PRELIMINARY ECOLOGICAL APPRAISAL & BAT ACTIVITY SURVEYS

Woodland and Grounds at Warham House, Lower Breinton, Herefordshire

Final report
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SUMMARY

- A Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey and protected species assessment, was undertaken on 17th May 2013 of woodland at Warham House, Lower Breinton, Herefordshire in connection with Herefordshire Nature Trust's *'Herefordshire Parklands Project'*.

- Two bat activity surveys were undertaken during June and July 2013; these involved deployment of manual bat detectors along a pre-selected transect route after sunset; a minimum of six bat species was recorded, comprising, in order of abundance, soprano pipistrelle, common pipistrelle, at least two species of *Myotis* bat, long-eared bat and serotine; further surveys, and/or surveys using different methods, are likely to record additional bat species on the site.

- The woodland is dominated by uneven age oak and ash and exhibits a species-rich and dense understorey in places, providing structural variety within the woodland canopy and interior. There are several specimens of coppiced alder and hazel, while the far eastern end of the woodland consists of secondary growth woodland. The northern boundary contains a small number of notable and/or veteran trees spread out along its length.

- The field layer is varied across the woodland slope and is particularly rich at the woodland edge and in the vicinity of the pond and associated drainage channels adjacent to the southern boundary. There are various specimens of standing and fallen deadwood, supporting a saproxylic invertebrate assemblage, but few epiphytic species such as ferns, bryophytes or lichens. The woodland supports a high number of ancient woodland vascular plant (AWVP) species relative to its small size and is thus a good candidate for ancient woodland status.

- The protected species assessment revealed potential for the woodland and/or woodland edge to support protected species, including bats, badger, nesting birds, great crested newt, reptiles and otter. The site has low potential to support other protected species, including dormouse and water vole.

1 INTRODUCTION

1.1 Background

This report describes a Preliminary Ecological Appraisal (PEA), including a Phase 1 Habitat Survey and protected species assessment and bat activity surveys undertaken in May (PEA and protected species assessment), June and July (bat activity surveys) 2013 of woodland and grounds at Warham House, Lower Breinton, Herefordshire. The survey was required in connection with the Herefordshire Nature Trust's '*Herefordshire Parklands Project'* which aims to "*increase knowledge, understanding and appreciation of old parklands within the county*"[1].

The PEA included the woodland, located at approximate OS National Grid Reference SO 476 392, while the bat activity surveys included the woodland and grounds of Warham House, the latter located at SO 481 391. The surveys were carried out by Nick Underhill-Day and Johnny Birks of Swift Ecology Ltd.

1.2 Site Description and Ecological Context

The woodland lies at between 60 and 70 m above sea level and comprises a long narrow strip of broadleaved woodland, of approximately 3.5 hectares, running roughly parallel (north-west to south-east) with the River Wye, 3 km west of Hereford (plate 1, area 1). The woodland is approximately 830 m in length and mostly of 35 – 55 m width, narrowing to 20 – 25 m at each end. The woodland is steeply sloped (approx. 20%) with a south-west aspect. Between the woodland and the river lies an area of grassland floodplain; the river meanders closest to the woodland at its western end, near Lower Breinton. The woodland is called 'Breinton Wood' - this name will be used in this document.

Warham House and grounds lie at between 58 and 68 m above sea level and encompass an area of approximately 5.3 hectares, which includes the house, outbuildings, driveway, gravel parking area, mown grassland, pasture grassland, garden areas, walls, hedgerows, scattered trees and arable fields (plate 1, area 2). The house and grounds are more gently sloped with a south-easterly aspect.

Breinton Wood and the grounds of Warham House are bordered on the south by the flat pasture floodplain of the River Wye, and on the north by a mixture of arable farmland and orchards of Lower Breinton. To the south of the River Wye there are several small woodlands, some of ancient semi-natural woodland (ASNW) status, interspersed with pastoral and arable farmland; immediately south of the river lies the parkland of Belmont House (Herefordshire Parklands Project, 2012). To the north of Breinton Wood and Warham House grounds lies open arable farmland and several fruit orchards. The village of Lower Breinton and grounds of Wyecliffe Court lie immediately west of the woodland while the suburbs of Hereford are some three kilometres to the east.

[1] http://www.herefordshirewt.org/parklands.html

The River Wye is a designated Site of Special Scientific Interest (SSSI) and is notified as an important wildlife corridor, migration route and key breeding area for a number of nationally and internationally important species.

Breinton Wood is well connected to areas of semi-natural habitat and patches of woodland, grassland and riparian habitat, contained within the floodplain valley. In addition there is a small pond on the southern border of the woodland; this is fed by seepage lines which lead into a shallow drainage channel running along the southern boundary of the wood, and which connects, across the narrow floodplain, to the River Wye.

Plate 1. Google Earth image showing the landscape context of the Breinton Wood and grounds at Warham House, Herefordshire. Areas surveyed are outlined in yellow: area 1 – bat activity and woodland survey area; area 2 - bat activity survey area.

2 METHODS

2.1 Background Data Search

A background data search was undertaken by the Herefordshire Biological Records Centre (HBRC) of protected species records within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe (Lower Breinton). A desktop search was undertaken of designated (statutory, non-statutory) sites within a 2 km radius around a central grid reference, SO 475 393.

2.2 Preliminary Ecological Appraisal

2.2.1 General

A preliminary ecological appraisal, comprising a Phase 1 Habitat Survey and protected species assessment was undertaken, following standard methods as described in the Guidelines for Preliminary Ecological Appraisal (IEEM, 2012) and the Phase 1 Habitat Survey Methodology (JNCC, 2003, revised 2010).

2.2.2 Phase 1 habitat survey

A Phase 1 Habitat Survey was undertaken of the woodland, following standard methods as described in the Phase 1 Habitat Survey Methodology (JNCC, 2003, revised 2010). A Phase 1 Habitat survey typically comprises the following elements, as necessary depending on the nature of the site:

- Habitat descriptions for each separate habitat type;
- Target notes to identify particular areas of interest or concern; and
- Plant species lists, if appropriate.

During the survey vascular plant species were identified, recorded and their abundance estimated where possible using the DAFOR(L) scale (D=dominant, A=abundant, F=frequent, O=occasional, R=rare[2], L = locally). Vegetation was categorised into several structural groups: canopy, understorey, woody shrubs and climbers, field layer and ground layer. Ancient woodland indicator status is assigned according to Kirby, K. (2004) and Rose, F. All information was mapped and recorded as target notes (TN) where appropriate.

2.2.3 Protected species assessment

The suitability of habitats for any protected animal species was assessed at the same time as the Phase 1 Habitat Survey and any incidental evidence of such species was recorded if encountered. Species that might be expected to be present in the geographic location include bats, badger *Meles meles*, nesting birds, great crested

[2] *The use of the term "rare" in this context is solely in relation to the species' abundance on this site, and does not imply any level of local, regional or national scarcity.*

newt *Triturus cristatus*, reptiles, European otter *Lutra lutra*, European water vole *Arvicola amphibius* and hazel dormouse *Muscardinus avellanarius*.

2.2.4 Bats

The woodland contained a number of mature trees suitable for roosting bats. These were target noted, where applicable, and the habitat was noted for its bat foraging and commuting potential.

2.2.5 Badger

Habitat was assessed for its suitability for badger foraging and sett digging. Any incidental signs of badgers, such as setts, latrines, foraging signs, or footprints, were recorded if they were encountered. A full badger survey was not undertaken.

2.2.6 Hazel dormouse

The woodland was assessed for its suitability to support dormice; a full dormouse survey was not undertaken.

2.2.7 Nesting birds

Woodland was assessed for its suitability for breeding birds and nests were recorded if they were encountered. Bird species observed or heard during the survey were recorded.

2.2.8 Great crested newt

There is a single pond adjacent to the woodland which may be suitable to support great crested newt. This species uses terrestrial habitats normally within 500 m of breeding ponds; such habitat is protected. Therefore, terrestrial habitats within the woodland were assessed for their potential to support this species, based on factors including vegetation structure and composition, and the availability of shelter and foraging resources.

2.2.9 Reptiles

Woodland edges provide suitable habitat for common reptiles (adder *Vipera berus*, grass snake *Natrix natrix*, common lizard *Zootoca vivipara* and slow-worm *Anguis fragilis*). The quality of the woodland edge was assessed, based on factors such as the quality of the foraging resource, the presence of suitable sites for basking, and the presence of refugia for shelter and hibernation.

2.2.10 Water vole

Habitat along the boundary drainage channel, and provided by the pond, was assessed for its suitability to support water voles. A full water vole survey was not undertaken.

2.2.11 Otter

Habitat was assessed for its suitability to support otters, which are well established on the River Wye. Features such as tree root cavities, fallen trees, grass tussocks,

scrub and mud were briefly searched for evidence of otter spraints, lay-ups and footprints; a full otter survey was not undertaken.

2.2.12 Other species

General habitat suitability and incidental sightings of other animal species, including UK and Local Biodiversity Action Plan species, were noted.

2.3 Bat Activity Surveys

Two bat activity surveys were undertaken according to the method recommended in the Good Practice Guidelines for manual bat surveys away from bat roosts (Hundt, 2012). This involved a single surveyor walking slowly along a pre-selected transect route (the route is illustrated in the Results section in Figure 2) for approximately two hours, starting at the eastern end of Breinton Wood at sunset.

Bat detectors and digital recording devices were used to detect and store bat echolocation calls for subsequent analysis using *Batsound* and *Analook* software. Details of equipment, timings and weather conditions are given in *Table 1.* Both activity surveys were carried out by Dr Johnny Birks; Johnny is an experienced bat worker who is familiar with the techniques involved in bat surveys.

Table 1. Warham House Bat Activity Survey Details

Survey type	Dusk	Dusk
Date	26 June 2013	27 July 2013
Weather conditions	20% cloud cover, dry with light NE breeze after a warm, sunny day. Start temp. 16 °C; finish 11 °C	20% cloud cover, very light southerly breeze, warm and dry. Start temp. 22 °C; finish temp. 17 °C
Sunset time (BST)	2137	2114
Start time	2130	2115
End time	2318	2315
Equipment	1 x Pettersson D240x, 1 x Anabat	1 x Pettersson D240x, 1 x Anabat

2.4 Constraints

Late May is normally an optimal time of year for Phase 1 Habitat Survey, because most flowering plants within woodlands are readily identifiable at this time; however, late-flowering, shade-tolerant species may not have been identified and recorded, including ancient woodland vascular plant species, thus the AWVP species list within this document should only be used as a guide to the floral assemblage present and, by association, the conservation value of the woodland.

