branches (still attached to the tree) Rot-holes Standing dead trunks Well-rotted timber Rotten heartwood	Poor: 8 types	Poor: score of 12	Medium

4.10 Coniferous woodland is present as a single block, this being within the Old Hall CWS. In the 1920s OS map this area was shown as deciduous woodland but was presumably planted with pines *Pinus* species in the post-war period. Additionally, along the western edge are scattered young mature specimens of silver birch, and saplings of oak with scattered shrubs such as hawthorn and elder.

4.11 Scrub is present off-Site alongside the A12, as a small block inside the fence and more extensive lengths outside. This presumably dates from the road's construction and includes some which is clearly planted and some which is presumably self-sown. The main species are oak, ash, field maple, with bramble *Rubus fruticosus* agg. as frequent components, while gorse is present as scattered plants.

5. BAT SURVEYS

DATA SEARCH

- 5.1 The data search returned records for: barbastelle, Daubenton's, Natterer's, serotine, noctule, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and brown long-eared bat. The roost records comprise two from within 2km, 1.2km north (pipistrelle) and 1.49km south (Soprano pipistrelle). The nearest European Protected Species Mitigation Licence that has been granted is from a Site 3.90km west for brown long-eared and common pipistrelle.

FORAGING

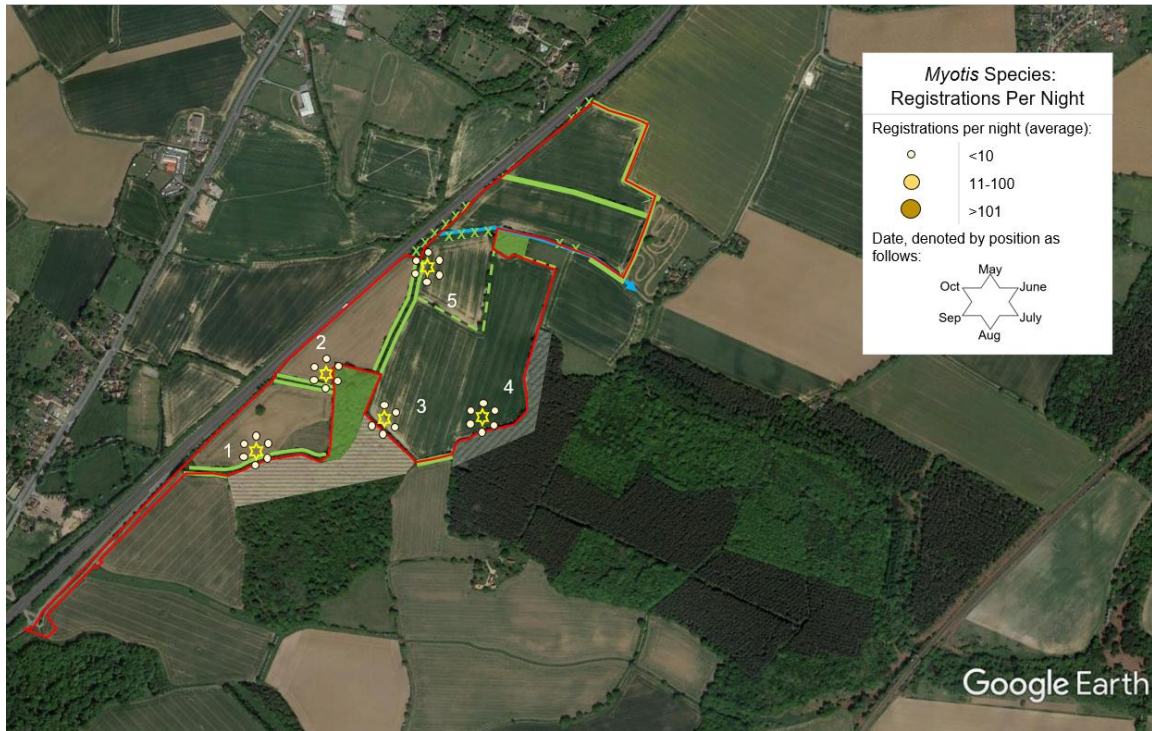
- 5.2 Manual transects and static recording were undertaken monthly May to October 2021, with 5 nights of static recording each month (Figure 3a-f) and a single transect route around the Site (Figure 4).
- 5.3 Six species of bat were recorded by static recording but only four on transects. The number of registrations shown in Table 7 provides an indication of the abundance of species on-Site. The interpretation of the data from the transects and static recorders are that:
- Activity is concentrated towards the woodland edge areas rather than hedgerows, as shown by the greater numbers of contacts along transects.
 - Comparisons between static registrations however does show that away from the woodland blocks in areas of higher quality, the overall level of activity is similar in terms of species and registrations.
 - Commuting activity was not noted along the hedgerows and in particular the tracks with hedgerows on either side appeared to be used for foraging rather than having evidence of commuting.

Table 7. Summary of bat activity.

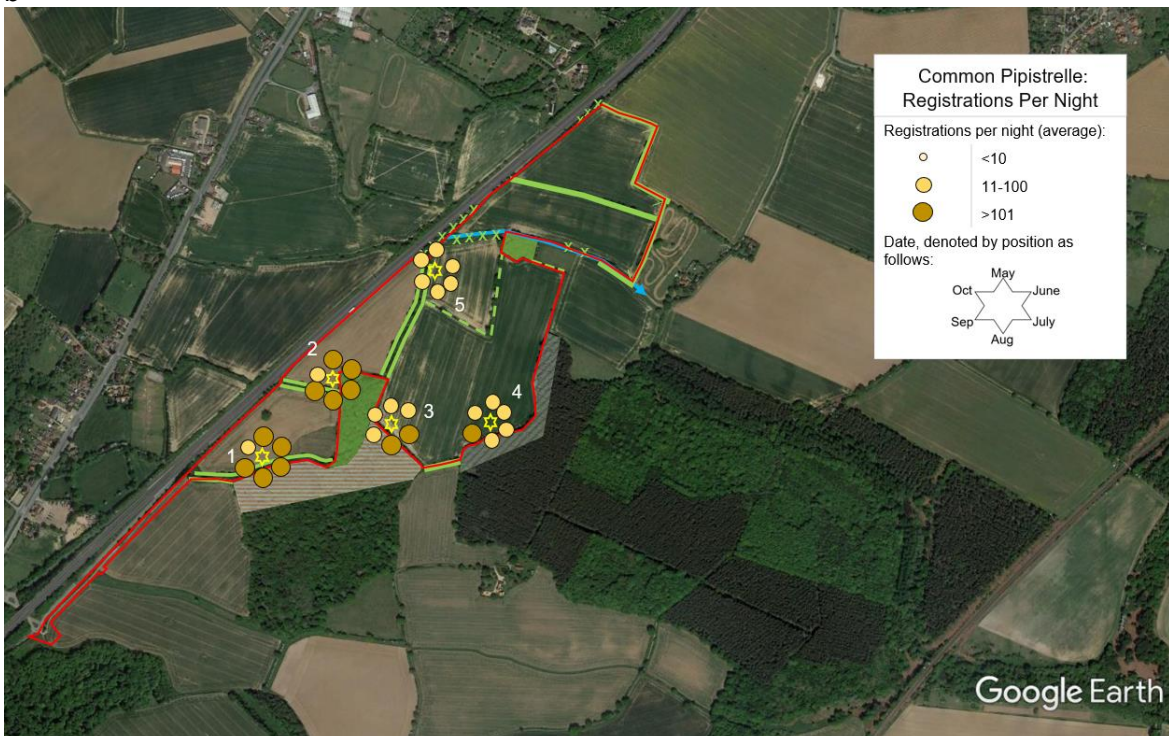
Species	Number of static registrations (all months pooled, May - October)	Recorded on transects	Activity
Common pipistrelle	14593	Yes	High levels of activity throughout on the static recorders, with the transects suggesting lower levels of activity along most hedgerows.
Soprano pipistrelle	7649	Yes	High levels of activity throughout on the static recorders, with the transects suggesting lower levels of activity along most hedgerows.
<i>Myotis</i> species	640	Yes	Only recorded by the static recorders and activity likely to be reduced away from woodland and larger hedgerows.
Brown long-eared	428	No	Only recorded by the static recorders and activity likely to be reduced away from woodland and larger hedgerows.
Noctule	796	Yes	Widespread across the Site, probably overflying and foraging at a high altitude, in particular near woodlands and trees.
Serotine	72	No	Widespread across the Site, probably overflying and foraging near woodlands and trees.

Figure 3a-f. Static recorder data: mean registrations per night on each session (*Myotis* species, common pipistrelle, soprano pipistrelle, brown long-eared, noctule and serotine).