Weather conditions were suitable during both bat activity surveys and there were no obvious constraints.

3 RESULTS

3.1 General

Breinton Wood was first visited on 17th May 2013 for the Phase 1 habitat survey and protected species assessment. The woodland is approximately 3.5 hectares and consists of broadleaved species, predominantly pedunculate oak *Quercus robur* and ash *Fraxinus excelsior*. The woodland is of semi-natural character and is dominated by oak within the middle section of the wood (TN 1) and by ash at its eastern and western ends (TN2). At the very eastern tip is a small area of secondary woodland (TN 3) containing horse chestnut *Aesculus hippocastanum*. The structural and floral characteristics of the woodland are described in section 3.3.

A public footpath runs along the northern boundary of the woodland, accessed from the public highway to the east of Warham House. A second public footpath follows the River Wye and passes the woodland at its western edge, at Lower Breinton.

Weather conditions during the site visit were good, overcast, with light winds and no rain. Visibility was good and the air temperature was 16°C.

3.2 Background Data Search

3.2.1 Designated sites

Data were obtained from the Multi-Agency Geographic Information for the Countryside (MAGIC). The River Wye is a designated Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI); the river supports a number of nationally and internationally important species including a number of Annex II[3] species (allis shad *Alosa alosa*, twaite shad *Alosa fallax*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, otter *Lutra lutra*, Atlantic stream crayfish *Austropotamobius pallipes* and freshwater pearl mussel *Margaritifera margaritifera)*. The River Wye also falls within the Catchment Sensitive Farming Capital Grant Scheme Target Area.

South of the River is a cluster of ancient semi-natural and ancient replanted woodlands, including Ruckhall Wood, Priors Shell Wood, Old Hill Coppice and Newton Coppice. Breinton Wood is designated a Herefordshire Special Wildlife Site (SWS)/Site of Importance to Nature Conservation (SINC)[4]. Designated sites within a 2 km radius are listed in Appendix 1.

[3] Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora
[4] Herefordshire Unitary Development Plan, Appendix A.

3.2.2 Protected species

Herefordshire Biological Records Centre holds 876 records for protected or priority species within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe, dated between 1964 and 2010 (there is one record from 1881); records for protected and notable species (excluding bird species) are presented in Appendix 2.

An absence of records does not mean that a particular species is not present; merely that it has not been recorded. Many species records are not obtainable from the sources utilised and therefore there may be further undetected records for such species on the study site or in the local area. Key records of protected species from the HBRC are provided below (section 3.5) under the relevant species or taxa.

3.3 Woodland Features

3.3.1 Geology and soils

Breinton Wood is steeply sloped across its narrow (35-55 m) width, dropping approximately 10 m in altitude from the north-east to the south-west. The area lies upon bedrock of undifferentiated Pridoli rocks (mudstone, siltstone and sandstone) deposited between 419 and 423 million years ago (mya). Over this lie superficial floodplain deposits of glacial sand and gravel of quaternary age, from 2.6 mya to the present[5]. The soil of the woodland is predicted to contain parent material of claystone and mudstone with a texture of clayey to silty loam[6]. This soil is characterised as slightly alkaline and of intermediate depth. Toward the floodplain this is likely to intergrade into deeper riverine clay and floodplain sands and gravels; the soil lower down the slope has a higher water content and will exhibit a texture that reflects the higher clay and sand composition. However, in places further up the slope, where badgers have been excavating setts, the soil is quite sandy in colour and content. The steep slope and predicted change in soil composition, texture and moisture content will be reflected by changes in the floral composition across the slope.

3.3.2 Canopy

Breinton Wood is largely dominated by oak and ash standards but there are specimens of sycamore *Acer pseudoplatanus*, wild cherry/gean *Prunus avium*, sweet chestnut *Castanea sativa* and yew *Taxus baccata* scattered throughout the woodland. There are several mature or veteran oak (TN 4 and 13) and other notable or veteran trees along the northern boundary. Silver birch *Betula pendula* is occasional within the woodland and there are isolated specimens of small-leaved lime *Tilia cordata* (TN 5) and crab apple *Malus sylvestris* (TN 6). White willow *Salix alba* grows in the damper soils in areas bordering the pond and associated drainage channels.

[5] British Geological Survey (data.bgs.ac.uk/home.html)
[6] Natural Environment Research Council, British Geological Survey, Centre for Ecology & Hydrology.

The western section of the woodland is dominated by ash but with a more varied canopy of other species as listed above; here the understorey and field layer is dense. The middle section of the wood is dominated by oak, with some ash, over a hazel *Corylus avellana* and field maple *Acer campestre* understory; this shrub layer is less dense than that in the west and the field layer is also thinner. There are several gaps in the canopy where large trees have been grounded. Ash begins to dominate again toward the eastern section of the wood while at the far eastern end is an area of secondary woodland of horse chestnut *Aesculus hippocastanum*. In places, particularly in the west of the woodland, there are few large standards; however, the woodland as a whole contains an uneven-aged tree composition giving structural diversity to the canopy. Areas of ash and oak-dominated woodland intergrade; thus these distinctions are only a guide and are not particularly apparent on the ground.

Towards the western area of the woodland there are several recently planted saplings of oak, ash, sycamore and rowan *Sorbus aucuparia* (TN 7).

3.3.3 Understorey

Underneath the relatively light shade in ash-dominated areas there is a rich and dense understorey comprising abundant or frequent field maple, hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, wild cherry/gean, elder *Sambucus nigra*, English elm *Ulmus procera*, wych elm *Ulmus glabra*, young ash (dominant) and sycamore, the last more frequent within the western end of the woodland. Holly *Ilex aquifolium* and spindle *Euonymus europaeus* are occasional.

Where oak dominates, hazel and field maple are locally abundant, cherry is scattered throughout, particularly along the northern edge. In the lower half of the woodland, where the soil moisture content is higher, there is a small area of coppiced hazel and alder *Alnus glutinosa* (TN 8).

Toward the eastern end of the wood, within the secondary woodland, the understorey disappears; the canopy drops to a field layer dominated by tall ruderal vegetation and bramble *Rubus fruticosus* agg.

3.3.4 Woody shrubs and climbers

Within the woodland, ivy *Hedera helix* is the dominant climbing species. Along the woodland edge dog-rose *Rosa canina* is frequent while field-rose *Rosa arvensis* and honeysuckle *Lonicera periclymenum* are more occasional. Bramble is locally abundant where there are gaps in the canopy, particularly at the eastern end of the woodland.

3.3.5 Field layer

The herbaceous flora varies from east to west across the woodland depending upon whether oak or ash dominates. In places where there is more light, in openings or under an ash canopy, there are locally dominant and abundant common grasses and ruderal species including creeping bent *Agrostis stolonifera*, cock's-foot *Dactylis glomerata*, Yorkshire-fog *Holcus lanatus*, nettle *Urtica dioica*, cow parsley *Anthriscus sylvestris* and herb robert *Geranium robertianum*. Frequent to occasional species

include red fescue *Festuca rubra*, wood avens *Geum urbanum*, stinking hellebore *Helleborus foetidus*, stinking iris *Iris foetidissima*, wood melick *Melica uniflora*, garlic mustard *Alliaria petiolata*, red campion *Silene dioica*, common sorrel *Rumex acetosa*, broad-leaved dock *Rumex obtusifolius* and wood dock *Rumex sanguineus*. Goldilocks buttercup *Ranunculus auricomus* is rare.

Bluebell *Hyacinthoides non-scripta* dominates during the spring underneath the central, oak-dominated area of the woodland, especially higher up the slope. Dog's mercury *Mercurialis perennis* is also locally dominant throughout much of the central area of the woodland, where the soils are more base-rich toward the bottom of the slope.

Spring species, many of which are ancient woodland indicators (AWIs), include abundant lesser celandine *Ranunculus ficaria*, frequent ground ivy *Glechoma hederacea* and occasional to rare wild daffodil *Narcissus pseudonarcissus*, pignut *Conopodium majus*, early dog-violet *Viola reichenbachiana*, sweet violet *Viola odorata*, germander speedwell *Veronica chamaedrys*, ivy-leaved speedwell *Veronica hederifolia* and wood speedwell *Veronica montana*.

A number of species occur in the damp and wet soils toward the bottom of the slope, particularly near the pond (TN 9) and the associated drainage channels along the southern boundary. Wood anemone *Anemone nemorosa* is locally dominant or abundant in moist soils while occasional to rare species include pendulous sedge *Carex pendula*, remote sedge *Carex remota*, wood sedge *Carex sylvatica*, male fern *Dryopteris filix-mas*, yellow archangel *Lamium galeobdolon*, wood millet *Milium effusum*, soft shield fern *Polystichum setiferum* and currant *Ribes* species.

Growing on wet soils surrounding the pond are additional species including cuckooflower *Cardamine pratensis*, meadowsweet *Filipendula ulmaria*, yellow iris *Iris pseudacorus*, soft rush *Juncus effusus*, gipsywort *Lycopus europaeus*, water mint *Mentha aquatica* and hemlock water-dropwort *Oenanthe crocata*.

3.3.6 Ground layer

The ground layer is species-poor with locally dominant and abundant species including cleavers *Galium aparine*, lesser periwinkle *Vinca minor* and bramble, the last particularly at the eastern end within secondary woodland.

Breinton Wood is long and narrow with a relatively small area and thus its core is relatively small; the interior of the woodland will be highly exposed to the climatic influences of wind, air temperature and loss of humidity. As a consequence epiphytic species, such as ferns, bryophytes and lichens, which require constant moisture, are mostly absent; the ground is bare in many places under the thicker oak-dominated areas.