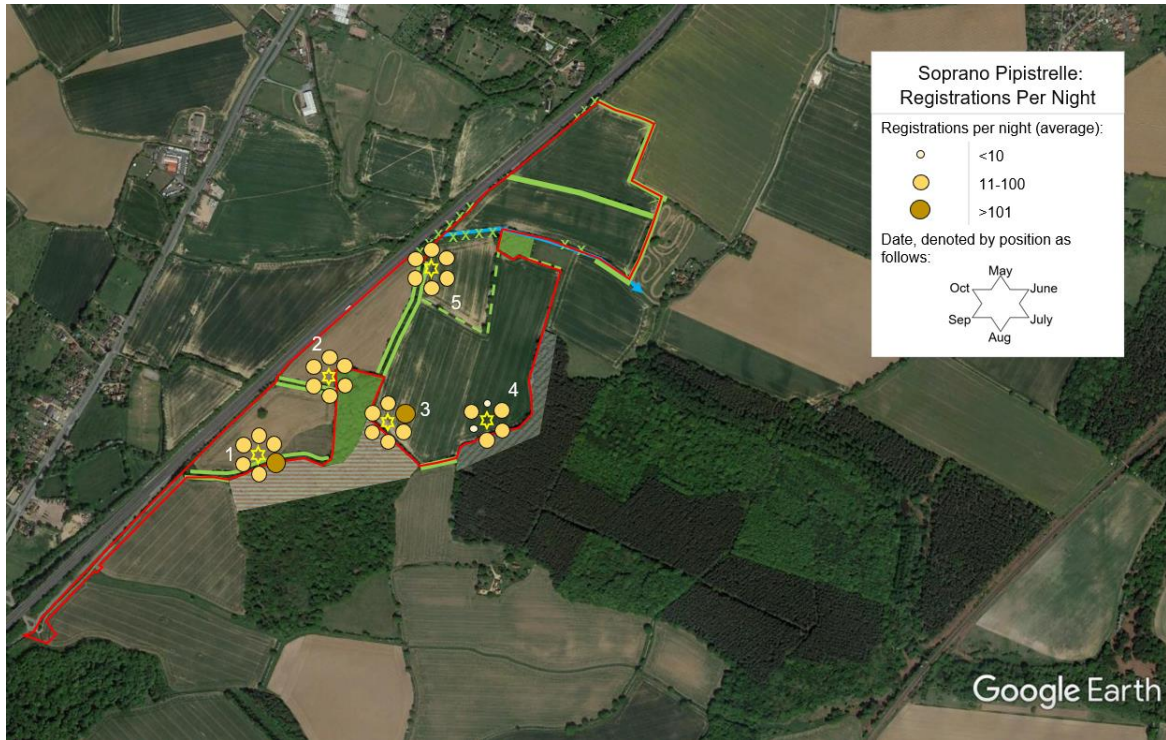
a



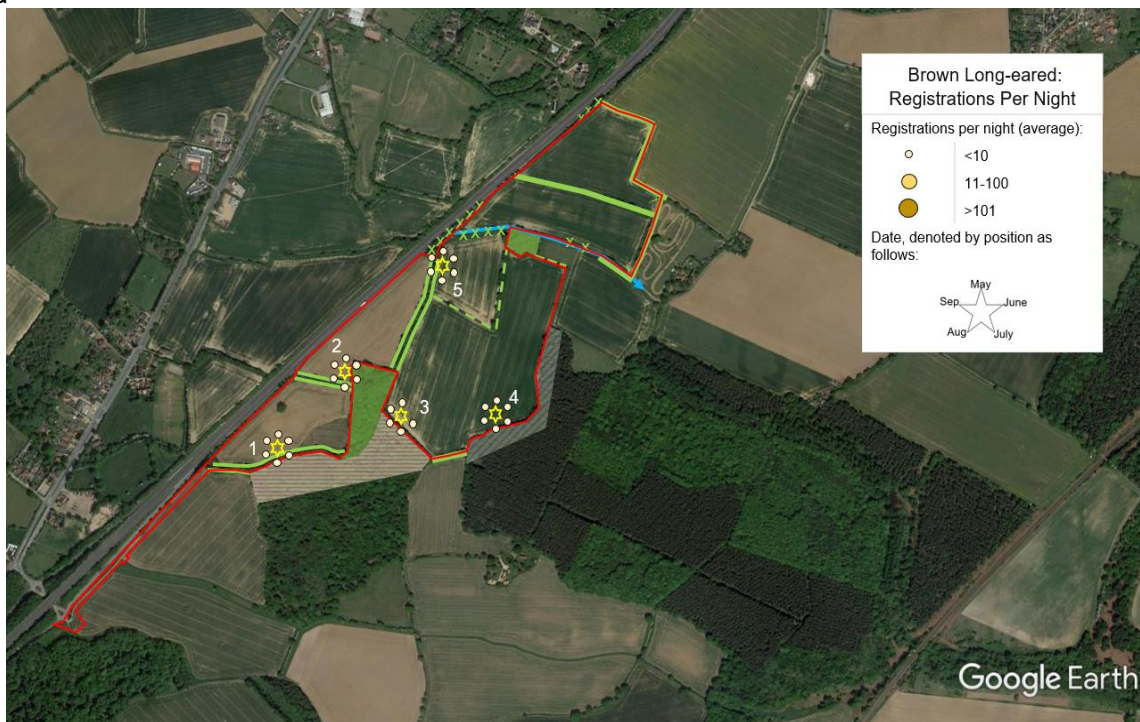
b



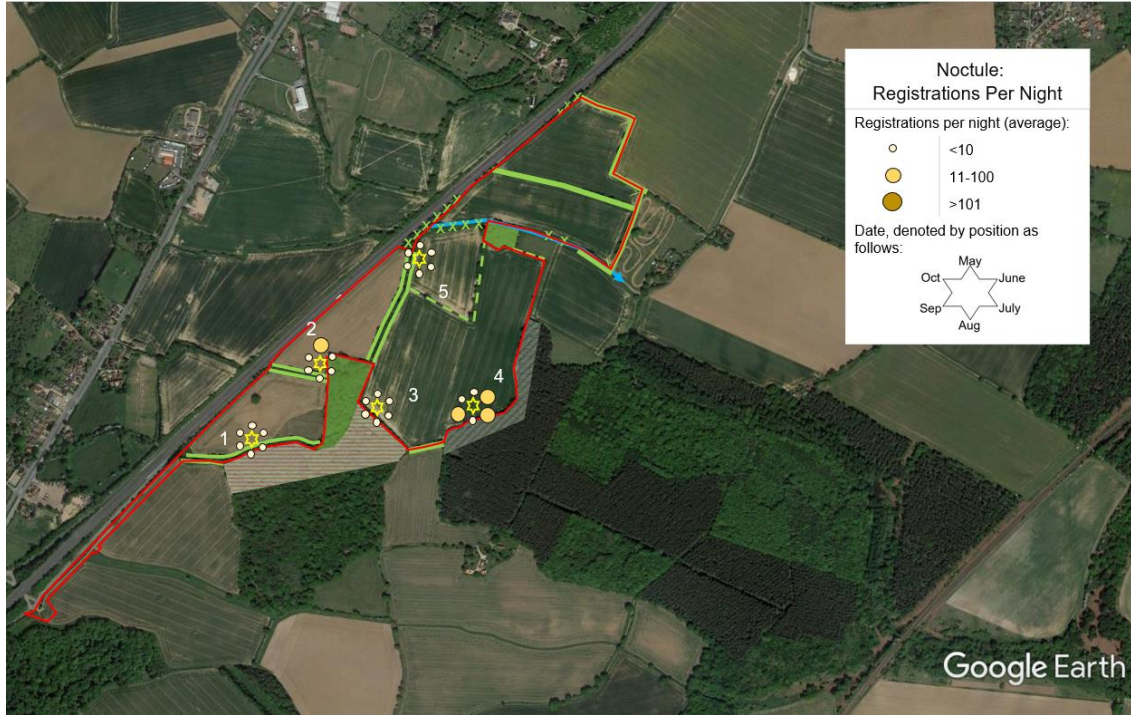
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e



f

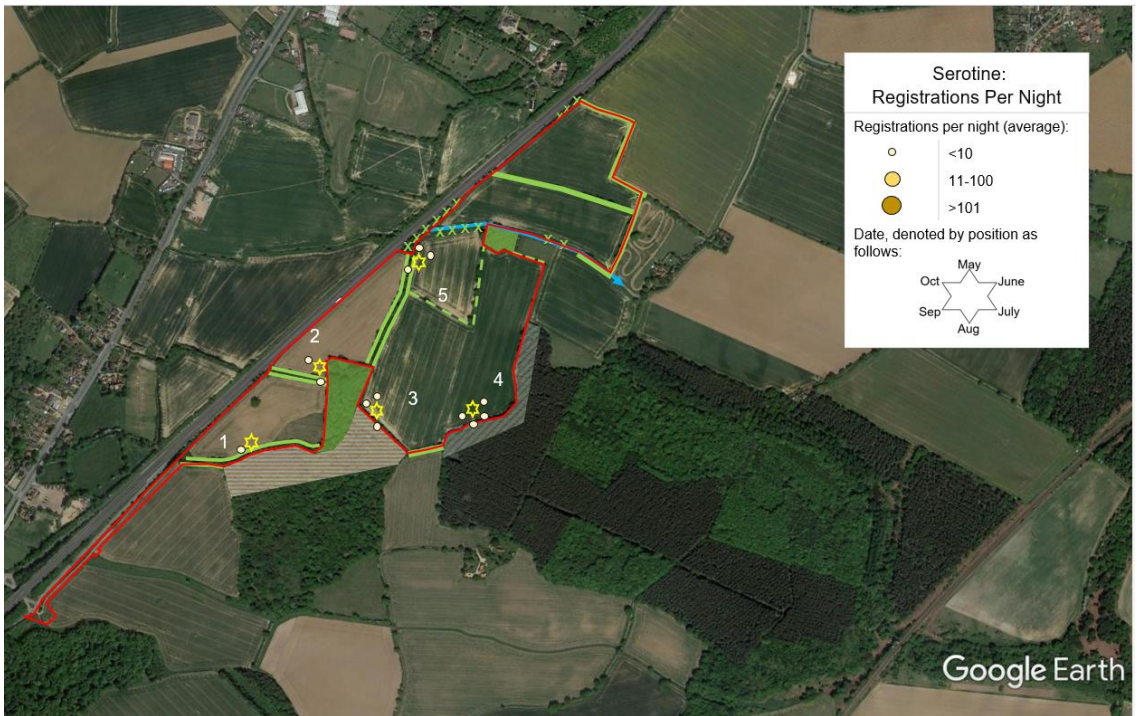
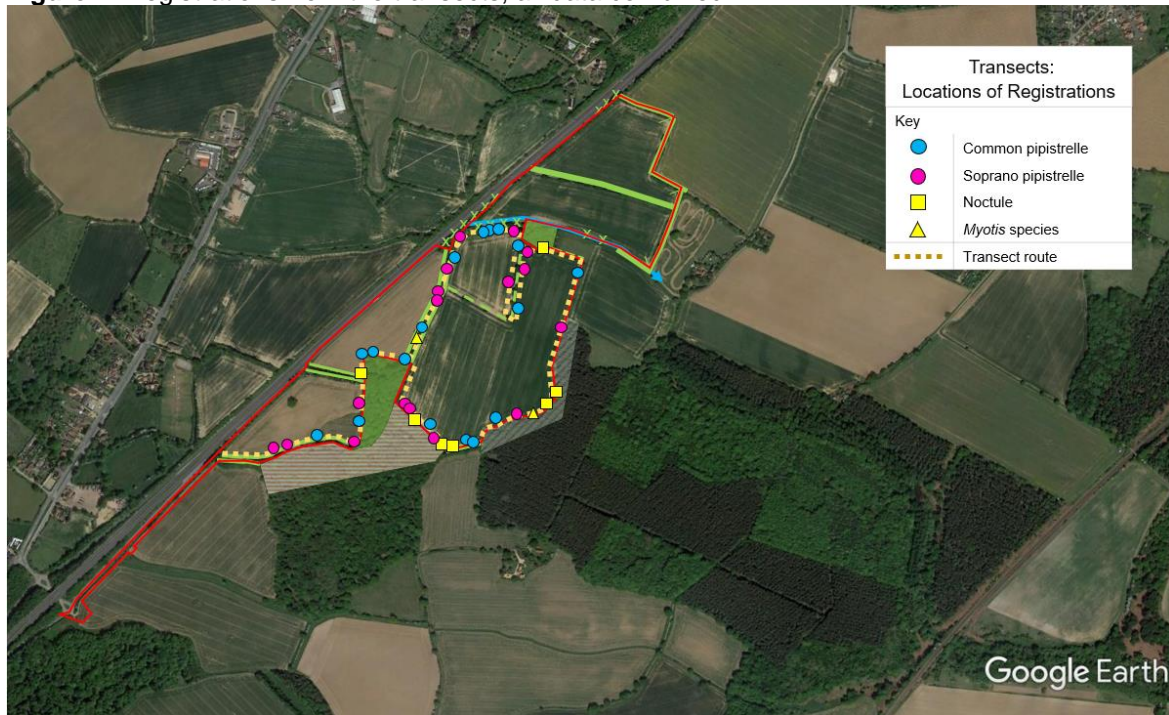


Figure 4. Registrations from the transects, all data combined.