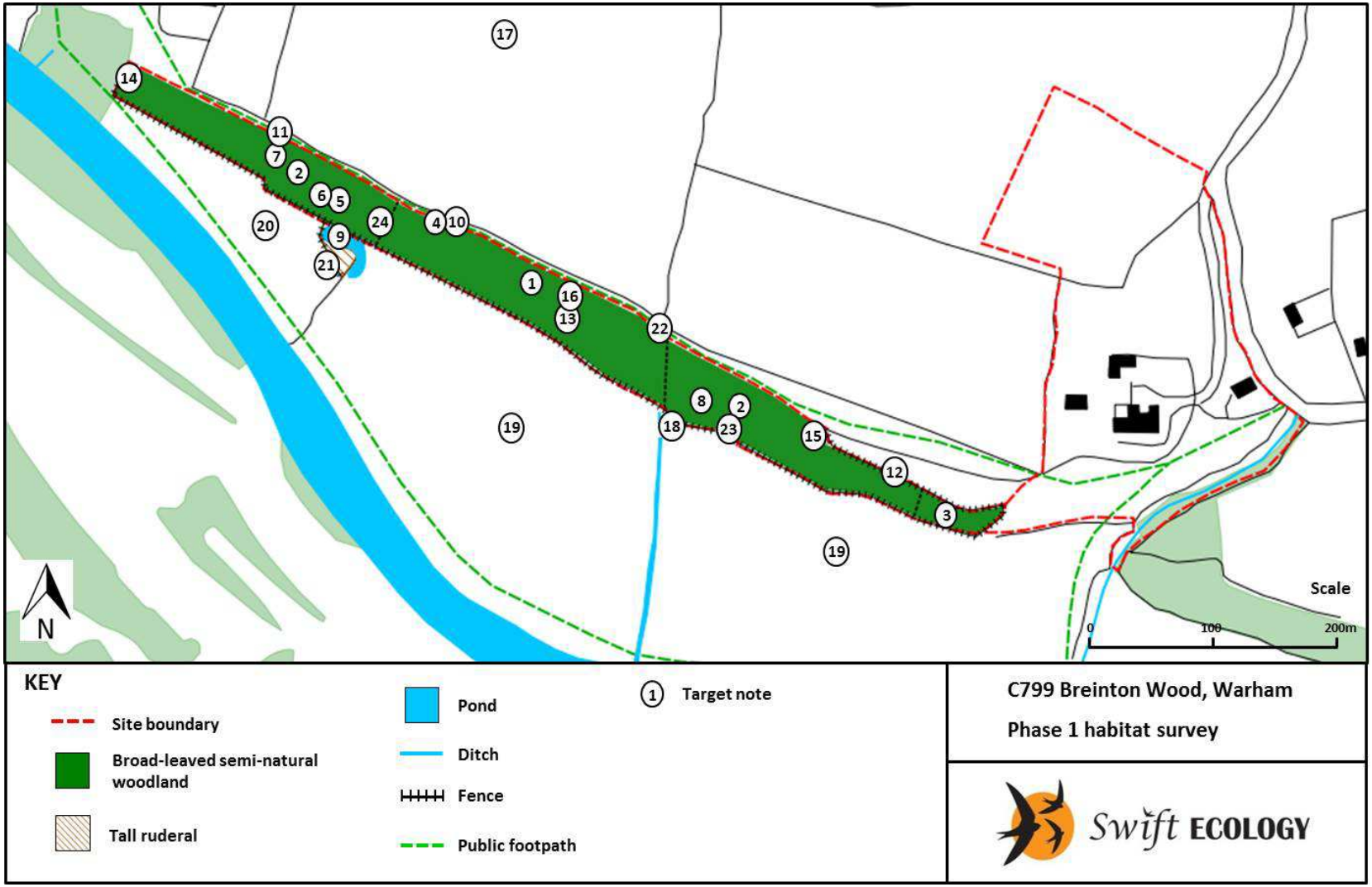

Figure 1. Phase 1 habitat map of Breinton Wood, Herefordshire

3.3.7 Deadwood

The woodland contains abundant dead and rotting wood, both standing and fallen (TN 10-12), providing micro-habitats, food resources and sheltering, nesting or roosting opportunities for several ecological guilds including fungi, saproxylic invertebrates, small mammals (including bats), and birds.

In places there are accumulations of leaf litter and rotting wood; several of the larger trees have been up-ended, thereby exposing the root plate. Standing deadwood includes old cherry, silver birch, horse chestnut and oak.

3.3.8 Woodland edge

The woodland edge contains a diverse shrub and field layer. Woody shrub and tree species include hawthorn, blackthorn, field maple, cherry, elm, wych elm, spindle, elder, holly, hazel, yew, sycamore, bramble, field rose and occasional dogwood *Cornus sanguinea* along the southern boundary.

The ground flora consists of abundant grasses including creeping bent, cock's-foot, Yorkshire-fog, red fescue, meadow foxtail *Alopecurus pratensis*, barren brome *Anisantha sterilis*, sweet vernal grass *Anthoxanthum odoratum*, false oat-grass *Arrhenatherum elatius*, soft-brome *Bromus hordeaceus*, crested dog's-tail *Cynosurus cristatus* and black bent *Agrostis gigantea*.

Forbs growing along the woodland edge include cow parsley, nettle, cleavers, herb-robert, wood avens, red campion, common sorrel, garlic mustard, ground ivy, thistle species *Cirsium* sp., hogweed *Heracleum sphondylium*, ribwort plantain *Plantago lanceolata*, meadow buttercup *Ranunculus acris*, creeping buttercup *Ranunculus repens*, hedge woundwort *Stachys sylvatica*, greater stitchwort *Stellaria holostea*, greater celandine *Chelidonium majus*, dandelion *Taraxacum officinalis* agg., and red clover *Trifolium pratense*. In places along the woodland edge wood melick is locally abundant.

Table 2. Plant species list for Breinton Wood, Herefordshire. Vascular plant species were estimated for their abundance using the DAFOR(L) (Dominant, Abundant, Frequent, Occasional, Rare, Locally) scale. Ancient woodland indicator status is assigned according to Kirby, K. (2004) and Rose, F. (1999).

Scientific name	Common name	Abundance (*DAFOR*)	Ancient Woodland Indicator
Canopy			
Acer pseudoplatanus	Sycamore	F/O	
Aesculus hippocastanum	Horse-chestnut	O	
Betula pendula	Silver birch	O/R	
Castanea sativa	Sweet chestnut	O	
Fraxinus excelsior	Ash	D	
Malus sylvestris	Crab apple	R	√
Quercus robur	Pedunculate oak	D	
Salix alba	White willow	O	
Taxus baccata	Yew	R	
Tilia cordata	Small-leaved lime	R	√
Understorey			
Acer campestre	Field maple	LA	√
Acer pseudoplatanus	Sycamore	F	
Alnus glutinosa	Alder	F	
Corylus avellana	Hazel	LA/F	
Crataegus monogyna	Hawthorn	A/F	
Euonymus europaeus	Spindle	O	√
Fraxinus excelsior	Ash	D/A	
Ilex aquifolium	Holly	O	√
Prunus avium	Wild cherry/gean	A	√
Prunus spinosa	Blackthorn	A/F	
Sambucus nigra	Elder	F	
Sorbus aucuparia	Rowan (planted)	R	
Ulmus glabra	Wych elm	A	√
Ulmus procera	English elm	F	
Woody shrubs & climbers			
Hedera helix	Ivy	D	
Lonicera periclymenum	Honeysuckle	O	
Rosa arvensis	Field-rose	O	√
Rosa canina	Dog-rose	F	
Rubus fruticosus agg.	Bramble	LA/F	
Field layer			
Agrostis stolonifera	Creeping bent	LD/A/F	
Agrostis gigantea	Black bent-grass	R	
Alliaria petiolata	Garlic mustard	F	
Alopecurus pratensis	Meadow foxtail	F	
Anemone nemorosa	Wood anemone	A/LD	√
Anisantha sterilis	Barren brome	F	
Anthoxanthum odoratum	Sweet vernal grass	LF	
Anthriscus sylvestris	Cow parsley	A/F	
Arrhenatherum elatius	False oat-grass	F	

Arum maculatum	Lords-and-Ladies	O	
Bromus hordeaceus	Soft-brome	O	
Cardamine pratensis	Cuckooflower	O	
Carex pendula	Pendulous sedge	O	√
Carex remota	Remote sedge	R	√
Carex sylvatica	Wood sedge	R	√
Cirsium sp.	Thistle sp.	O	
Chelidonium majus	Greater celandine	O	
Conopodium majus	Pignut	R	√
Cornus sanguinea	Dogwood	O	
Cynosurus cristatus	Crested dog's-tail	F	
Dactylis glomerata	Cock's-foot	A/F	
Dryopteris filix-mas	Male fern	O	
Festuca rubra	Red fescue	F	
Filipendula ulmaria	Meadowsweet	O	
Geranium robertianum	Herb-Robert	A/F	
Geum urbanum	Wood avens	F	
Glechoma hederacea	Ground-ivy	F	
Helleborus foetidus	#Stinking hellebore	O	√
Heracleum sphondylium	Hogweed	F	
Holcus lanatus	Yorkshire-fog	A	
Hyacinthoides non-scripta	Bluebell	D	√
Iris foetidissima	Stinking iris	F	√
Iris pseudacorus	Yellow iris	R	
Juncus effusus	Soft rush	R	
Lamium galeobdolon	Yellow archangel	O	√
Lycopus europaeus	Gipsywort	R	
Melica uniflora	Wood melick	LF/O	√
Mentha aquatica	Water mint	R	
Mercurialis perennis	Dog's mercury	D	√
Milium effusum	Wood millet	R	√
Narcissus pseudonarcissus	#Wild daffodil	O	√
Oenanthe crocata	Hemlock water-dropwort	R	
Plantago lanceolata	Ribwort plantain	F	
Polystichum setiferum	Soft shield fern	O	
Ranunculus acris	Meadow buttercup	A/F	
Ranunculus auricomus	Goldilocks buttercup	R	√
Ranunculus ficaria	Lesser celandine	A	
Ranunculus repens	Creeping buttercup	A	
Ribes sp.	Currant	R	√
Rumex acetosa	Common sorrel	F/O	
Rumex obtusifolius	Broad-leaved dock	F	
Rumex sanguineus	Wood dock	O	
Silene dioica	Red campion	F/O	
Stachys sylvatica	Hedge woundwort	O	
Stellaria holostea	Greater stitchwort	F/O	
Taraxacum officinalis agg.	Dandelion	O	
Trifolium pratense	Red clover	F/O	
Urtica dioica	Nettle	A/F	
Veronica chamaedrys	Germander speedwell	R	

Veronica hederifolia	Ivy-leaved speedwell	O	
Veronica montana	Wood speedwell	O	√
Viola odorata	#Sweet violet	O	√
Viola reichenbachiana	Early dog-violet	O	√
Ground flora			
Galium aparine	Cleavers	LD/A	
Hedera helix	Ivy	LD/A	
Rubus fruticosus agg.	Bramble	LA/F	
Vinca minor	Lesser periwinkle	LD/A	

The use of the term "rare" in this context is solely in relation to the species' abundance on this site, and does not imply any level of local, regional or national scarcity.

- record supplied by Lewis Goldwater.

3.4 Ancient Woodland Indicators

Table 2 lists a number of Ancient Woodland Vascular Plants (AWVPs) that occur within Breinton Wood; these are species of ancient woodland indicator status according to Kirby, K. (2004) and Rose, F. (1999).

During the Phase 1 Habitat Survey, twenty three AWVPs were recorded, an additional three species' records were supplied by Lewis Goldwater (Herefordshire Nature Trust) giving a total of twenty six AWVP species. This list is almost certainly incomplete; however, a number of key points are outlined below:

- The majority of AWVP species occur within the middle section of the woodland under the oak-dominated canopy. Several AWVP species occur throughout the woodland including wild cherry, wych elm, bluebell and stinking iris.
- Of the dominant AWVP species, bluebell occurs higher up the slope, possibly reflecting its preference for mildly acidic soils. On the heavier, presumably more alkaline soils lower down the slope, bluebell is replaced by dog's mercury.
- There are several early-flowering (light-demanding) AWVP species including wood anemone, stinking hellebore, dog's mercury, wild daffodil, sweet violet and early dog-violet.
- High numbers of AWVP species were recorded toward the bottom of the slope, on the damp, heavier, calcareous or base-rich soils in the vicinity of the pond and drainage channels. This area appears as a particular 'hotspot' for AWVP species and includes pendulous sedge, remote sedge and wood sedge, yellow archangel, dog's mercury, wood millet, Goldilocks buttercup and currant.
- Several AWVP species are associated with the woodland edge including the drier soils of the north-eastern edge (holly, field rose, wood melick) and the heavier, calcareous clay soils of the bottom edge (spindle, pendulous sedge, yellow archangel).
- Locally dominant, abundant or frequent AWVP species include wood anemone, wild cherry/gean, wych elm and bluebell.
- Several AWVPs are of low (rare) abundance including crab apple, small-leaved lime, remote sedge, wood sedge, pignut, wood millet, goldilocks buttercup, stinking hellebore and currant.
- Among the species present are several with a high fidelity for ancient woodlands including small-leaved lime, wood anemone, wood melick, wood millet and wood speedwell (Spencer, 1990; Rackham, 2006).

Summary

The distribution of AWVP species within Breinton Wood reflects both changes in the dominant canopy tree species across the site and changes in soil characteristics (nutrient content, pH, moisture content) across the woodland slope. The majority of species occur in the central area under an oak canopy, possibly reflecting an older origin for this section of woodland compared with the ash-dominated areas at the

eastern and western ends. The distribution of species also changes with soil character across the site; there is a high number of species present that are more often associated with damp, heavier calcareous or base-rich soils. The area near the pond and drainage channels, on the lower slopes of the woodland, appears to provide a particular hotspot for AWCP species.

3.5 Protected Species Assessment

3.5.1 General

Evidence of badgers was found within the woodland. No other protected species were observed during the Preliminary Ecological Appraisal but the woodland has the potential to support a number of such species due to the presence of important ecological features within the woodland, its status as a relatively undisturbed area of semi-natural habitat, and its position within the surrounding landscape, which encompasses a variety of ecologically important and well-connected habitats. No detailed protected species surveys were undertaken apart from the bat activity surveys described in section 3.6.

3.5.2 Bats

Within the woodland there are numerous trees with potential roost features, including woodpecker holes, knot holes, tear-outs, splits, fissures, snaps, cracks, peeling bark and dense ivy; the woodland offers high potential to support roosting bats. There are several buildings in the immediate vicinity, for example in Lower Breinton, which may also support roosting bats while the surrounding landscape contains semi-natural features and habitat (e.g. hedgerows, woodland, orchards, river corridor) which could act both as flight lines for commuting bats and as a foraging resource.

The HBRC holds 70 records of at least seven bat species within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe, including a 2011 record of lesser horseshoe bat *Rhinolophus hipposideros* roosting in a building (SO48583839) on the outskirts of Hunderton; records from 2007 and 2010 of common pipistrelle *Pipistrellus pipistrellus,* soprano pipistrelle *Pipistrellus pygmaeus* and long-eared bat *Plecotus* sp. roosting in several buildings within Lower Breinton; and records from 2005 of common pipistrelle, soprano pipistrelle and long-eared bat roosting in buildings at Warham Court. Other records, dating from 1992 – 2011, include flying and/or foraging common pipistrelle, soprano pipistrelle, lesser horseshoe bat, brown long-eared *Plecotus auritus*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, Daubenton's bat *Myotis daubentonii* and unidentified bat species including unidentified *Myotis* sp.

3.5.3 Badger

The woodland contains three badger setts including two large setts (TN 14 and 15) and one outlier sett (TN 16); badger footprints and coarse guard hairs were found at sett entrances. The woodland was criss-crossed with badger trails and paths between setts or leading out of the woodland. Numerous foraging signs were

observed including rooting, snuffle holes and several discarded maize cobs. Dead badgers were recorded at two separate locations within the wood.

The HBRC holds nine records for badger *Meles meles,* from between 1998 and 2008, within a 0.5 km radius around the area of Warham House, Belmont and Wycliffe.

3.5.4 Hazel dormouse

The woodland contains suitable habitat for hazel dormouse *Muscardinus avellanarius*. The ash and oak-dominated canopy and well-structured, continuous shrub layer provide good three-dimensional arboreal habitat, while the woodland contains a wide variety of food resources (nectar, pollen, berries, nuts) utilized by this species including oak, hazel, honeysuckle, bramble, ash, sycamore yew, sweet chestnut, blackthorn, hawthorn and bramble (Bright *et al*., 2006). Ivy, crab apple and holly might also be utilized by this species.

However, although understory shrubs, including hazel, are abundant the closed tree canopy and dense shading will prevent fruiting; thus much (or perhaps the majority) of hazel present will fail to fruit; understory shrubs are more likely to fruit under the ash-dominated canopy at either end of the woodland or where there are gaps in the canopy. The woodland borders, with their diverse and well-structured shrub layer and open light conditions, provide perhaps the best foraging habitat in the area for this species.

Although there is some connectivity with riparian woodland, hedgerows and tree lines, particularly to the west of Warham and Lower Breinton, the woodland is relatively isolated from other larger woodlands in the area; the cluster of semi-natural woodlands to the south is separated by the River Wye and there is little woodland cover in the surrounding area to the north, with the exception of the adjacent orchards at Lower Breinton (TN 17). This isolation will limit dispersal of this species into the woodland from larger source populations, while the small size of the wood (approx. 3.5 ha) is unlikely to support a viable population; any population that might exist would be vulnerable to extinction by stochastic events.

The HBRC holds no records for hazel dormouse within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe.

3.5.5 Nesting birds

The woodland supports a number of bird species that potentially breed on the site; most are common species of woodland and edge habitats and are listed with green or amber conservation status[6]. Table 3 lists bird species seen or heard during the field visit. Several species recorded were outside the woodland including cuckoo, buzzard, carrion crow and great spotted woodpecker.

The HBRC holds 736 bird records, from 1970 to 2012, within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe. Among these records are several rare or scarce woodland species including two records for lesser spotted woodpecker *Dendrocopos minor*, one of these from 2006 at Lower Breinton, and one

record of willow tit *Poecile montanus*, from 2003, at Newton Coppice. Several declining farmland species have been recorded in the vicinity, including one record for yellowhammer *Emberiza citrinella*, from 2004, at Lower Breinton; and one record for skylark *Alauda arvensis*, from 2006, within the floodplain pasture between the woodland and River Wye. Barn owl *Tyto alba* has been recorded (2002) at Newton Coppice.

Table 3. Bird species list for the woodland at Warham House, Lower Breinton, Herefordshire.

Common name	Latin name	Conservation status[7]
Blackbird	*Turdus merula*	Green
Blackcap	*Sylvia atricapilla*	Green
Blue tit	*Cyanistes caeruleus*	Green
Bullfinch	*Pyrrhula pyrrhula*	Amber
Buzzard	*Buteo buteo*	Green
Carrion crow	*Corvus corone*	Green
Chaffinch	*Fringilla coelebs*	Green
Chiffchaff	*Phylloscopus collybita*	Green
Cuckoo	*Cuculus canorus*	Red
Dunnock	*Prunella modularis*	Amber
Garden warbler	*Sylvia borin*	Green
Goldcrest	*Regulus regulus*	Green
Goldfinch	*Carduelis carduelis*	Green
Great spotted woodpecker	*Dendrocopos major*	Green
Green woodpecker	*Picus viridis*	Amber
House martin	*Delichon urbica*	Amber
Jackdaw	*Corvus monedula*	Green
Long-tailed tit	*Aegithalos caudatus*	Green
Magpie	*Pica pica*	Green
Mistle thrush	*Turdus viscivorus*	Amber
Nuthatch	*Sitta europea*	Green
Robin	*Erithacus rubecula*	Green
Rook	*Corvus frugilegus*	Green
Song thrush	*Turdus philomelos*	Red
Stock dove	*Columba oenas*	Amber
Tawny owl	*Strix aluco*	Green
Willow warbler	*Phylloscopus trochilus*	Amber
Woodcock#	*Scolopax rusticola*	Amber
Woodpigeon	*Columba palumbus*	Green
Wren	*Troglodytes troglodytes*	Green

- recorded by Lewis Goldwater, 19th March 2013

[7] Eaton M A, Brown A F, Noble D G, Hearn R, Aebischer N J, Gibbons D W, Evans A & Gregory R D (2009). Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds, 102, 296-341.