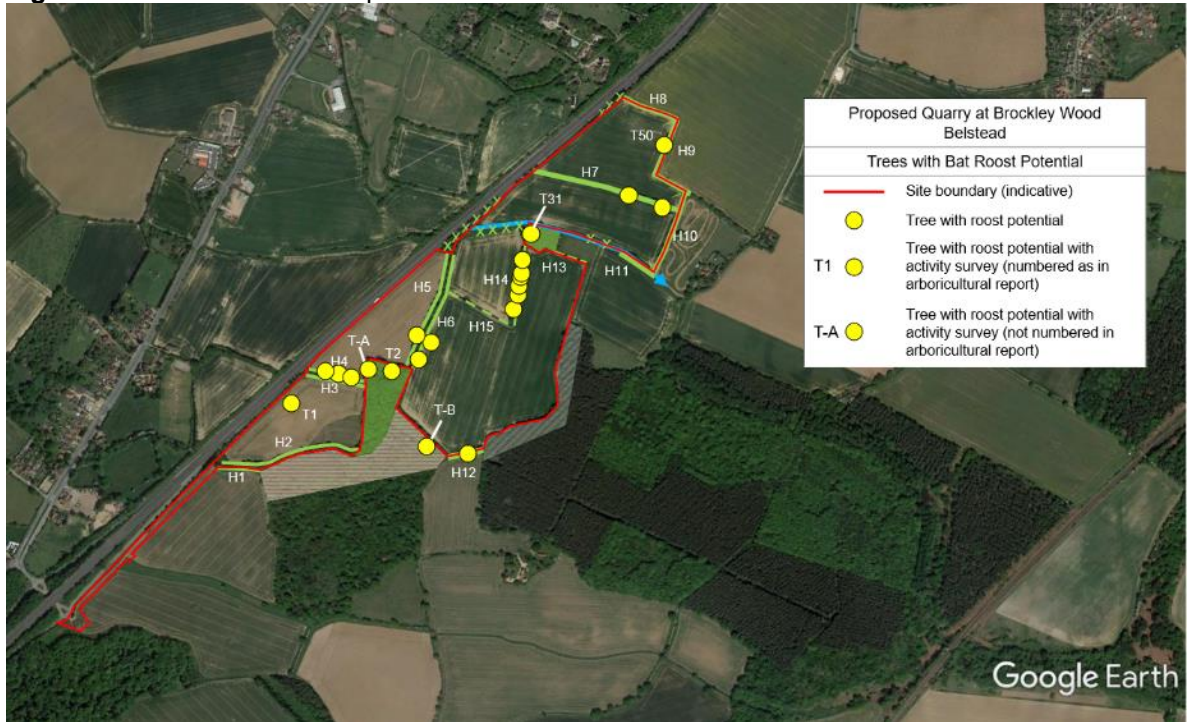
TREES

- 5.4 Twenty-one trees were considered to have potential roost features, either on-Site or nearby (Figure 5). Many of these were directly inspected from a ladder, which was relatively straightforward as most are pollards. The trees that were directly inspected mostly had lower quality features, such as open cavities and none had any evidence of roosting bats.
- 5.5 The remaining five trees on-Site or nearby were surveyed directly by a single surveyor and in most cases in conjunction with a thermal camera. Bats were not found to emerge or re-enter and on this basis roosts are not considered to be present, although it is recognised that the presence of bats cannot be discounted.

Table 8. Trees for which emergence / re-entry surveys were undertaken.

Tree reference	Details
T-B	Moribund woodland edge tree with extensive flaking bark. Emergence and re-entry survey (July and August).
T-A	Moribund woodland edge tree with extensive flaking bark. Emergence survey (July).
T1	Large open growth tree, with aerial dead wood. Emergence survey (July).
T2	Large open growth tree, with aerial dead wood. Emergence survey (July).
T50	Large open growth tree, with aerial dead wood. Emergence survey (July).

Figure 5. Trees with bat roost potential.



6. OTHER PROTECTED SPECIES

- 6.1 The only records from within 2km are for a Site 1.03km north-west. There are no ponds within 250m of the Site, the nearest marked pond on OS maps is 400m south.
- 6.2 [REDACTED] are scoped out on the basis of the absence of ponds within a relevant distance.

DORMICE

- 6.3 Dormice are known from several of the ancient woodland blocks in the landscape as an arc from the north (north of the A14) through the east to the south. There is a single record west of the A12. The nearest records are:
- Brockley Wood CWS (ancient woodland), 120m south with one other record from Brockley Wood. These records are believed to date from 2003.
 - In Old Hall Wood CWS the nearest record is 230m south east, with one other record from Old Hall Wood. These records are believed to date from 2002 and 2003
- 6.4 The survey effort is summarised below (Figure 6) and was based on 100 tubes placed in hedgerows and 46 nest boxes primarily in woodland edge areas of the Brockley Wood CWS (priority habitat). The tubes were set in May and checked from June to November, with the effort exceeding the required effort score of not less than 20 units (with an effort score of 20 units).
- 6.5 Dormice were not recorded in any of the tubes or boxes.

Figure 6. Locations of tubes (100, red) and nest boxes (46, yellow). The numbers show the sequence of tubes / boxes in each survey length.



REPTILES

- 6.6 The records for reptiles locally are for grass snakes, slow worm (the nearest records for both from 190m south-east) and common lizard (the nearest 1.25km north).

- 6.7 The field surveys deployed 35 refugia in the areas of highest potential quality for reptiles (along the stream edge and hedgerow edges), with checks in September – October, but no reptiles were recorded.

BADGERS

- 6.8 The data search records comprise sett and roadkill records (fifty in total), None are reported from or nearby the Site, other than for roadkill individuals on the A12.
- 6.9 No setts were found on-Site but a small sett of ~13 holes were found in a location towards the northern boundary of the Site. The location is kept confidential within this document, but an evaluation and assessment are provided within the remainder of the document.

7. BIRDS

DATA SEARCH

7.1 The data search returned an extensive list of species of conservation concern locally, associated with a wide range of habitats including some that are not relevant to the Site. Species potentially relevant to the Site are those of farmland and generalists of the wider countryside. Those known locally are:

- Farmland species: Kestrel, reed bunting, yellow wagtail, corn bunting, grey partridge, linnet, skylark, starling, stock dove, turtle dove, and yellowhammer.
- Generalists: cuckoo, meadow pipit, mistle thrush, house martin, house sparrow, swift, bullfinch, dunnock, song thrush, tawny owl, nightingale, sparrowhawk, spotted flycatcher, and willow warbler.

RESULT

7.2 Twenty seven species were recorded breeding on the Site (as confirmed, probable or possible breeding species). Of these, ten are listed on the Birds of Conservation Concern¹⁹ and / or as priority species (Table 9, Figure 7) while 18 do not have conservation status. These species include those present in woodland edge areas adjacent to the Site and boundary hedgerows.

Table 9. Species of conservation concern recorded as confirmed / probable or possible breeding species in the different surveys.

Species	Breeding status	Estimated no. breeding pairs	Conservation status
Skylark	Confirmed / probable	2	Priority species Red
Song thrush	Confirmed / probable	1-2	Priority species Red
Yellowhammer	Confirmed / probable	3	Priority species Red
Linnet	Confirmed / probable	1-2	Priority species Red
Greenfinch	Probable	1	Red
Whitethroat	Confirmed / probable	2	Amber
Mistle Thrush	Possible	1	Red
Dunnock	Confirmed / probable	3	Priority species Amber
Wren	Confirmed / probable	3	Priority species Amber
Nightingale	Possible	1	Red

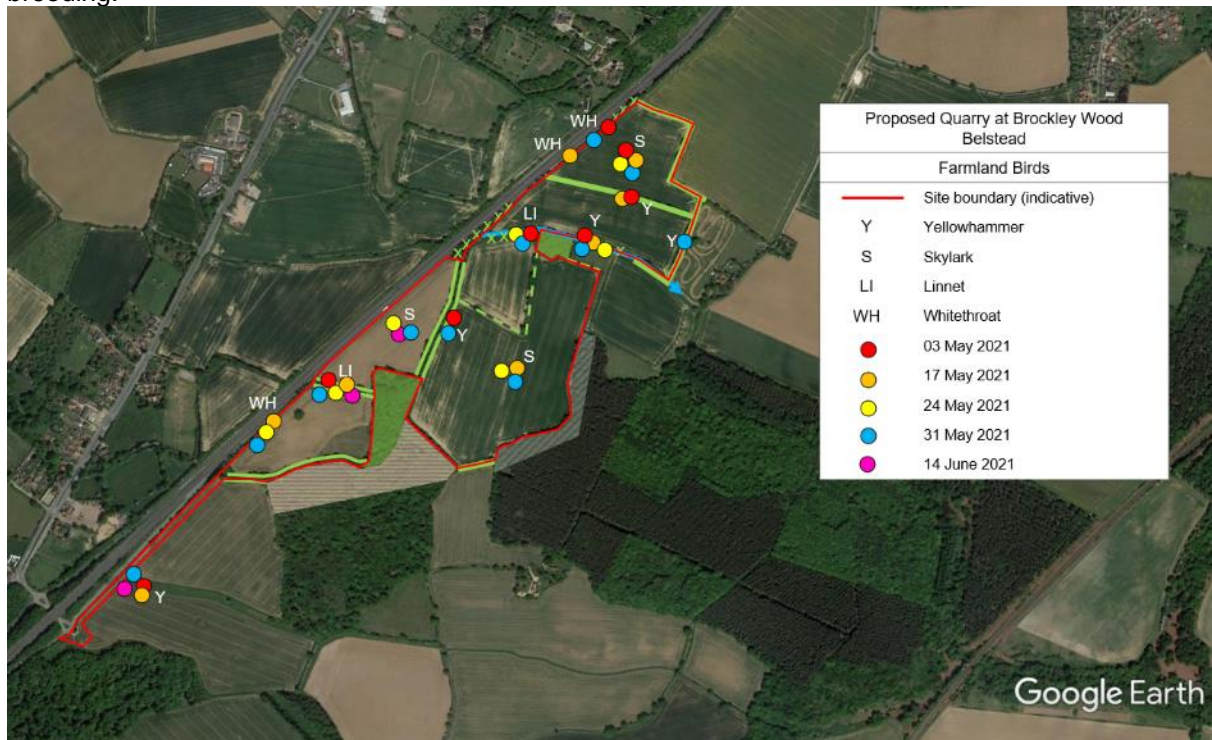
Table 10. Confirmed / probable and possible breeding species not of conservation concern.

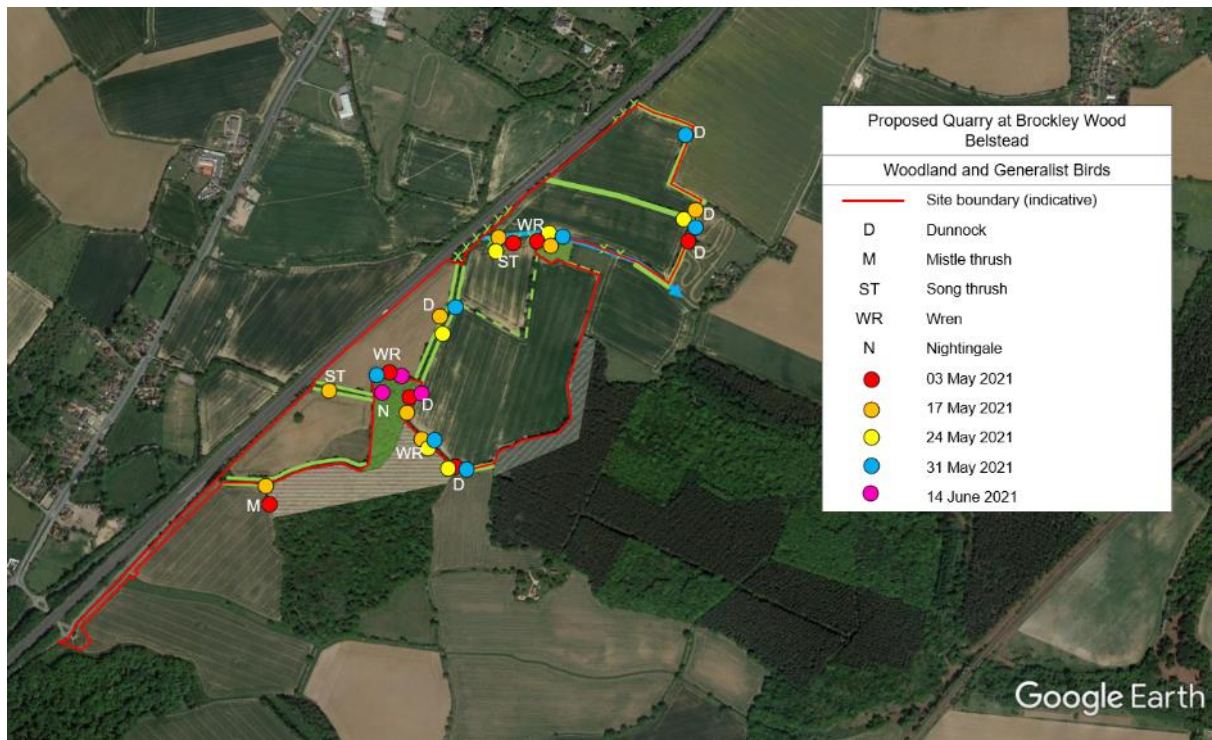
Species	Breeding status	Estimated no. breeding pairs
Blackbird	Confirmed	3
Blackcap	Confirmed	3
Chaffinch	Probable	4
Chiffchaff	Probable	2
Carrion crow	Possible	1
Goldcrest	Probable	1
Goldfinch	Probable	8
Great spotted woodpecker	Possible	1
Great tit	Possible	3

¹⁹ BTO (2021) *Birds of Conservation Concern 5*. Available from: <https://www.bto.org/sites/default/files/publications/bocc-5-a5-4pp-single-pages.pdf>

Species	Breeding status	Estimated no. breeding pairs
Blue tit	Probable	2
Lesser whitethroat	Confirmed	1
Nuthatch	Possible	1
Robin	Probable	8
Whitethroat	Confirmed	6
Long tailed tit	Probable	1
Coal tit	Probable	1
Treecreeper	Probable	1

Figure 7a and b. 2021. Registrations with species of conservation concern breeding or probably breeding.





WINTERING BIRDS

7.3 Nineteen species of conservation concern were recorded wintering on the open fields or boundary hedgerows, as mostly small flocks or singletons not repeatedly encountered in any particular areas (Table 11).

Table 11. Observations of wintering bird species of conservation concern recorded between November 2017 and March 2021.

Species	Observations	Peak Count	Red Amber or list species	Species Principal Importance	of
Woodpigeon	November to March	30+	Amber	-	
Stock dove	Foraging (November and December)	3	Amber		
Black-headed gull	Present November to February.	14	Amber	-	
Common gull	Foraging in December.	4	Amber	-	
Lesser black-backed gull	Small numbers in November to February.	6	Amber	-	
Mistle thrush	As singletons with peak in February.	3	Red	-	
Fieldfare	Small flock in February.	12	Red	-	
Redwing	Small flocks in December, January and February.	24	Red	-	
Song thrush	As singletons in each month and a peak count of 3.	3	Red	Yes	
Starling	Small foraging flocks on all visits.	8	Red	Yes	
Yellowhammer	January.	13	Red	Yes	
Meadow pipit	November to January mostly as singletons with small flock January	2	Amber	-	
Woodpigeon	November to March	30+	Amber	-	

Species	Observations	Peak Count	Red Amber or list species	Species Principal Importance	of
Rook	November to March	12	Amber	-	
Grey partridge	November	3	Red	-	
Lapwing	Singleton (January)	1	Red	-	
Stock dove	Foraging (November)	3	Amber		
Skylark	Small flocks in November to February.	13	Red	Yes	
Dunnock	Singletons across the Site.	5	Amber	Yes	

8. OTHER SPECIES OF CONSERVATION CONCERN

OTHER MAMMALS

8.1 Other mammals are scoped as follows:

- Hedgehogs, for which there are 113 records of hedgehogs locally. They probably forage over the Site and may shelter within the hedgerows.
- Brown hares were recorded as a peak count of 13 individuals during the bird surveys in early May 2021, located in the northern fields and north of Brockley Wood. The Site is likely to be used regularly by small numbers of brown hares.

INVERTEBRATES

8.2 The invertebrate records from within 2km comprise records for 69 species, and these data were analysed using the Pantheon analysis package of Natural England (Webb et al., 2018²⁰; Table 12). The species fall into four broad categories:

- Twenty-two species of widespread but declining moths which are typically habitat generalists (Butterfly Conservation, 2007²¹).
- Dead wood species, mainly beetles as characterised within the Pantheon output. These include the stag beetle as a charismatic species and a priority species.
- Open grassland species, mainly bees and wasps.
- Woodland / tree-associated butterflies, namely the white admiral *Limenitis camilla* (Lepidoptera: Nymphalidae) which feeds on honeysuckle *Lonicera periclymenum* and the white-letter hairstreak *Satyrrium w-album* (Lepidoptera: Lycaenidae) which feeds on elms.

Table 12. Pantheon profile analysis for the data search. Not all species are classified at finer resolutions.

Biotope	No. of species	Habitat	No. of species	Specific Assemblage Type	No. of species
Open habitats	32	Tall sward and scrub	19	-	-
		Short sward and bare ground	12	Bare sand and chalk	1
				Open short sward	2
		-	-	Rich flower resource	9
Tree-associated	28	Arboreal	11	-	-
		Shaded woodland floor	3	-	-
		Decaying wood	14	Bark and sapwood decay	9
				Heartwood decay	4
		Fungal fruiting bodies	1		
Wetland	3	Acid and sedge peats	1	Reed fen and pools	1

²⁰ Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M.C., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2018). *Pantheon - database version 3.7.6*. Available from: <https://www.brc.ac.uk/pantheon/>

²¹ Butterfly Conservation (2007) *Biodiversity Action Plan – Moths*. Available from: <https://butterfly-conservation.org/our-work/reports-and-factsheets/biodiversity-action-plans>

Biotope	No. of species	Habitat	No. of species	Specific Assemblage Type	No. of species
		Marshland		-	
		Running water	1	Slow flowing rivers	1

8.3 The field assessment of the Site identifies two microhabitats / resource suites of relevance to invertebrates:

- Dead wood, with the woodland block and also veteran trees. As assessed the dead wood resources of the woodlands are of no more than medium for continuity and diversity, and poor for volume throughout.
- Semi-natural vegetation in general, which is likely to support a small-medium sized assemblage of widespread but declining priority moths. These will be within the woodland and hedgerows feeding on a range of native shrubs and herbs.

9. EVALUATION

HABITATS

- 9.1 The only on-Site habitats considered to qualify as Habitats of Principal Importance (Maddock, 2011²²) are some but not all of the hedgerows, with several also qualifying as Important Hedgerows under the Hedgerow Regulations (Table 13).

Table 13. Summary of hedgerows and their statuses.

Status	Reference
Important hedgerow (and also priority Hedgerow Habitat of Principal Importance)	H1, H2, H3, H4, H5 and H6
Priority Hedgerow Habitat of Principal Importance only	H7, H8, H9, H10, H11, and H12
Defunct and not meeting conservation criteria	H13, H14, and H15

- 9.2 Other on-Site habitat areas are considered to be of low conservation value, while the off-Site woodland blocks are either priority habitat or ancient woodland. The coniferous woodland of Old Hall Wood CWS constitutes a plantation on ancient woodland and receives the same protection within the NPPF as ancient woodland.

SPECIES

- 9.3 The arable flora survey recorded two species of note:
- Common cudweed is classed as Near Threatened nationally due to population declines (Cheffings and Farrell, 2005²³). In Suffolk it is “*found on well-drained neutral to acid soils, found in arable and set-aside fields on sandy heaths, dry tracks and waste places. Declining nationally and classed as Near Threatened. Frequent in Suffolk where there are disturbed light soils*” (Sandford and Fisk, 2010²⁴).
 - Sharp-leaved fluellen, which has a restricted national distribution but is “*locally frequent in the south-west of Suffolk on boulder clay and occasional on loamy soils in the south-east*” (Sandford and Fisk, loc. cit.)
- 9.4 Using the Plantlife quality criteria (Byfield and Wilson, 2005²⁵) for Important Arable Plant Areas, the cudweed scores ‘9’ and the fluellen scores ‘2’, which falls substantially below the threshold of ‘20’ for sites of county importance. It is therefore considered the Site is of only local importance for arable herbs.

Bats

- 9.5 The arable habitats on the Site are considered to be of lower quality for foraging bats. The higher quality hedgerow, woodland edge and woodland vegetation are likely to produce an abundance of insect prey.
- 9.6 The scheme presented by Wray et al. (loc. cit.) is used to evaluate the Site for bats, based on the rarity of species, numbers of individuals, roosting potential of a locality, and the landscape

²² Maddock, A. (2011) *UK Biodiversity Action Plan Priority Habitat Descriptions*. Available from: http://jncc.defra.gov.uk/PDF/UKBAP_PriorityHabitatDesc-Rev2011.pdf

²³ Cheffings, C.M. and Farrell, L. (2005) *Species Status No. 7 The Vascular Plant Red Data List for Great Britain*. Available from: http://archive.jncc.gov.uk/pdf/pub05_speciesstatusvprelist3_web.pdf

²⁴ Sandford, M. and Fisk, R.J. (2010) *A Flora of Suffolk*. Privately published.