3.5.6 Great crested newt

Breinton Wood contains suitable foraging and refugia opportunities for this species. Within the woodland, there is fallen wood, rotting deadwood, mammal burrows and areas of scrub which provide cover, resting places, foraging and hibernacula opportunities. The base of woodland edges might also provide shelter for this species but there are fewer features (e.g. fallen or cut timber, brash, exposed tree roots, mammal burrows and piles of loose stones or brickwork) typically associated with great crested newt hibernation.

The likelihood of newts using the site would depend on the presence of a breeding pond or ponds within a reasonable distance (250-500 m or less); there is a single pond bordering the woodland on its southern boundary (TN 9), and a second ephemeral pond further east along the woodland edge (TN 18), both fed by drainage channels running along the woodland boundary from Breinton spring. In the vicinity of Lower Breinton there are three ponds between 340 and 400 m distance while an additional three ponds lie across the River Wye at 270 m, 285 m and 435 m respectively.

The HBRC holds five records for great crested newt within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe. Four records, all from 2013, are from a 100 m X 100 m square containing a pond at Little Breinton; this pond is some 650 m distance from the woodland. A fifth record, also from 2013, is from a 100m X 100 m square containing the pond bordering the southern edge of the woodland.

3.5.7 Reptiles

Habitats along the woodland edge, and adjacent to the woodland (e.g. scrub, tall rank grassland and ruderal vegetation) provide suitable foraging and basking habitat for reptiles. The field and shrub layer, particularly along the southern edge of the woodland, provides a sunny edge at the periphery of dense shrub vegetation. In contrast to the heavily grazed fields between the main bulk of the woodland and the river (TN 19), the rank, tussocky grassland of the small field bordering the south-west of the wood (TN 20), and tall grass/ruderal vegetation and scrub patches in the vicinity of the pond (TN 21), provide structurally suitable habitat for reptile foraging and shelter, particularly for common and relatively mobile species such as slow-worm and grass snake. Habitats in the vicinity of Lower Breinton, to the west and north-west of the woodland, are also suitable for reptiles while some areas of the woodland itself, such as bramble-covered areas within the secondary woodland on the eastern end, may also be suitable.

The woodland itself contains some features (fallen logs/trees, root holes, mammal burrows) that could act as suitable refugia for hibernation or extended torpor; many features are only a short distance from the woodland edge.

The HBRC holds three records for grass snake *Natrix natrix*, from between 2006 to 2009, within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe. Two records are from Breinton Common and a single record is from Little Breinton.

3.5.8 Water vole

The pond bordering the southern edge of the woodland and associated drainage channels running along the woodland boundary are too shallow (less than 0.5 m) to hold much water thus are not suitable for this species; the banks are too shallow for burrowing and the water level too low to provide protection from predators. Although the pond contains some marginal vegetation, its banks are mostly heavily shaded and thus there are fewer foraging resources here.

The River Wye, smaller tributary streams (i.e. streams to the east and west of the woodland) and local ponds (i.e. ponds in Lower Breinton and Breinton Court) might provide suitable habitat; however, this species does not move far from water and thus is unlikely to be found within the woodland.

The HBRC holds no records for water vole *Arvicola amphibius* within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe.

3.5.9 Otter

The River Wye supports a well-established otter population and individuals are likely to use many areas of cover within the river corridor, such as Breinton Wood, for resting and, perhaps, for breeding. Notably, because Breinton Wood is relatively undisturbed and is located close to the River Wye but above its floodplain, it represents a potential breeding site for otters according to the criteria identified by Liles (2003). The abundance of burrows excavated by badgers in the sloping woodland, many unused, provide potential holt sites above flood level; and the habitat links with the river at the Breinton Springs and via drainage ditches or hedgerows further east provide connectivity for otters moving between the river and the woodland.

The HBRC holds one record for otter *Lutra lutra*, from 2011, within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe.

3.5.10 Other species

During site visits, several additional species or signs of species were observed including club-tailed dragonfly *Gomphus vulgatissimus* (TN 22), numerous banded demoiselle *Calopteryx splendens* (TN 9), an area of molehills (TN 23) and an area of rabbit holes (TN 24).

Woodland habitats present, including woodland edge, might support other species of high biodiversity value, such as hedgehog *Erinaceus europaeus* and harvest mouse *Micromys minutus*, both of which have been recorded within a 0.5 km buffer around the area of Warham House, Belmont and Wycliffe.

Important invertebrate records within a 0.5 km buffer around the area include club-tailed dragonfly, white letter hairstreak *Satyrium w-album*, wood white *Leptidea sinapis*, wall *Lasiommata megera*, pale eggar *Trichiura crataegi*, lackey *Malacosoma Neustria* and slender ground hopper *Tetrix subulata*.

For designations see Appendix 2.

3.6 Bat Activity Surveys

Two bat activity surveys were completed as described in Section 2.3 and Table 1. The surveys followed a transect route shown in Figure 2, which was divided into sectors numbered 1 to 6 so as to relate the raw bat activity data shown in tables 4 and 5 below to the map in Figure 2. A summary of the variation in bat species diversity across the six transect sectors in both activity surveys is shown in Table 6.

The following is a summary of observations of the minimum of six bat species recorded during the surveys, listed in approximate order of frequency of encounters and occurrence in the six transect sectors shown in Figure 2:

Soprano pipistrelle *Pipistrellus pygmaeus*
This species was encountered more frequently and more widely (detected in all transect sectors over the two surveys) than any other during both surveys; this is unsurprising because soprano pipistrelles feed on the adults of small insects that breed in water, so they are typically associated with river valleys and other wetland areas. Also, a breeding roost is reportedly present in Breinton, which explains the concentration of activity by this species at the western end of the wood. The path past the Breinton Springs at the western end of the wood appeared to be a commuting route for soprano pipistrelles travelling between Breinton and the River Wye.

Common pipistrelle *Pipistrellus pipistrellus*
Common pipistrelles were less abundant during the surveys than their close relative above, but were nevertheless encountered in all transect sectors over the two surveys. This species is a true generalist and, producing relatively loud and distinctive calls, is more likely to be recorded on transects than some of the quieter bats.

***Myotis* bats**
This group of bats, many of which show an affinity with woodland, comprises several closely related species that are difficult to separate with confidence on the basis of their echolocation calls alone; unequivocal identification normally requires the close inspection of bats in the hand or the use of DNA recovered from droppings or tissue samples. Nevertheless, a broad separation of some species can be attempted on the basis of the frequency range of their recorded ultrasound calls: two of the medium-sized species are 'broadband' – Natterer's bat *Myotis nattereri* and Bechstein's bat *Myotis bechsteinii;* and the remainder are smaller and relatively 'narrowband' – whiskered bat *Myotis mystacinus,* Brandt's bat *Myotis brandtii,* Daubenton's bat *Myotis daubentonii* and Alcathoe bat *Myotis alcathoe.*

At Warham both 'broadband' and 'narrowband' *Myotis* bats were encountered on the bat detector, so at least two *Myotis* species were present (there may well have been more). As well as being less frequently encountered than the two pipistrelles, *Myotis* bats were also less widespread across the survey transect, being recorded

only on sectors 1-4; this distribution reflects the preference shown for woodland habitat by most *Myotis* species in Britain. Notably, on the July activity survey, *Myotis* bats were frequently encountered on woodland transect sectors 2, 3 and 4; this indicates that the site may support a colony of one or more *Myotis* species that depend upon the woodland habitat for roosting and foraging.

Long-eared bat *Plecotus* sp.
This species, which in Herefordshire is almost certainly the brown long-eared bat *Plecotus auritus,* but it is good practice to confirm this via measurements or DNA analysis, is a relatively common bat in well-treed landscapes such as woodland and parkland; however, the quiet nature of their echolocation calls means that they may be under-recorded during activity surveys. At Warham long-eared bats were recorded just four times in three different transect sectors over the two surveys.

Serotine *Eptesicus serotinus*
This large and impressive bat is often associated with woodland habitat. It was encountered only once during the activity surveys, on the northern edge of the wood (sector 4) during the July transect.

Table 4. Warham House bat activity survey results for 26th June 2013.

Transect sector	Time (BST)	Bat species	Activity/comments
1	2143	Pipistrelle sp.	Faint pass up in woodland canopy at eastern end
	2153-2200	Soprano pipistrelle	Several foraging passes high up in canopy on southern edge of wood
	2202	Common pipistrelle	Foraging along southern edge of wood
	2202	*Myotis* sp.	Very broadband so likely to be Natterer's bat?
2	2205	Common pipistrelle	Faint activity heard over field outside wood
	2215	*Myotis* sp.	Narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
	2220	Soprano pipistrelle	Foraging along path inside southern edge of wood
	2221	*Myotis* sp.	Narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
3	2237	Long-eared	Faint calls on southern edge of wood
	2242-44	Common pipistrelle	Occasional foraging calls inside wood near western end
	2244-48	Soprano pipistrelle	Occasional calls inside wood near western end
	2248	Common pipistrelle	Occasional calls inside wood near western end
	2249	Soprano and common pipistrelle	A cacophony of calls at the western end of the wood, suggesting commuting by many bats towards river? Mainly soprano pipistrelles
4	2252-54	Soprano and common pipistrelle	Several bats feeding near church, mostly soprano pipistrelles
	2254	Common pipistrelle	Feeding along northern edge of wood
	2256	Common pipistrelle and *Myotis* sp.	Both species recorded feeding along northern edge of wood; *Myotis* narrowband
	2257	Common pipistrelle	Feeding along northern edge of wood
	2301	*Myotis* sp.	Very broadband so likely to be Natterer's bat?
5	2303	Soprano and common pipistrelle	Individuals of both species recorded feeding over NE end of wood
	2308	Common pipistrelle	Feeding in parkland south-west of Warham House
6	2311-18	Soprano and	Individuals of both species recorded feeding in the

		common pipistrelle	grounds of Warham House

Table 5. Warham House bat activity survey results for 27th July 2013.

Transect sector	Time (BST)	Bat species	Activity/comments
1	2126	Soprano pipistrelle	Several calls inside eastern end of wood
	2133-34	Soprano pipistrelle	More calls from bat foraging on southern edge of wood
	2142-43	Soprano pipistrelle	Another bat feeding along southern edge of wood
2	2144-47	Common pipistrelle	Single bat foraging in canopy along southern edge of wood
	2154-55	*Myotis* sp.	Bat foraging inside wood; narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
	2202	*Myotis* sp.	Bat foraging inside wood; narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
3	2204	*Myotis* sp.	Bat foraging inside wood; narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
	2215	*Myotis* sp.	Narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
	2221	Soprano pipistrelle	Foraging inside western end of wood
	2222	*Myotis* sp.	Narrowband so likely to be small *Myotis*: whiskered/Brandt's/Alcathoe?
	2223	Common pipistrelle	Foraging at western end of wood
4	2229-33	Soprano pipistrelle	Many bats foraging at north-western end of wood by church
	2234	Long-eared and serotine	Both species recorded at same time on northern edge of wood
	2234-49	*Myotis* sp.	Many calls along northern edge of wood and probably more than one species present as both broad and narrowband calls recorded?
	2241	Long-eared	Clear calls along northern edge of wood
	2242	Common pipistrelle	Single bat foraging along northern edge of wood
5	2250-58	Common pipistrelle	Bats feeding over parkland to west of Warham House with social calls
	2253	Soprano pipistrelle	Single bat feeding over parkland
6	2259	Long-eared	Bat foraging in grounds of Warham House
	2300-14	Soprano and common pipistrelle	Individuals of both species recorded feeding in grounds of Warham House

Table 6 below summarises the occurrence of the bat species recorded across the six transect sectors during both activity surveys. In both surveys transect sector 4 had more bat species recorded than any other; and it is the only one in which all six bat species were recorded in one activity survey. This transect sector extended along the northern edge of the wood, with a traditional orchard adjacent to the north; thus it lies between two areas of good bat foraging habitat.

Table 6. The variation in bat species diversity across the six activity survey transect sectors at Warham House during June and July 2013

Transect sector no.	**June survey**	**July survey**	**Min. no. bat species**
1	Common pipistrelle Soprano pipistrelle Broadband *Myotis*	Soprano pipistrelle	**3**
2	Common pipistrelle Soprano pipistrelle Narrowband *Myotis*	Common pipistrelle Narrowband *Myotis*	**3**
3	Common pipistrelle Soprano pipistrelle Long-eared	Soprano pipistrelle Common pipistrelle Narrowband *Myotis*	**4**
4	Common pipistrelle Soprano pipistrelle Broadband *Myotis* Narrowband *Myotis*	Long-eared Common pipistrelle Soprano pipistrelle Broadband *Myotis* Narrowband *Myotis* Serotine	**6**
5	Soprano pipistrelle Common pipistrelle	Soprano pipistrelle Common pipistrelle	**2**
6	Soprano pipistrelle Common pipistrelle	Soprano pipistrelle Common pipistrelle Long-eared	**3**
Min. no. bat species	**5**	**6**	**6**

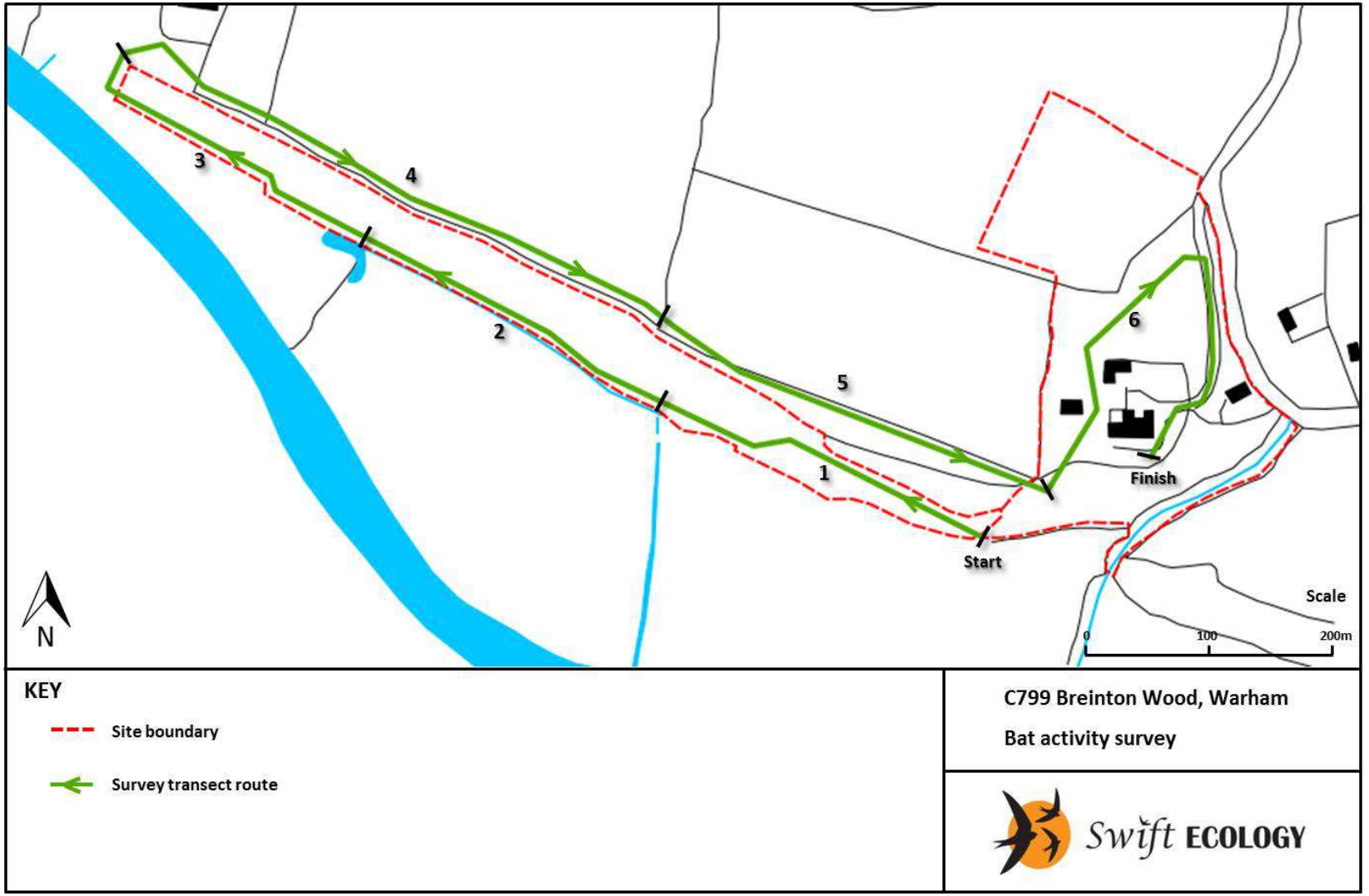

Figure 2. Bat activity survey route, Breinton Wood, Herefordshire. Transect route sections are numbered 1 to 6.

4 EVALUATION

4.1 Woodland

The woodland is dominated by oak and ash and has a dense and varied understory, particularly under ash-dominated areas. Trees are uneven aged thus the canopy provides variation in vertical architecture. There are numerous trees in various stages of senescence; standing deadwood and mature or veteran trees provide a variety of features, such as holes, splits, fissures, cracks and peeling bark, suitable for nesting birds and roosting bats. There are several fallen trees with rotting wood providing habitat for saproxylic invertebrates and saprophytic flora. The woodland is narrow thus is open to climatic variation; consequently it does not support a rich bryophyte or lichen assemblage which normally requires a constant moisture level. The floral composition is varied across the site reflecting the change in canopy species, sloped topography and associated changes in soil nutrients, pH, moisture and light.

4.1.1 Ancient woodland status

Areas of continuous woodland cover since AD1600 are generally classified as ancient (Rose, 1999) while a variety of methods, including analysis of archive data (including historical maps, tithe maps and documentary evidence), and surveys of ancient woodland indicator species are commonly used to identify woodlands of ancient origin. Where documentary evidence is not available, the number and composition of ancient woodland vascular plants present is often used to indicate woodland longevity and ancient woodland indicator lists have been developed across the regions and counties to reflect differences in species' occurrence across the UK; to our knowledge, there is no generally accepted ancient woodland indicator list for Herefordshire (Glaves *et al*., 2009).

Historic Ordnance Survey maps of Warham House show the woodland to be present in circa 1815 and 1889 (Herefordshire Parklands Project, 2012) while the Tithe map for Warham of 1840 classifies the eastern section of the woodland (the only part visible on this map) as coppice (Whitehead, 2011); thus the woodland has been around for at least 200 years and part of it might be a former working coppice. The presence of a small number of coppiced hazel and alder within the woodland are perhaps indicative of its former use. An old trackway, from Warham House grounds, running onto this area of the woodland has also been identified from archaeological surveys (Herefordshire Parklands Project, 2012).

In this report, ancient woodland indicator status has been assigned according to Kirby, K. (2004) and Rose, F. (1999); a total of twenty six AWVPs are identified as occurring within Breinton Wood. This includes eight species of trees and shrubs; several common, carpet-forming geophytes, including bluebell and wood anemone; five clonal species, including wood anemone, yellow archangel, wood melick, dog's mercury and wood speedwell; and a number of species that respond positively to coppicing, including wood anemone, three sedge species, pignut, bluebell, yellow archangel, wood melick, wood millet, wild daffodil, Goldilocks buttercup, wood

speedwell and two violet species. Dog's mercury is the only AWI species within the woodland that responds negatively to coppicing (Rackham, 2006).

Within the assemblage of AWVP species are several which exhibit high fidelity to ancient woodlands, including small-leaved lime, wood anemone, bluebell, wood melick, wood millet and wood speedwell (Spencer, 1990; Rackham, 2006). However, small-leaved lime is sometimes planted and this may have been the case at Breinton Wood along with sweet and horse chestnut, wych elm, holly and hazel (Whitehead, 2011). Wood anemone also occurs in pastures and upland habitats (Rose, 1999) while daffodil cultivars are sometimes planted within woodlands. Wood melick is a summer-leafing perennial closely associated with ancient woodbanks (Rackham, 2006). In Breinton wood this species occurs at its greatest abundance along the northern boundary of the woodland; it is in this area that at least seven trees of veteran status have been recorded (Herefordshire Parklands Project, 2012, see also target notes) including a hollow oak of at least 300 years of age.