²⁵ Byfield A.J. and Wilson P. J. (2005) *Important Arable Plant Areas: identifying priority sites for arable plant conservation in the United Kingdom*. Plantlife International, Salisbury, UK.

character. The completed evaluation is shown in Table 14 and for each species the value of the Site and woodland edges are considered to be at the local scale rather than district or county scale.

Table 14. The 2018 evaluation of the Site for individual bat species.

Species	Criterion scores				Summed score	Value
	Rarity	No. of individuals	Roosting potential	Landscape value		
<i>Myotis</i> species	2	5	4	4	15	Local
Brown long-eared	2	5	4	4	15	Local
Common pipistrelle	2	10	4	4	20	Local
Soprano pipistrelle	2	10	4	4	20	Local
Serotine	5	5	4	4	18	Local
Noctule	5	5	4	4	18	Local

Dormice

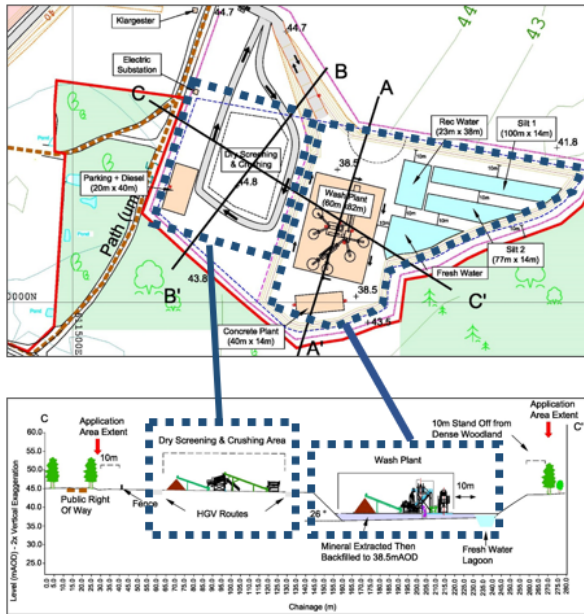
- 9.7 The woodlands in the local landscape are known to support an extensive population of dormice, and this population is likely to be of regional importance. The part of Old Hall Wood that abuts the Site is not suitable for dormice. Dormice were not recorded within the surveys and are therefore presumed absent and it should be assumed that in the adjacent parts of Brockley Wood they are either absent or present in very low numbers.

Other Species

- 9.8 The other species are evaluated as follows:

- Badgers. It is considered that there are no setts on-Site but there is a small sett abutting the Site. Notwithstanding legal protection this is of value at a local scale only.
- Birds. The overall assemblage of breeding and wintering birds is relatively small albeit including species of conservation concern, as both priority Species of Principal Importance and also those with Red- and Amber-listing. The species present, numbers of pairs and overall assemblage is likely to be typical of similar sites in the local landscape and scarcer species of farmland and also woodland specialists were not recorded. The Site is considered to be only local importance for birds.
- Hedgehogs are likely to be present as components of larger local population, and the Site does not have features of particular value.
- Brown hares are present as components of larger local population, and the overall numbers are likely to be typical of other similar farmland sites locally.
- Invertebrates are likely to be mainly associated with dead wood in on-Site trees and off-Site woodland and more generally with semi-natural vegetation. While the wider woodland blocks locally are probably of county or greater value for invertebrates, the extent of dead wood and semi-natural vegetation on-Site is unlikely to be of greater than local value in isolation and in the context of these woodlands.

Figure 9. Interim plant area: an aerial plan and cross section to show the infrastructure located below current ground level and at ground level.



INTERIM PLANT AREA

The parcel north-east of Brockley Wood will be partially extracted, with the wash plant, lagoon and concrete batch plant located below the existing level.

At the current level the infrastructure will comprise the dry screening and crushing area and the parking area and access routes.

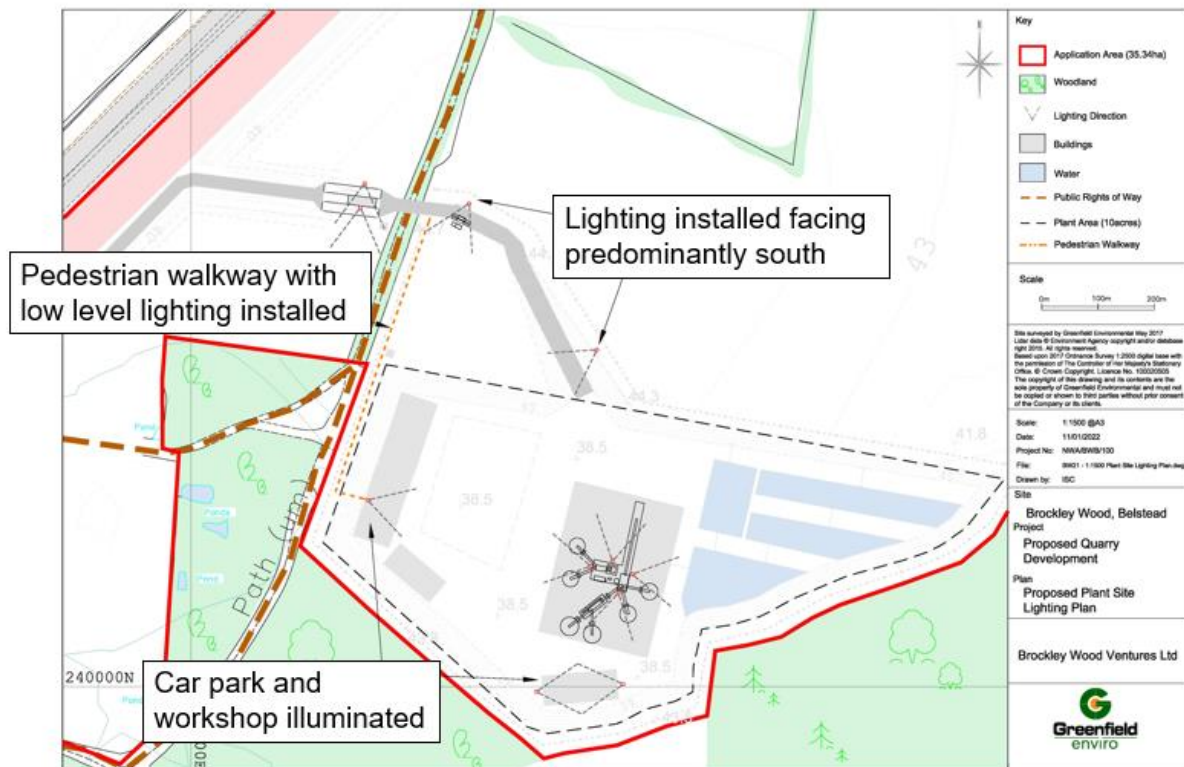
The top figure shows an aerial plan, and the bottom figure shows a section north-east to south-east with the navy lines connecting the relevant areas.

FINAL PLANT AREA

Following phase 2, the western part of the plant area will be beneath ground level

10.3 Night time lighting will be required as shown in Figure 10, located to the south and west of the plant area.

Figure 10. Lighting plan (with annotations).



10.4 Noise levels will be above background and calculated to be 61dB in the woodland edge areas nearest the plant area. As estimated from the noise contour plots²⁶ during the interim stage the maximum noise

²⁶ Sharps Redmore (2022) *Brockley Wood, Belstead. Proposed Quarry. Assessment of Sound Levels*. Unpublished report.

levels within the Brockley Wood edge would be 59 to 91 dB reducing to 57 to 59 dB at the final plant stage (end of phase 2).

IMPACTS

10.5 A summary assessment is provide below for different pathways of potential impacts (Table 15), noting that the scheme has been designed to minimise impacts via an iterative process. The impacts that are considered to be minor rather than negligible are:

- Dust generation and woodland.
- Disturbance of woodland habitat by workers.
- Habitat removal in relation to hedgerows and trees.
- Habitat removal for nesting birds.
- Noise in relation to roosting bats and breeding birds.
- Disturbance to badgers.

10.6 Arable herbs are likely to benefit from the scheme.

Table 15. Construction and operational phase impacts.

Receptors	Pathway of potential impact	Assessment
Designated sites: statutory	Possibly soil run-off	Negligible impact given the destination of any run-off and the length of the route to designated sites.
Designated sites: County Wildlife Sites	See 'woodland', below	See 'woodland', below.
Habitat: woodland	Direct impacts	Direct impacts on the woodland are assessed via information and assessment within the arboricultural report ²⁷ . All woodland will be retained with an additional 10m buffer to ensure extraction works do not damage tree roots. The 10m buffer zone must be strictly adhered to where adjacent to the woodlands and where possible avoid all root areas of trees being retained where their root areas extend into the site. There are few areas where the 10m buffer needs to be extended as trees are generally offset from the field boundary. The direct impacts of excavation on woodland are therefore assessed as negligible.
	Dust	Dust generated by traffic, excavation and associated works will be inert, in as much as it will be derived from local material and will presumably have a similar chemistry and composition. The main impact of dust would probably be physical, in terms of covering leaves and surfaces. Given the separation of the works from the woodland the overall extent is likely to be low and impacts would be minor.
	General disturbance	There may be use of the woodland by workers and staff for informal recreation during breaks and similar times. This would result in general disturbance and trampling. The extent in terms of numbers of visits and their spatial extent would probably be low and impacts would therefore be minor.

²⁷ Oakfield Trees (2022) *Arboricultural Impact Assessment. Proposed Quarry. Brockley Wood, Belstead, Suffolk*. Unpublished report.