The number of AWVP species is often used to indicate ancient origin although the size of the woodland, and the variety of meso- and micro-habitats it contains (i.e. soil type, pH and moisture, structural diversity, topographical and physical variations and past management), will affect the number of indicators present. Often threshold values are used but this varies across regions, for example, the best sites in the south of England contain more than 50 AWVP species while the best sites in Somerset and Cornwall contain 35-40 AWVPs (Rose, 1999). Rackham suggests that a large ancient woodland might contain 50% of ancient woodland indicator species on the regional list while small woodlands (less than 5 ha) might contain only 10% (Rackham, 2006).

Glaves and co-authors surveyed the coverage, use and application of ancient woodland indicator lists in the UK and tabulated species listed on ancient woodland indicator lists (Glaves *et al*., (2009), Appendix 4). A quick analysis of this table shows that the surrounding regions and counties of Worcestershire, Shropshire, South and East Wales contain between 87 and 108 indicator species on their ancient woodland indicator lists. However, only 50 species are common to all four lists which, when combined, give a total 133 AWVP species. Taking the average of 97 species for these four surrounding regions/counties (there is no recognised list for Gloucestershire), a candidate list of AWVP species for Herefordshire might contain approximately 100 species; this is the same number derived for the south of England regions by Rose (1999). Breinton Wood would therefore contain 26% (n=26) of ancient woodland indicator species on this candidate list; even the best woodlands in the region are only likely to contain 40- 50% of listed AWI species, and most of these are larger woodlands. This is a good percentage for such a small (approx. 3.5 ha) woodland and might reflect the diversity of micro-habitats catered for by the changing canopy, sloping topography, change in soil character from the top to the bottom of the woodland and past management (i.e. coppicing) of the woodland. Fourteen AWI species are common to all four lists of Worcestershire, Shropshire, South and East Wales.

In summary, the relatively high number and varied composition of ancient woodland indicator species, presence of several veteran trees (one of at least 300 years of age), and evidence of past management (i.e. coppiced alder and hazel), suggest that this woodland might be of ancient origin and highlights its important conservation value.

4.2 Protected Animal Species

4.2.1 Bats

There are numerous old and/or veteran trees and standing deadwood within the woodland and along the woodland edge suitable for roosting bats. The woodland may be used by foraging/commuting bats, particularly along the southern boundary where the presence of water (i.e. pond and drainage channels) is likely to enhance the abundance of invertebrate prey. See also Section 4.3 below.

Bats tend to feed in open woodland, along woodland edges and watercourses and in associated wet and riparian habitats thus the woodland and adjacent areas are highly likely to support several bat species.

4.2.2 Badger

Breinton Wood is heavily used by badgers and contains two large active setts and one outlier along its length as well and numerous badger trails linking each of these setts or exiting the woodland. The three setts probably support one social group but it is not possible to estimate badger numbers from the size of their sett(s).

The woodland provides some foraging habitat for this species but there is a wide variety of suitable habitat in the surrounding area which will provide numerous foraging opportunities, including arable farmland, pasture and orchards.

4.2.3 Hazel dormouse

Habitats and food resources within Breinton Wood and along its boundary are suitable for hazel dormouse but the woodland is poorly connected with other areas of semi-natural woodland and is probably not large enough to support a viable population without immigration from larger source populations. There is a low probability that this species will occur in the woodland.

4.2.4 Nesting birds

Breinton Wood supports a community of common bird species as well as several typical woodland species (e.g. nuthatch, great spotted woodpecker and warbler species). Features within the woodland provide nesting sites (e.g. tree holes/cavities in notable/veteran trees and scrub) while the woodland canopy, understorey and woodland edge flora are likely to support an abundant invertebrate assemblage providing an important foraging resource for birds.

4.2.5 Great crested newt

The woodland and woodland edges provide suitable foraging and refugia opportunities for this species, which has been recorded in the main pond bordering

the southern edge of the woodland; GCN are generally found within 50 – 100 m of their breeding ponds (Cresswell and Whitworth, 2004). Based on this record from 2013, it is highly likely that the woodland provides terrestrial habitat for this species.

There is a second, ephemeral pond bordering the woodland on its southern boundary and a further six ponds within 500 m of the woodland but the status of these ponds for breeding amphibians is unknown. Three ponds are south of the River Wye which is likely to form a barrier to this species' movements; flowing water is negatively correlated with great crested newt migration (Oldham, 2000).

4.2.6 Reptiles

Habitats adjacent to, and merging with, the woodland, including scrub, tall grass and ruderal vegetation, rank grassland and woodland edges offer foraging, basking and shelter opportunities for reptiles.

4.2.7 Water vole

It is highly unlikely that water vole occurs within the small pond or associated drainage channels running along the southern boundary of the woodland. There is a low probability that this species will occur in the woodland.

4.2.8 Otter

Scrub and tall ruderal vegetation bordering the woodland, on its southern edge, and in the vicinity of the small pond, might provide refuge opportunities for this species. This area is linked to the River Wye by small drainage channels at the base of tall hedgerows, which might provide commuting routes for otter.

4.2.9 Other species

The woodland and surrounding variety of habitats are likely to support a wide range of common faunal species including mole, hedgehog and common invertebrates.

4.3 Bat Activity Surveys

The list of bats recorded at Warham during the two activity surveys in June and July 2013 is unlikely fully to reflect the number of species using the site; this is because two summer activity surveys can provide only an incomplete 'snapshot' of the bat community, and because the methods used cannot reliably distinguish between some of the species, notably those in the *Myotis* group. More intensive recording, for example involving the use of ultrasonic 'bat lures' to attract bats into nets or harp traps for detailed examination, would be needed in order to determine the full range of *Myotis* species present. It is quite likely that such surveys would confirm the presence of three or more *Myotis* species at the site.

The following four additional bat species are present in Herefordshire, and most are widespread so are likely to be present in the vicinity of Warham; they would probably be detected by more frequent manual activity surveys or by the long-term deployment of automatic bat detectors: lesser horseshoe *Rhinolophus hipposideros,*

noctule *Nyctalus noctula,* Leisler's *Nyctalus leisleri,* and barbastelle *Barbastella barbastellus.*

Notwithstanding the caveats above, the abundance and diversity of bats recorded is respectable and reflects the quality of habitat provided by the Warham site. The site provides foraging, commuting and roosting habitat for bats, although roosting was not confirmed during the activity surveys. Habitat quality for bats is largely a function of the occurrence of the block of structurally diverse and undisturbed ancient semi-natural woodland close to the River Wye, with the proximity of old buildings in Breinton offering further bat roosting opportunities; the presence of sheltered parkland with permanent pasture is an additional feature of value to foraging bats. The presence of mature trees with standing deadwood in Breinton Wood is likely to support a more diverse bat community than actively managed woodlands, although its small size must limit its capacity to support colonies of woodland-dependent bats.

5 RELEVANT LITERATURE

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Appendix 1 – Data Search Results: Statutory and Non-statutory Designated Sites within 2 km

Designation	National Grid Reference
Special Areas of Conservation (SAC)	
River Wye	ST544912 - SO230429
Sites of Special Scientific Interest (SSSI)	
River Wye	ST544912 - SO230429
Catchment Sensitive Farming Capital Grant Scheme Target Area	
River Wye	ST544912 - SO230429
Herefordshire Special Wildlife Site (SWS /Site of Importance to Nature Conservation (SINC)	
Breinton Wood - site no. SO 43/17	SO474393
Ancient Woodland: Ancient & Semi-Natural Woodland	
Ruckhall Wood	SO464393
Priors Shell Wood	SO465391
Priors Shell Wood	SO463389
Old Hill Coppice	SO472388
Newton Coppice	SO483378
Ancient Woodland: Ancient Replanted Woodland	
Ruckhall Wood	SO456390
Newton Coppice	SO484376

Appendix 2 - HBRC Data Search Results: Table of Protected and Notable Species within 0.5 km

Common name	Scientific name	Citations	National grid reference	Year	Measurement
BATS					
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO485383	2011	Present Droppings
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO48583839	2011	Present Roosting
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO485383	2011	Present Feeding
Chiroptera	*Chiroptera*		SO486381	2011	Present Droppings
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO463398	2010	Present Feeding
Long-eared Bat species	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO463398	2010	Present In flight
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO463398	2010	Present
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO46363984	2010	At least 4 Roosting
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO46343983	2010	1 Roosting
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO46363984	2010	5 Roosting
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b	SO46363984	2010	1 Roosting
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO46343983	2010	1 Roosting
Bats	*Chiroptera*		SO474400	2008	Present Signs
Bats	*Chiroptera*		SO474400	2008	Present Droppings
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO489379	2007	1 Present
Daubenton's Bat	*Myotis daubentonii*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	1 Present
Noctule	*Nyctalus noctula*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	1 Present
Plecotus	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO489379	2007	1 Present
Serotine	*Eptesicus serotinus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	1 Present

Bats	*Chiroptera*		SO47333973	2007	Present Droppings
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO47333973	2007	1 Feeding
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO47333973	2007	3 Feeding
Serotine	*Eptesicus serotinus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	1 In flight
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO489379	2007	1 Feeding
Daubenton's Bat	*Myotis daubentonii*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	2+ Feeding
Noctule	*Nyctalus noctula*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	2 Feeding
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO489379	2007	2 Feeding
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	2 Feeding
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO489379	2007	1 Feeding
Daubenton's Bat	*Myotis daubentonii*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	2+ Feeding
Noctule	*Nyctalus noctula*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	1 Feeding
Pipistrellus	*Pipistrellus*	CMS_A2, HabRegs2, WCA5	SO489379	2007	1 In flight
Serotine	*Eptesicus serotinus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	1 In flight
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	1 Feeding
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO489379	2007	1 Feeding
Pipistrellus	*Pipistrellus*	CMS_A2, HabRegs2, WCA5	SO489379	2007	3 In flight
Serotine	*Eptesicus serotinus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, WCA5	SO489379	2007	1 In flight
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	1 Present
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO489379	2007	1 Present
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO47333973	2007	1 Roosting
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO47303972	2007	1 Roosting
Plecotus	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	1 Roosting
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	3 Feeding
Plecotus	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	1 Feeding
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO47303972	2007	3 Feeding
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO47303972	2007	1 Feeding
Bats	*Chiroptera*		SO47303972	2007	Present Droppings
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41,	SO47303972	2007	1 Feeding

		UKBAP, WCA5			
Plecotus	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	200+ Droppings
Pipistrellus	*Pipistrellus*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	3 Feeding
Plecotus	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	4 Feeding
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	1 Feeding
Plecotus	*Plecotus*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	1 Feeding
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO47303972	2007	3 Feeding
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO489379	2007	2 Feeding
Unidentified Bat	*Myotis*	CMS_A2, HabRegs2, WCA5	SO489379	2007	1 In flight
Brown Long-Eared Bat	*Plecotus auritus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, Sect.41, UKBAP, WCA5	SO485392	2005	5 Roosting
Common Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO485392	2005	1 In flight
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO485392	2005	1 In flight
Brown Long-Eared Bat	*Plecotus auritus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, Sect.41, UKBAP, WCA5	SO485392	2005	1 Droppings
Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO485392	2005	>1 In flight
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, Sect.41, UKBAP, WCA5	SO485392	2005	3 Roosting
Brown Long-Eared Bat	*Plecotus auritus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HSD4, Sect.41, UKBAP, WCA5	SO485392	2005	2 Roosting
Pipistrelle	*Pipistrellus pipistrellus*	Bern2, CMS_A2, HabRegs2, HBAPCC, HBAPPS, HSD4, WCA5	SO485392	2005	2 Roosting
Bats	*Chiroptera*		SO471396	2004	Present
Bats	*Chiroptera*		SO4856337207	2003	Present Droppings
Bats	*Chiroptera*		SO470396	2002	Present
Bats	*Chiroptera*		SO469385	1999	Present Feeding
Bats	*Chiroptera*		SO488387	1999	Present Feeding
Bats	*Chiroptera*		SO487377	1992	Present
BADGER					
Badger	*Meles meles*	HBAPCC, PBA	SO476400	2008	Present Droppings
Badger	*Meles meles*	HBAPCC, PBA	SO474398	2008	Present Signs
Badger	*Meles meles*	HBAPCC, PBA	SO474398	2008	Present Burrow
Badger	*Meles meles*	HBAPCC, PBA	SO472398	2008	4 Droppings
Badger	*Meles meles*	HBAPCC, PBA	SO472398	2008	Present Tracks

Badger	*Meles meles*	HBAPCC, PBA	SO473397	2007	1 Dead
Badger	*Meles meles*	HBAPCC, PBA	SO481391	2002	Present
Badger	*Meles meles*	HBAPCC, PBA	SO484386	2001	Present Tracks
Badger	*Meles meles*	HBAPCC, PBA	SO473394	1998	Present
GREAT CRESTED NEWT					
Great Crested Newt	*Triturus cristatus*	Bern2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO476400	2008	2 Male
Great Crested Newt	*Triturus cristatus*	Bern2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO476400	2008	1 Female
Great Crested Newt	*Triturus cristatus*	Bern2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO476400	2008	2 Female
Great Crested Newt	*Triturus cristatus*	Bern2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO476400	2008	21 Egg/ovum
Great Crested Newt	*Triturus cristatus*	Bern2, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO474393	1998	Frequent Larvae
REPTILES					
Grass Snake	*Natrix natrix*	HBAPCC, Sect.41, UKBAP, WCA5	SO476400	2009	1 Adult
Grass Snake	*Natrix natrix*	HBAPCC, Sect.41, UKBAP, WCA5	SO457397	2007	1 Juvenile
Grass Snake	*Natrix natrix*	HBAPCC, Sect.41, UKBAP, WCA5	SO457397	2006	1 Dead
OTTER					
European Otter	*Lutra lutra*	Bern2, CITESA, HabRegs2, HBAPCC, HBAPPS, HSD2p, HSD4, Sect.41, UKBAP, WCA5	SO486381	2011	1 Dead
OTHER MAMMALS					
West European Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO49263827	2011	1 Dead
Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO486377	2008	1 Dead
Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO481378	2005	1 Dead; 1 Adult Dead
Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO479378	2005	1 Dead
Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO479378	2005	1 Dead
West European Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO492383	2005	1 Adult Dead
Hedgehog	*Erinaceus europaeus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO481378	2005	1 Dead
Harvest Mouse	*Micromys minutus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO484386	2001	8 Nest
Harvest Mouse	*Micromys minutus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO480373	2000	1 Present
Harvest Mouse	*Micromys minutus*	HBAPCC, HBAPSR, Sect.41, UKBAP	SO484385	2000	1 Present

INVERTEBRATES					
Club-Tailed Dragonfly	*Gomphus vulgatissimus*	HBAPCC, HBAPPS, RLGB.Lr(NT)	SO474393	2004	1 Present; 1 Male; Present Adult; Present Exuvia
White Letter Hairstreak	*Satyrium w-album*	BCRM, RLGB.EN, Sect.41, UKBAP, WCA5	SO4739	1990	Present
White Letter Hairstreak	*Satyrium w-album*	BCRM, RLGB.EN, Sect.41, UKBAP, WCA5	SO473394	1985	Present
Slender Ground Hopper	*Tetrix subulata*	HBAPCC, HBAPPS, HBAPSR	SO473395	1984	Present
Wood White	*Leptidea sinapis*	BCRP, HBAPCC, HBAPPS, RLGB.EN, Sect.41, UKBAP, WCA5	SO4739	1984	Present
Wall	*Lasiommata megera*	BCRM, HBAPCC, RLGB.Lr(NT), Sect.41, UKBAP	SO474392	1984	Present
White Letter Hairstreak	*Satyrium w-album*	BCRM, RLGB.EN, Sect.41, UKBAP, WCA5	SO4739	1984	Present
White Letter Hairstreak	*Satyrium w-album*	BCRM, RLGB.EN, Sect.41, UKBAP, WCA5	SO4739	1983	Present
White Letter Hairstreak	*Satyrium w-album*	BCRM, RLGB.EN, Sect.41, UKBAP, WCA5	SO4739	1970	Present
Pale Eggar	*Trichiura crataegi*	Sect.41, UKBAP	SO4640	1967	Present Adult
Pale Eggar	*Trichiura crataegi*	Sect.41, UKBAP	SO4640	1966	Present Adult
Lackey	*Malacosoma neustria*	Sect.41, UKBAP	SO4640	1964	Present Adult
FLORA					
Snowdrop	*Galanthus nivalis*	CITESB	SO478377	2012	Present
Shepherd's-needle	*Scandix pecten-veneris*	RLGB.CR, Sect.41, UKBAP	SO458401	2012	Present
Corn Buttercup	*Ranunculus arvensis*	RLGB.CR, Sect.41, UKBAP	SO46104004	2012	Present
Shepherd's-needle	*Scandix pecten-veneris*	RLGB.CR, Sect.41, UKBAP	SO46094009	2012	Present
Sun Spurge	*Euphorbia helioscopia*	CITESB	SO475399	2008	Rare Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO475399	2008	Rare Present
Mistletoe	*Viscum album*	HBAPCC, HBAPPS	SO475399	2008	Frequent Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO484386	2001	Present
Narcissus	*Narcissus pseudonarcissus*	HBAPCC, HBAPPS	SO473394	1998	Present

pseudonarcissus subsp. pseudonarcissus	*subsp. pseudonarcissus*				
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO473394	1998	Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO488377	1993	Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO490374	1993	Present
Mistletoe	*Viscum album*	HBAPCC, HBAPPS	SO43U	1990	Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO43U	1990	Present
Narcissus pseudonarcissus subsp. pseudonarcissus	*Narcissus pseudonarcissus subsp. pseudonarcissus*	HBAPCC, HBAPPS	SO4739	1977	Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO4739	1977	Abundant Present
Bluebell	*Hyacinthoides non-scripta*	HBAPCC, WCA8	SO485389	1977	Present
Spreading Hedge-Parsley	*Torilis arvensis*	NS, RLGB.EN, Sect.41, UKBAP	SO487383	1881	Present

Appendix 3 – Phase 1 Habitat Survey: Target Notes

No.	Target Note (TN) Description	National Grid Reference
1	Pedunculate oak *Quercus robur* over hazel *Corylus avellana* and field maple *Acer campestre*	SO 47630 39264
2	Ash *Fraxinus excelsior* dominated woodland	SO 47420 39377 SO 47818 39160
3	Secondary woodland – stand of horse chestnut *Aesculus hippocastanum*, bramble thickets, cow parsley and nettle	SO 47971 39083
4	Veteran hollow oak. The girth at breast height is 540 cm suggesting an age of between 300-350 years.	SO 47563 39330
5	Small-leaved lime *Tilia cordata*	SO 47479 39334
6	Wild crab apple *Malus sylvestris*	SO 47457 39346
7	Some planted trees (oak, ash, rowan, sycamore)	SO 47436 39377
8	Area of coppiced alder and hazel	SO 47763 39177
9	Pond (fed by drainage channels)	SO 47468 39308
9	Numerous banded demoiselle *Calopteryx splendens* – breeding in pond	
10	Standing dead wood: veteran cherry with numerous woodpecker holes. #Girth at breast height 230 cm.	SO 47588 39320
11	Standing dead wood with woodpecker holes: breeding birds/potential bat roosts	SO 47419 39405
12	Standing deadwood: horse chestnut. #Girth at breast height 390 cm	SO 47958 39113
13	Mature/veteran oak *Quercus robur*. Contains potential bat roost features. Girth at breast height 370 cm	SO 47657 39237
14	Badger sett: very large main sett	SO 47299 39452
15	Badger sett: very large main sett	SO 47888 39137
16	Badger sett: outlier sett	SO 47649 39260
17	Old orchard with trees of ancient/veteran status	SO 47597 39466
18	Ephemeral pond (dry on day of visit)	SO 47739 39154
19	Heavily grazed 'short-cropped' pasture	SO 47600 39141 SO 47915 39024
20	Ungrazed meadow (unimproved/semi-improved)	SO 47415 39317
21	Tall grasses, ruderal vegetation and scrub adjacent to pond	SO 47469 39302
22	Common club-tail *Gomphus vulgatissimus*	SO 47736 39235
23	Area of molehills	SO 47770 39149
24	Area of rabbit holes	SO 47502 39321

- measurements taken from (Herefordshire Parklands Project, 2012).