Receptors	Pathway of potential impact	Assessment
Habitat - hedgerows and trees	Direct habitat loss	<p>Three lengths of hedgerow will be removed with eight veteran trees:</p> <ul style="list-style-type: none"> • H7: a defunct hedgerow with standard trees including two veterans (T42 and T45). • H14: a defunct hedgerow with standard trees including six veterans (T18, T20, T23-T26). • H15: a defunct hedgerow with standard trees but not veterans. <p>Other works on hedgerows will be minor and the access track will use an existing gap without vegetation where it crosses H5 and H6.</p> <p>The ecological significance of the tree removals is likely to be minor, based on the absence of bat roosts based on direct inspection and their isolation within defunct hedgerows reducing their association with other habitat and foraging areas.</p>
	Disturbance including dust	See 'woodland', above.
Arable herbs	Habitat loss and disturbance	The species of greater value identified during surveys were arable herbs, associated with open disturbed ground. These are likely to benefit from operations, creating new habitat areas without agricultural inputs such as herbicide. Arable herbs are likely to benefit from works.
Roosting bats	Noise	<p>The presence of roosts within the woodland edge areas of Brockley Wood cannot be discounted, even though none were found.</p> <p>In relation to noise, there are anecdotal examples of bats roosting and tolerating noisy locations such as road bridges, although formal studies are apparently absent (Berthinussen et al., 2021²⁸). However, it is likely that roosting bats attenuate to noise (Luo et al., 2014²⁹) and the presence of bats in urban areas such that attenuation is likely (Russo and Ancillotto, 2015³⁰).</p> <p>It is likely that noise from operations will have a negligible impact on roosting bats, but as a precautionary assessment this is assessed as minor.</p>
	Lighting	<p>Trees with roosts were not located but it should be assumed that woodland edge areas nevertheless have roosts.</p> <p>The lighting scheme shows limited lighting and following phase 2 all of the structures with lighting will be below ground level. The separation between the woodland edge and lighting is also</p>

²⁸ Berthinussen, A., Richardson O.C. and Altringham J.D. (2021) *Bat Conservation: Global Evidence for the Effects of Interventions. Conservation Evidence Series Synopses*. University of Cambridge, Cambridge, UK.

²⁹ Luo, J., Clarin, B.-M., Borissov, I. M. and Siemers, B. M. (2014) Are torpid bats immune to anthropogenic noise? *The Journal of Experimental Biology* 217, 1072-1078.

³⁰ Russo, D. and Ancillotto, L. (2015) Sensitivity of bats to urbanization: a review. *Mammalian Biology*, 80(3), 205-212.

Receptors	Pathway of potential impact	Assessment
		substantial and light spill will be limited by the design of the lighting scheme. Lighting impacts on roosts are therefore assessed as negligible.
	Loss of trees with roost potential	None of the trees with roost potential were found to have evidence of bat roosting when inspected, and the cavities and voids within these trees were generally of low suitability. Direct tree loss is therefore assessed as of negligible impact to roosts.
Foraging bats	Noise	Noise will be during working hours and with little overlap to periods when bats may be foraging. While some bats are sensitive to anthropogenic noise while foraging (Luo et al., 2015 ³¹) the short overlap of noise generation and the availability of alternative foraging areas is sufficient to conclude that the impacts of noise on foraging bats will be negligible.
	Lighting	The extent of lighting is relatively restricted and for much of the year will be outside of periods when bats will be foraging, although bats will continue to forage in autumn and winter. Given the small spatial spread of light spill, impacts on foraging bats are therefore assessed as negligible.
	Habitat loss of hedgerows	The reduction in available habitat during individual phases is likely to be relatively small in the local context and more widely in the landscape. This loss of habitat is assessed as being of negligible significance.
Dormice	Lighting	Dormice are considered absent from the adjacent woodland areas but present elsewhere in Brockley Wood. The areas where light spill is possible were included in the survey without dormice being found, and impacts will therefore be negligible.
	Noise	Dormice are considered absent from the adjacent woodland areas but present elsewhere in Brockley Wood. There do not appear to be studies to consider noise disturbance to dormice, but they are certainly known to live in roadside vegetation (Downs et al. 2020 ³²) while Friebe et al. (2018) ³³ conclude that they do not avoid busy and major roadside areas and associated disturbance including noise. On the basis of the known association of dormice with roadside habitats it is concluded that the noise generated by the scheme is unlikely to affect dormice and the impact is likely to be negligible.
Badgers	Direct damage	Direct impacts on badger setts will be avoided through physical separation of excavations from entrances by at least 20m.

³¹ Luo, J., Siemers, B. M. and Koselj, K. (2015) How anthropogenic noise affects foraging. *Global Change Biology*, 21(9), 3278-3289.

³² Downs, N.C., Dean, M., Wells, D. and Wouters, A. (2020) Displacing and translocating hazel dormice (*Muscardinus avellanarius*) as road development mitigation measures. *Mammal Communications* 6: 1-9, London.

³³ Friebe, K., Steffens, T., Schulz, B., Valqui, J., Reck, H. and Hartl, G. (2018) The significance of major roads as barriers and their roadside habitats as potential corridors for hazel dormouse migration—a population genetic study. *Folia Zoologica*, 67(2), 98-109.

Receptors	Pathway of potential impact	Assessment
	Disturbance	<p>Disturbance to badgers is possible, through vehicle movements and excavations, plus the wider disturbance creating by excavation. This would be most relevant during phase 3.</p> <p>At this stage it is assumed that licensing for disturbance of setts would be required, and mitigation options may include new sett creation in areas where disturbance will be minimal. Such licensing and mitigation are entirely feasible and achievable within the scheme.</p> <p>The decision on the approach to badger mitigation will ultimately be taken closer to the start of phase 3 works and informed by additional surveys. Key consideration will be the numbers and locations of sett entrances and the extent to which individual entrances may be connected. If the level of activity at the south end of the wood is low and isolated it may be appropriate to only close a limited numbers of entrances (part of the wider sett) or indeed to undertake work on a precautionary or low impact basis. Additionally, the nature of works in the vicinity will be key consideration, including whether the offence would constitute disturbance as opposed to destruction of any sett.</p>
Birds	Noise	<p>In response to anthropogenic noise, various studies have shown changes in bird behaviour and also reduction in reproductive success (Ortega, 2012³⁴). The noise from the scheme would be characterised as regular but intermittent, and restricted to working hours. Birds could show a range of adaptive responses such as altering when they sing, with the most extreme response being avoidance of areas affected by elevated noise (Potvin, 2017³⁵).</p> <p>Quantifying the responses of birds to increased noise levels is not possible, but key consideration are that the noise will be regular and therefore increase the likelihood of behavioural attenuation or tolerance of the noise. The noise will also be only within working hours such that early mornings when birds are calling and singing in spring and summer would be outside of these times.</p> <p>In summary the noise is likely to affect bird behaviour to some extent, but any knock-on impacts to breeding success within areas will elevated noise are difficult to assess. The impacts of noise are therefore assessed as minor.</p>
	Habitat loss of arable and hedgerows	<p>The reduction in available habitat during individual phases is likely to be relatively small in the local context and more widely in the landscape. This loss of habitat is assessed as being of negligible significance.</p> <p>Risk of nest destruction can be mitigated via the timing of clearance.</p>

³⁴ Ortega, C. P. (2012) Chapter 2: Effects of noise pollution on birds: A brief review of our knowledge. *Ornithological monographs*, 74(1), 6-22.

³⁵ Potvin, D. A. (2017) Coping with a changing soundscape: avoidance, adjustments and adaptations. *Animal Cognition*, 20(1), 9-18.

Receptors	Pathway of potential impact	Assessment
Hedgehogs	Habitat loss of hedgerows	The reduction in available habitat during individual phases is likely to be relatively small in the local context and more widely in the landscape. This loss of habitat is assessed as being of negligible significance.
Brown hares	Habitat loss of arable	The reduction in available habitat during individual phases is likely to be relatively small in the local context and more widely in the landscape. This loss of habitat is assessed as being of negligible significance.
Invertebrates	Lighting	A range of invertebrates would be affected by artificial lighting (Boyes et al., 2021a ³⁶) including local densities of caterpillars rather than adults (Boyes et al., 2021b ³⁷). The extent of light spill into woodland edge areas will be limited, as described for foraging bats. It is likely that any negative impacts would be very small and are assessed as negligible.
	Habitat loss of hedgerows	The reduction in available habitat is likely to be relatively small in the local context and more widely in the landscape. This loss of habitat is assessed as being of negligible significance.

MITIGATION

- 10.7 As specific additional measures in relation to where potential impacts are assessed as minor rather than negligible (Table 16),

Table 16. Summary of additional mitigation recommendations.

Pathway	Receptor	Mitigation
Dust generation	Woodland	Dust suppression measures during periods of excessively dry weather.
Disturbance (human)	Woodland	Restrictions on worker access through a code of conduct or similar.
Habitat removal	Hedgerows and trees	Replacement plant as part of restoration.
Habitat removal	Nesting birds	Timing of works outside of the nesting bird season (which runs March to August) or, if necessary, under watching brief.
Noise	Roosting bats and breeding birds	Additional mitigation is likely to be difficult and a minor residual impact is likely during operation.
Disturbance from machinery and operations	Badgers	Licensing of works, if necessary, depending on the occurrence of badgers at relevant times. Mitigation may include sett creation if disturbance is likely to be high. This mitigation is considered to be realistic and feasible.

³⁶ Boyes, D.H., Evans, D.M., Fox, R., Parsons, M.S., & Pocock, M.J. (2021) Is light pollution driving moth population declines? A review of causal mechanisms across the life cycle. *Insect Conservation and Diversity*, 14(2), 167-187.

³⁷ Boyes, D.H., Evans, D.M., Fox, R., Parsons, M.S., & Pocock, M.J. (2021) Street lighting has detrimental impacts on local insect populations. *Science Advances*, 7(35), eabi8322.

RE-SURVEYS

10.8 In advance of each phase of works re-survey is likely to be required to ensure legal compliance with respect of badgers, roosting bats in trees and possibly also dormice. The interval before works and surveys should not be greater than two years, and in the case of badgers 3 months.

HABITAT RESTORATION

10.9 Habitat restoration is proposed for the loss of hedgerows and trees (Figure 11):

- Woodland planting as a belt north of the stream.
- Woodland planting adjacent to the A12, on a 3m screening bund.
- Reinstatement hedgerow planting.

Figure 11. Restored landscape.



10.10 In broad terms the targets for ecological enhancement will focus on dormice, but with knock-on benefits to a range of species which will utilise new planting including bats, birds, invertebrates and others. The prescriptions for the planting therefore comprise:

- Trees. To provide longevity for individual trees, with a target for them to become veterans over the long-term, there should be planting of trees where they will not be crowded by neighbouring trees. This will allow them to develop open growth forms with veteran features such as hollow limbs and heartwood decay.
- Woodland and scrub should aim to create areas of dense thickets with a high abundance of hazel, honeysuckle *Lonicera periclymenum* and also dense bramble, which are both associated with dormice populations Goodwin et al., 2018³⁸; Woodland

³⁸ Goodwin, C., Suggitt, A., Bennie, J., Silk, M., Duffy, J., Al-Fulaij, N., Bailey, S., Hodgson, D., McDonald, R. (2018). Climate, landscape, habitat, and woodland management associations with

Trust, undated³⁹. Physical gaps between hedgerows and woodland should also be minimised as far as possible, to provide a network of connected habitats.

10.11 Within the specific proposals for the landscaping masterplan there is a net gain in the lengths of hedgerow and also new woodland planting which has the potential to provide new habitat areas for dormice and also improve connecting to existing areas:

- The hedgerow planting and enhancement includes hedgerow H12 which occupies a strategic location between Brockley Wood and Old Hall Wood.
- Reinforcement and infill of hedgerows H5 and 6 are proposed as part of the restoration, which will increase connectivity from Brockley Wood northwards towards the existing block of woodland and also the new woodland planting within the Site and along the A12 boundary.

BIODIVERSITY NET GAIN

10.12 Calculations for Biodiversity Net Gain are provided separately.

hazel dormouse *Muscardinus avellanarius* population status *Mammal Review* 48(3), 209-223.
<https://dx.doi.org/10.1111/mam.12125>

³⁹ <https://ptes.org/wp-content/uploads/2014/06/managing-woodlands-for-dormice-final.pdf>

11. CONCLUSIONS

- 11.1 The species and species groups that are present or likely to be present are assessed as being of value at the local scale, rather than being of district or county value.
- 11.2 The pathways and receptors where impacts are assessed as minor rather than negligible are:
- Dust generation and woodland.
 - Disturbance of woodland habitat by workers.
 - Habitat removal in relation to hedgerows and trees.
 - Habitat removal for nesting birds.
 - Noise in relation to roosting bats and breeding birds.
 - Disturbance to badgers.
- 11.3 Mitigation is proposed for these pathways either during works or on completion and impacts can be reduced to negligible. During operation the disturbance to birds and roosting bats from noise is assessed as a minor negative residual impact.
- 11.4 As part of landscape restoration, new planting should be discussed towards creating new areas of habitat for dormice, to form a connected network of suitable habitat. Tree planting should also include provision for well-spaced trees with the aim for these to develop open growth forms and veteran characteristics in the long-term.

12. APPENDIX 1: HABITATS

ARABLE WEEDS

The arable weed survey was undertaken to identify if any ‘Nationally threatened’ (i.e. critically endangered, endangered or vulnerable) arable vascular weed species (Cheffings et al., loc. cit.) were present and to assess whether species assemblages constituted an ‘Important Arable Plant Area’ following Plantlife criteria (Byfield and Wilson, loc. cit.).

The survey was on 19 May 2021, and comprised a walkover of the field margins and verges

A simple ‘DAFOR scale’ ranking (where D = dominant, A= abundant, F = frequent, O = occasional and R = rare) was assigned to give an approximate indication of species abundance.

No nationally threatened vascular arable plants were recorded within the survey area (Table A1). The Site and wider survey area do not constitute an Important Arable Plant Area based on Plantlife criteria (Byfield and Wilson, loc. cit.), and the two species of greatest note were:

- Common cudweed *Filago vulgaris*.
- Round-leaved fluellen *Kickxia spuria*.

Table A1. Arable vascular herbs and grasses recorded on-Site (Key: DAFOR scale: D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare (highest level/survey indicated)).

Species	Abundance
Grasses	
Creeping bent <i>Agrostis stolonifera</i>	O
Black grass <i>Alopecurus myosuroides</i>	R
False oat-grass <i>Arrhenatherum elatius</i>	O
False brome <i>Brachypodium sylvaticum</i>	R
Soft brome <i>Bromus hordeaceus</i>	O
Barren brome <i>Bromus sterilis</i>	O
Cock’s-foot <i>Dactylus glomerata</i>	R
Common couch <i>Elymus repens</i>	R
Italian rye-grass <i>Lolium multiflorum</i>	R
Perennial rye-grass <i>Lolium perenne</i>	O
Annual meadow-grass <i>Poa annua</i>	O
Herbs	
Yarrow <i>Achillea millefolium</i>	R
Garlic mustard <i>Alliaria petiolata</i>	O
Scarlet pimpernel <i>Anagallis arvensis</i>	O
Cow parsley <i>Anthriscus sylvestris</i>	O
Common orache <i>Atriplex patula</i>	R
Shepherd’s purse <i>Capsella bursa-pastoris</i>	R
Nodding thistle <i>Carduus nutans</i>	R
Sea mouse-ear <i>Cerastium diffusum</i>	R
Fat-hen <i>Chenopodium album</i>	O
Many-seeded goosefoot <i>Chenopodium polyspermum</i>	R
Creeping thistle <i>Cirsium arvense</i>	R
Hemlock <i>Conium maculatum</i>	R
Field bindweed <i>Convolvulus arvensis</i>	O
Canadian fleabane <i>Conyza canadensis</i>	R
Swine-cress <i>Coronopus squamatus</i>	O
Teasel <i>Dipsacus fullonum</i>	
Hoary willow-herb <i>Epilobium parviflorum</i>	O
Sun spurge <i>Euphorbia helioscopia</i>	
Common cudweed <i>Filago vulgaris</i>	
Cleavers <i>Galium aparine</i>	F

Species	Abundance
Cut-leaved crane's-bill <i>Geranium dissectum</i>	O
Dove's-foot crane's-bill <i>Geranium molle</i>	
Herb-robert <i>Geranium robertianum</i>	R
Ground-ivy <i>Glechoma hederacea</i>	O
Hogweed <i>Heracleum sphondylium</i>	O
Field forget-me-knot <i>Myosotis arvensis</i>	R
Sharp-leaved fluellen <i>Kickcia elatine</i>	R
White dead-nettle <i>Lamium album</i>	O
Purple dead-nettle <i>Lamium purpureum</i>	
Nipplewort <i>Lapsana communis</i>	O
Hoary cress <i>Lepidium draba</i>	
Autumnal hawkbit <i>Leontodon autumnalis</i>	
Common mallow <i>Malva sylvestris</i>	
Pineapple mayweed <i>Matricaria discoides</i>	R
Scented mayweed <i>Matricaria recutita</i>	
Redshank <i>Persicaria maculosa</i>	R
Bristly ox-tongue <i>Picris echioides</i>	O
Greater plantain <i>Plantago major</i>	
Common knotgrass <i>Polygonum aviculare</i>	O
Clustered dock <i>Rumex conglomeratus</i>	O
Curled dock <i>Rumex crispus</i>	O
Common ragwort <i>Senecio jacobaea</i>	O
Groundsel <i>Senecio vulgaris</i>	A
White campion <i>Silene alba</i>	
Charlock <i>Sinapsis arvensis</i>	R
Perennial sow-thistle <i>Sonchus arvensis</i>	
Smooth sow-thistle <i>Sonchus oleraceus</i>	R
Hedge mustard <i>Sisymbrium officinale</i>	O
Hedge woundwort <i>Stachys sylvatica</i>	
Dandelion <i>Taraxacum agg.</i>	R
Field penny-cress <i>Thlaspi arvense</i>	
Upright hedge-parsley <i>Torilis japonica</i>	
Scentless mayweed <i>Tripleurospermum inodorum</i>	O
Common nettle <i>Urtica dioica</i>	F
Small nettle <i>Urtica urens</i>	O
Germander speedwell <i>Veronica chamaedrys</i>	
Common field speedwell <i>Veronica persica</i>	O
Field pansy <i>Viola arvensis</i>	

DEADWOOD

To further describe semi-natural character of the woodland, the dead wood resource was appraised using the Hubble and Hurst (loc. cit.) semi-quantitative method. Thus, 16 types are identified on a presence-absence basis and on a semi-quantitative scale:

- Sun-baked wood
- Fungus-infected bark
- Fine branches and twigs (on the ground, below 5 cm diameter)
- Bracket fungi
- Birds' nest holes
- Stumps
- Hollow trees (can be whole trunks or single branches)
- Dead outer branches (still attached to the tree)
- Rot-holes
- Standing dead trunks
- Roots showing signs of decay
- Well-rotted timber
- Wet fallen wood in long-term water features
- Rotten heartwood

- Burnt wood
- Large fallen timber (above 5 cm diameter)

Three measures of dead wood resource are used:

- **Diversity**, which is measured as the number of dead wood types present, with a score of 0 - 8 types indicating a 'poor' dead wood diversity, 9 - 11 'medium' and 12 - 16 'good'.
- **Dead wood volume**, as a summed frequency of all the dead wood types, with each type assigned a score of 0-4, where '4' = 'abundant', '3' = 'frequent', '2' = 'occasional', '1' = 'rare' and '0' is 'absent'. A summed score of 0 - 19 indicates a 'poor' dead wood volume, 20 - 25 'medium' and 26 or more 'good'.
- **Continuity**, as a measure of the dead wood stages present. Woodlands with 'poor' continuity have few species of dead wood, especially of key species, with gaps in the range of decay stages and dead wood types; woodlands with 'medium' continuity have the key tree species and most decay stages; woodlands with 'good continuity have the key species, with each having a range of decay stages and dead wood types present.

13. APPENDIX 2: BAT SURVEYS

METHODS

The survey methods are in accordance with bat Conservation Trust recommendations (Collings, 2016⁴⁰). Foraging surveys comprised monthly transect and static recording surveys (using 5-nights of survey per month with five Anabat Express units) (Table A2). Emergence survey details are given in Table A3.

Table A2. Details for bat foraging surveys.

Date	Survey type	Weather
16 May 2021	Transect and start of static recordings	14°C, fairly, calm and dry
06 June 2021	Transect and start of static recordings	19°C, warm, calm and dry
11 July 2021	Transect and start of static recordings	18°C, warm, calm and dry
22 August 2021	Transect and start of static recordings	18°C, warm, calm and dry
26 September 2021	Transect and start of static recordings	18°C, warm, calm and dry
11 October 2022	Transect and start of static recordings	16°C, warm, calm and dry

Table A3. Dates for tree emergence surveys.

Tree reference	Details	Date	
T-B	Emergence and re-entry survey (July and August).	17 July 2021 28 August 2021	21°C, calm and dry 13°C, calm and dry
T-A	Emergence survey (July).	18 July 2021	20°C, calm and dry
T1	Emergence survey (July).	19 July 2021	20°C, calm and dry
T2	Emergence survey (July).	23 July 2021	15°C, calm and dry
T50	Emergence survey (July).	25 July 2021	18°C, calm and dry

RESULTS

The static recorder data are shown in Tables A4, with station references cross-referencing to the main text.

Table A4. Static recorder summary data.

Species and station	Total registrations over 5-nights							Average registrations per night					
	May	Jun	Jul	Aug	Sep	Oct	Sum	May	Jun	Jul	Aug	Sep	Oct
Common pipistrelle													
1	862	783	648	1037	1495	254	5078	172.5	156.6	129.6	207.48	298.9	50.8
2	526	721	831	758	683	302	3819	105.1	144.1	166.1	151.5	136.6	60.4
3	315	446	526	523	240	200	2249	63.1	89.1	105.2	104.5	48.0	40
4	282	296	257	453	545	184	2016	56.3	59.2	51.5	90.6	108.9	36.8
5	241	273	358	237	125	197	1429	48.1	54.6	71.5	47.3	25	39.4
	14593												
	Total registrations over 5-nights							Average registrations per night					
Soprano pipistrelle	May	Jun	Jul	Aug	Sep	Oct	Sum	May	Jun	Jul	Aug	Sep	Oct

⁴⁰ Collins, J. (2016) *Bat Surveys for Professional Ecologists*. Bat Conservation Trust, London.

1	111	115	570	615	214	89	1714	22.2	23.068	114.1	123	42.7	17.8	
2	76	321	379	350	431	129	1687	15.3	64.256	75.8	70.1	86.2	25.8	
3	78	737	498	330	382	215	2240	15.7	147.4	99.7	65.9	76.4	43	
4	44	218	177	83	24	238	784	8.7	43.68	35.4	16.6	4.8	47.6	
5	246	182	457	64	101	174	1223	49.2	36.34	91.4	12.8	20.1	34.8	
	7649													
	Total registrations over 5-nights							Average registrations per night						
Brown long-eared	May	Jun	Jul	Aug	Sep	Oct	Sum	May	Jun	Jul	Aug	Sep	Oct	
1	17	21	17	12	6	2	73	3.3	4.2	3.3	2.3	1.2	0.4	
2	17	26	7	9	8	8	75	3.5	5.3	1.3	1.8	1.6	1.6	
3	22	0	10	16	15	19	81	4.5	0	1.9	3.1	2.9	3.8	
4	21	15	33	35	10	17	130	4.1	2.9	6.5	7.0	1.9	3.4	
5	12	9	17	18	2	11	68	2.3	1.8	3.3	3.6	0.4	2.2	
	428													
	Total registrations over 5-nights							Average registrations per night						
Noctule	May	Jun	Jul	Aug	Sep	Oct	Sum	May	Jun	Jul	Aug	Sep	Oct	
1	20	30	35	10	25	18	138	3.9	5.9	7.0	2.1	5.1	3.6	
2	81	12	10	31	11	26	169	16.1	2.4	1.9	6.2	2.1	5.2	
3	23	40	17	4	18	9	109	4.7	7.9	3.3	0.8	3.5	1.8	
4	28	64	55	37	55	34	272	5.5	12.7	10.9	7.5	11.0	6.8	
5	21	12	35	14	12	12	105	4.2	2.3	7.0	2.8	2.3	2.4	
							796							
	Total registrations over 5-nights							Average registrations per night						
Serotine	May	Jun	Jul	Aug	Sep	Oct	Sum	May	Jun	Jul	Aug	Sep	Oct	
1	0	0	0	0	5	0	5	0	0	0	0	1	0	
2	0	0	0	12	0	5	17	0	0	0	2.4	0	1	
3	4	0	0	9	0	2	15	0.8	0	0	1.8	0	0.4	
4	0	6	6	3	8	0	23	0	1.2	1.2	0.6	1.6	0	
5	8	2	0	0	2	0	12	1.6	0.4	0	0	0.4	0	
	72													
	Total registrations over 5-nights							Average registrations per night						
Myotis species	May	Jun	Jul	Aug	Sep	Oct	Sum	May	Jun	Jul	Aug	Sep	Oct	
1	43	16	24	18	15	8	124	8.6	3.2	4.8	3.6	3	1.6	
2	18	24	18	40	25	6	131	3.6	4.8	3.6	8	5	1.2	
3	25	32	15	28	31	0	131	5	6.4	3	5.6	6.2	0	
4	11	20	5	19	18	11	84	2.2	4	1	3.8	3.6	2.2	
5	23	30	46	23	29	19	170	4.6	6	9.2	4.6	5.8	3.8	
	640													

14. APPENDIX 3: BIRDS

BREEDING BIRDS

Five morning breeding bird surveys were undertaken (03, 17, 24 and 31 May 2021 and 14 June 2021). Each commenced within about hour of sunrise and taking 3 hour to complete. Mornings were selected when weather conditions were good for survey, i.e. no precipitation and wind speed ranging from Beaufort Scale 0 to 2: calm (< 2 km/h) to light breeze (6 to 12 km/h). Features around the survey area field likely to support nesting birds, i.e. hedgerows and a low field bank, were walked at slow pace. The field itself was scanned (assisted using Leica 8 x 32 BA binoculars). All contacts (i.e. 'registrations') with birds, sight and sound, indicative of territoriality/breeding were plotted on field maps. Bird species codes (following those of the British Trust for Ornithology; BTO) were used to denote each species, and simple abbreviations/symbols used to record activity (e.g. song, alarm calling, carrying food) and observations of fledged young. Additional species within the survey area but not showing behaviour indicative of breeding (and/or nesting habitat lacking/unsuitable) and those overflying were also noted.

Observations were collated post-survey and the number of potentially breeding pairs of each species was assessed. An assessment of breeding status was also made, assigning one of three categories (following BTO criteria, except as indicated 'Probable', see below):

- Possible – species (individuals) observed in suitable nesting habitat (including male breeding calls/singing once).
- Probable – male breeding calls/singing twice or more in survey period at (or about) the same place (rather than 'Permanent Territory presumed through registration of territorial behaviour, e.g. song etc., on at least 2 different days a week', as per BTO criteria); pair in suitable nesting habitat; courtship/display in or near potential breeding habitat; visiting probable nest site; agitated behaviour/anxiety calls of adults suggesting nest or young nearby; nest-building/excavating nest hole.
- Confirmed – adult distraction display; nest with eggs/young; recent egg shell remains; recently fledged young (nidicolous species; e.g. song birds) or downy young (nidifugous species; e.g. gamebirds) but taking into account that young might being derived from a nest off site (especially more-mobile, older juveniles); adults entering/leaving a likely nest-site in circumstances indicated an occupied nest; adult carrying faecal sac or food.

WINTERING BIRDS

Surveys were undertaken: 30 November 2021, 19 December, 23 January 2022, 20 February and 13 March 2022. Visits were made on days with good to moderately good weather (calm to moderate breeze; no or very light precipitation), avoiding the first and last hour of daylight (as recommended; Gillings et al., 2008⁴¹). The site was walked, recording the number of individuals/flock sizes of the focal species encountered (i.e. all Red and Amber-listed species) as accurately as possible.

⁴¹ Gillings S., Wilson A.M., Conway G.J., Vickery J.A., Fuller R.J., Beavan P., Newson S.E., Noble D.G. and Toms M.P. (2008) *Winter Farmland Bird Survey*. BTO Research Report No. 494, Thetford, UK.

15. APPENDIX 4: REPTILES

The reptile surveys were undertaken using direct survey methods intended to identify the presence / absence of reptiles and the species present. The reptile survey involved the placement and checking of artificial refugia, together with general observations during visits. The refugia were made from heavy grade bitumen felt, cut to a size of approximately 50cm x 50cm. Surveys were undertaken during good weather conditions whenever possible: temperatures between 10°C and 18°C with intermittent or hazy sunshine and little or no wind (Table A5; as described by Beebee and Griffiths, 2000⁴²). 35 artificial refugia were deployed (Figure A1).

Table A5. Reptile survey dates and weather conditions.

Visit Number	Date	Start Time	Temp. C	Weather
Felts out	13/08/21	n/a	n/a	n/a
1	13/09/21	08.00	14	Light wind, 40% cloud
2	15/09/21	09.00	14	Light wind, 30% cloud
3	21/09/21	08.00	14	Light wind, 40% cloud
4	26/09/21	09.30	14	Light wind, 60% cloud
5	27/09/21	09.30	16	Light wind, 80% cloud
6	09/10/21	09.00	14	Light wind, 70% cloud
7	15/10/21	10.30	14	Light wind, 30% cloud

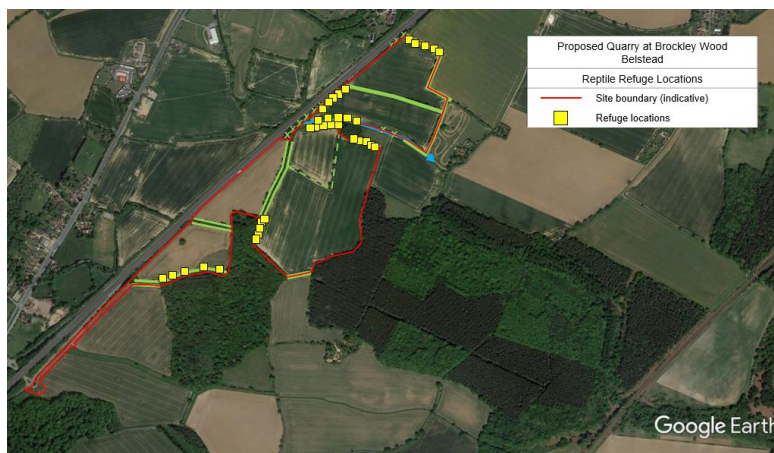


Figure A1. Location of reptile survey refuges.

⁴² Beebee, T. & Griffiths, R. (2000) *Amphibians and Reptiles – A Natural History of the British Herpetofauna*. HarperCollins, London.

16. APPENDIX 5: DORMICE

The nest boxes and nesting tubes were deployed and checked as follows:

- 27/05/2021 Set out 46 boxes and 100 nest tubes.
- 28/06/2021 Survey #1 No dormice Additional 15 nest tubes installed along A12 edge of site.
- 23/07/2021 Survey #2 No dormice.
- 20/08/2021 Survey #3 No dormice.
- 26/09/2021 Survey #4 No dormice.
- 20/10/2021 Survey #5 No dormice.
- 15/11/2021 Survey #6 No dormice

17. APPENDIX 6: LEGISLATION SUMMARY

Non-technical account of relevant legislation and policies.

Species	Legislation	Offence	Licensing
Bats: European protected species	Conservation of Habitats and Species Regulations 2017 (as amended) Reg 41	Deliberately capture, injure or kill a bat; deliberate disturbance of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required.
Bats: National protection	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
Birds	Wildlife and Countryside Act 1981 (as amended) S.1	Intentionally kill, injure or take any wild bird; intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built. Intentionally or recklessly disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species [e.g. kingfisher].	No licences are available to disturb any birds in regard to development.
█████ █████ █████ European protected species	Conservation of Habitats and Species Regulations 2010 (as amended) Reg 41	Deliberately capture, injure or kill a ██████ deliberate disturbance of a ██████ █████ deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by a ██████	Licences issued for development by Natural England.
█████ █████ █████ National protection	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb it in such a place.	A licence is required from Natural England for surveying and handling.
Adder, common lizard, grass snake slow worm	Wildlife and Countryside Act 1981 S.9(1) and S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required. However, an assessment for the potential of a site to support reptiles should be undertaken.
Scientific Interest (SSSI)	Wildlife and Countryside Act 1981 (as amended)	To carry out or permit to be carried out any potentially damaging operation. SSSIs are given protection through policies in the Local Development Plan.	Owners, occupiers, public bodies and statutory undertakers must give notice and obtain the appropriate consent under S.28 before undertaking operations likely to damage a SSSI. All public bodies to further the conservation and enhancement of SSSIs.

Species	Legislation	Offence	Licensing
County Wildlife Sites	There is no statutory designation for local sites.	Local sites are given protection through policies in the Local Development Plan.	Development proposals that would potentially affect a local site would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged.