



STAGE 2:

Bat and Bird activity survey Report



at

Rockfields Farm,

Cheadle Road, Wetley Rocks,
Staffordshire. ST9 0AX

July 2015

NOTES

Notice to readers

This report has been prepared by Charnia Ecology with all reasonable skill, care and diligence, within the terms of the contract with the client. The actions of the surveyor on site and during the production of the report were undertaken in accordance with the Code of Professional Conduct for the Chartered Institute of Ecology and Environmental Management (www.ieem.org.uk).

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Non-technical summary

Report rationale

1. This report has been prepared at the request of the client, Chris Bridgett, in relation to the identification of protected bat and bird species at Rockfields Farm, Cheadle Road, Wetley Rocks, Staffordshire. ST9 0AX. All activity surveys were carried during optimal periods and conditions under the supervision of a Natural England licensed bat ecologist and member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

Proposed works

2. It is understood that the proposed development would remove the flat roof extensions, and renovate dilapidated building sections, which will include roofing works.

Site description

3. Rockfields Farm comprises of an original block stone dwelling consolidated onto a bungalow, with a number of dilapidated auxiliary farm out-buildings and an open paddock compartment. Overall, there is good connectivity to the wider landscape, with excellent resources for both bats and birds considered.
4. The original cottage and bungalow sections of Rockfields Farm were found to have a moderate number of external features suitable for crevice-dwelling bat species (raised/missing tiles, cavities in brick-work). Internal inspection recorded minor historic evidence of bats in an apex void above a dormer room in the original cottage.
5. Three/four bat droppings were recorded floor level, although these were not considered as being fresh, and more than a few seasons old. A further roof void area was recorded in the bungalow section, although a full inspection of the area could not be carried out due to Health and Safety concerns. This void was also found to be tightly fitted with roofing membrane, which prevented any inspection of intermediate layers between the roof sections.
6. There are two single-storey, wooden shed buildings to the rear of the property and a dilapidated brick building minus roof on the north-east corner boundary. These auxiliary buildings were considered as having **negligible potential** for roosting bats overall, being exposed to the elements and unsuitable for optimal thermoregulation requirements of bats. **NO** further recommendations are made with regard to the auxiliary buildings. **NO** evidence of nesting birds, including Barn owl were recorded during internal and internal inspection of all structures onsite,

Desk top study

7. Pre-survey data shows the the proposed application area is contained under **Area Green Belt 64 Potteries and Churnet Valley & Special Landscape Area**, with a number of statutory and non-statutory designated sites are recorded within a 1-2km radius. At a local level, pre-survey data shows three species of bat present within a 2km search radius of the proposed application area; Common pipistrelle, Soprano pipistrelle and Brown Long-eared bat.

Presence/absence activity surveys

8. 2 x Dusk and 1 x Dawn bat activity surveys found **NO** evidence of bats emerging or re-entering any of the structures onsite. The dominant species was found to be Common pipistrelle in low numbers, which were predominantly recorded commuting and foraging along the tree lined access track to the rear of the property.

Ecology of bat species onsite

9. **NO HIGH IMPACT BAT ROOST(S)** (i.e. maternity roost) are predicted onsite, with **NO** immediate impact to any Valued Ecological Receptors considered within the Zone of Influence. However, due to some survey constraints of the building, coupled with minor historic evidence of individual bats recorded in the original cottage section, coupled with survey constraints; assessment cannot fully rule-out the potential that individual bats may utilize intermediate layers of the roof section, over space and time. This particularly true of Common pipistrelle which is known to switch between sites and show less fidelity to roosts than other species.

Ecological value of building unit(s)

10. Although no active bat roosts were recorded *in-situ*, given the number of crevice-dwelling roost features around the main building, coupled with the behaviour of Common pipistrelle, the main dwelling is considered as having **moderate** ecological value for individual crevice-dwelling bats, and **negligible ecological value for nesting birds** (including Barn Owl).

Impact assessment

11. Based on renovation and partial removal of selected flat-roof extensions, overall impact to individual roosting bats is considered as being low to moderate with regard to short-term disturbance, and low overall with regard to long-term roost modification and loss. Due to the scale of the proposed development, **NO** impact to any statutory or non-statutory designated areas is predicted.
12. It is considered that the proposed development would have **moderate short-term** disturbance on potential foraging and commuting habitat for low numbers of pipistrelle bats, with **negligible long-term** predicted overall.
13. **NO** impact to birds including Barn owl is predicted. However, where possible, works should be undertaken outside the bird breeding season (mid March – August). If this is not possible, then should any active bird nests be found during works, then these should be left undisturbed until offspring have fully fledged.

Mitigation Licence

14. As **NO** bats were recorded roosting within the proposed application area, **it will NOT** be necessary to apply for a European Protected Species (EPS) licence from Natural England. However, due to minor historic evidence of bats, coupled with survey constraints and selected removal of building sections, a number of **site safe-guard measures** are conditioned in the event that individual Common pipistrelle may adopt the building over space and time.

Recommendations & Conditions (see section 6.4)

15. Due to proposed removal and renovation of selected building sections, it is considered prudent to undertake a precautionary '**soft demolition**' approach during any works intended. This should be carried out under the supervision of suitably qualified bat ecologist, in the event that individual bats may be present. **Should any bats be discovered prior to, or during works (or suspicion arise about the possible presence of bats), then all works must cease immediately.**
16. In general, timing of works can be carried out between October – April, when bats have vacated to hibernation roosts. However, due to the behaviour of Common pipistrelle, it is recommended that any roofing works should be carried out between September to October, when bats are highly transient between autumn swarming sites and winter roosts. In the unlikely event that individual bats are encountered during works, any such individuals would be enabled to naturally disperse under their own volition, whilst there is still sufficient resources in the surrounding landscape for bats to utilize, prior to the onset of winter.
17. Where possible, all sustainable developments should consider providing sustainable roost compensation / enhancement for local bat populations, that may be inadvertently displaced or impacted upon during pre and post development. As there is minor historic evidence of individual bats in the upper roof void section of the original cottage section, it is recommended roosting features for crevice-dwelling bats are retained/created during the re-roofing works proposed around this section.
18. It is further recommended that additional bat boxes are incorporated into the landscaping of the development, being fitted to mature trees around the eastern boundary edges, or external elevations of the completed building where possible.
19. Further precautionary recommendations are made regarding the use of timber treatments and Breathable roofing membrane during any remedial roofing works. Consideration is also given to scaffolding during works, and pre/post development lighting within this report.

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1. INTRODUCTION

1.1 Site description

- 1.1.1 This report has been prepared at the request of the client, Chris Bridgett, in relation to the identification of protected bat and bird species at Rockfields Farm, Cheadle Road, Wetley Rocks, Staffordshire. ST9 0AX (OS grid reference: SJ966489).
- 1.1.2 The site is situated ca. two miles south of Cheddleton and six miles south of Leek. Rockfields Farm comprises of an original block stone dwelling consolidated with a bungalow extension, and a number of dilapidated auxiliary farm out-buildings to the rear. There is an open paddock compartment to the southern boundary, with the A522 Cheadle road adjacent to the western boundary.
- 1.1.3 There is an access lane along the eastern boundary which can be gained via Consall Lane. An area of dense vegetation and tree canopy partially shrouds the building along the northern elevation, with open agricultural land recorded beyond the eastern boundary.

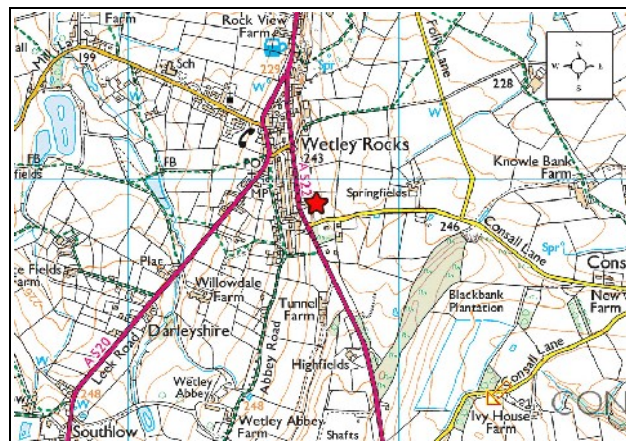


Figure 1. Location of site (red star) in context to the surrounding landscape (source: www.gridref.org.uk).

- 1.1.3 The objective of this report is to provide the client with information on the known and potential bat roosts and birds nesting within the building, and to outline recommendations on how to proceed with the works in a legal and ecologically sensitive manner, should bats and birds be present. As defined in Planning Policy Statement 9 (ODPM, 2005) (now superseded by the National Planning Policy Framework - NPPF 2012), Biodiversity and Geological Conservation sites of biodiversity conservation value and protected species are material considerations in the planning process.

1.2 Proposed works

- 1.2.1 It is understood that the original two-storey house section and bungalow is to be retained. The following proposed works are considered:

- Removal of the existing flat roof area to the rear of the property;
- Replace former flat roof extension with a pitched roof extension from the gable end of the existing cottage;
- removal of part of the L-shaped building tiled roof;
- Renovate and re-roof part of the existing collapsed L-shaped building on the north elevation;
- Re-slate the original cottage roof.

1.3 Aims of survey

1.3.1 The scope of this appraisal has been determined in line with the proportional approach to ecological survey, assessment and subsequent recommendations for avoidance and mitigation of impacts, which is encouraged in the emerging ‘BS 42020: Biodiversity – Code of practice for planning and development’. This report has been prepared with due consideration for various best practice guidance and methodologies including those of the Chartered Institute of Ecology and Environmental Management (CIEEM (2012)¹, the emerging BS 42020 and the Bat Conservation Trust Best Practice 2012.

1.3.2 The aims of the Stage 2 presence/absence activity surveys is to provide an ecological evaluation of the following species within the proposed application area:

<ul style="list-style-type: none"> • Bats
- Probability of bats and their roost sites being present at the proposed redevelopment site.
- To assess the roost status.
- To assess suitable food resources and habitat requirements.
- If a roost site is found, to provide an impact assessment.

Table 1. Aims of survey in relation to bats.

1.3.3 A bat roost is interpreted as ‘any structure or place, which any wild bat uses for shelter or protection. Bats tend to show a high fidelity to roosts. Subsequently, legal opinion regards a roost to be protected whether or not the bats are present at the time. There are many types of roost used by temperate bats during their annual cycle: Any structures found having evidence of bats will be further evaluated to assess which of the following roost categories may be present onsite (if any).

1.3.4 The survey protocol also considers all common wild birds that are protected under The Wildlife and Countryside Act 1981 (and as amended):

<ul style="list-style-type: none"> • Birds
<ul style="list-style-type: none"> • Establish if birds are using the site.
<ul style="list-style-type: none"> • Locate nest sites, if present.
<ul style="list-style-type: none"> • Assess what types of activities were shown within the redevelopment site.
<ul style="list-style-type: none"> • Assess suitable food resources and habitat requirements.
<ul style="list-style-type: none"> • Provide an impact assessment, if nests are found.

Table 2. Aims of survey in relation to birds.

- 1.3.5 Certain rare breeding birds such as Barn Owl (*Tyto alba*), are listed on Schedule One of The Wildlife and Countryside Act 1981 (and as amended). Under this legislation they are afforded the same protection as common wild birds, and are also protected against disturbance whilst building a nest or on or near a nest containing eggs and unfledged young. Survey protocol considers the following:

<ul style="list-style-type: none"> • Barn Owl
<ul style="list-style-type: none"> • Establish presence onsite.
<ul style="list-style-type: none"> • Establish potential nest sites (PNS).
<ul style="list-style-type: none"> • Locate any active roost sites (ARS).
<ul style="list-style-type: none"> • Locate any temporary roost sites (TRS)
<ul style="list-style-type: none"> • Assess potential feeding and dispersal habitats (PFH)
<ul style="list-style-type: none"> • Provide an impact assessment, should barn owl(s) be present

Table 3. Aims of survey in relation to Barn Owl.

- 1.3.6 Assessment also considers potential effects on valued ecological receptors (VERs) and zones of influence (Zoi) during pre and post development, both onsite and off- site. The term Zone of Influence is used to describe the geographic extent of potential impacts of a proposed development. Should a likely significance of negative impacts be identified, further surveys, mitigation and enhancement measures will then be determined accordingly; to prevent, offset or reduce the degree of impact that may occur should development commence.
- 1.3.7 Should bats be present onsite, then a European Protected Species (EPS) development license issued by Natural England (NE) may be required prior to any works taking place. If required, further presence/absence survey should be undertaken and a mitigation strategy be implemented with Natural England and the Local Planning Authority. Should no further surveying effort be considered, then the PEA report will include full justification and evaluation.

2. SURVEY METHODOLOGY

- 2.1.1 The aims of this activity survey report is to provide an ecological evaluation of the site in relation to protected bats and birds and considered appropriate to achieve the aims and objectives discussed in section 1.3.
- 2.1.2 The following survey protocol was considered appropriate to provide a full ecological valuation of the site in relation to protected bat and bird species, in order to determine the following aims and objectives:

- What impact the redevelopment is likely to have on any protected species found at the site.
- The need for any Natural England development licence application to be made in respect of activities concerning protected species.
- Recommendations for any mitigation measures that would be required.

2.1.3 In accordance with BCT 2nd edition (2012) guidelines, the following survey methodology is considered appropriate to achieve the aims and objectives:

2.2 Pre-survey data search

2.2.1 Pre-survey data search provided historical records of any protected bat and bird species found within a 2km radius of the application area. Additional ecological data has been sourced to understand any constraints that the proposed planning application may have on species and habitat in the wider landscape. A number of electronic sources sites were consulted including; www.magic.gov.uk; www.naturalengland.org.uk; Google Earth and www.ordinancesurvey.co.uk.

2.3 Surveyor information

2.3.1 All surveys were undertaken by 2/3 surveyors and overseen by a Natural England licensed bat ecologist and member of the Chartered Institute of Ecology and Environmental Management (CIEEM):

- **Mark Weston** – BSc (Hons), MIEEM, Natural England Bat Licence (CLS00836 – Level 2). Mark has specialized in bat ecology for over five years, being actively involved in scoping, presence/ absence surveys and method statement preparation with regard to planning and the law. He has a First Class Honours degree in Conservation Biology and awarded the Vice-Chancellor prize for academic excellence. He is also an associate lecturer in ecological sciences at the University of Derby, and has undertaken a number of BCT training courses and conferences concerning bat ecology, bats and the law, mitigation and echolocation sound analysis. He is a member of the Bat Conservation Trust (BCT) and Derbyshire Bat Conservation Group (DBCG).
- Assistant ecologist(s): **Melissa Loughran** BSc (Hons) / **Mark Johnson** BSc (Hons)

2.4 Field Surveys

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Inspection of Hibernation roosts- semi optimal survey			Limited activity-sub optimal	Summer roost emergence & re-entry surveys -Optimal survey period					Limited activity -sub optimal	Hibernation roosts - semi optimal survey	
Internal roost surveys are possible / Trees are best surveyed during Winter											

Table 4. Annual survey optimality for bats.

2.4.0 All field surveys were conducted during an optimal period of the bat surveying season and with sufficient intervals between surveys to allow for any stochastic events over space and time. Weather conditions were optimal throughout all survey periods (Temp: >8°C / dry conditions). Assessment incorporated the use of binoculars, torch, endoscope and ladders where necessary.

2.4.1 Habitat survey

2.4.1.1 The survey assessed habitat onsite in context to the wider landscape with regard to any important bat roosts, commuting/foraging areas that may be affected by the proposed development.

2.4.2 Roost surveys

2.4.2.1 All potential roost structures (i.e. buildings) onsite or within the Zone of Influence of the proposed development were assessed, based on standard methodologies set out by Natural England, the Bat Conservation Trust (BCT) and the Joint Nature Conservation Committee (JNCC). External inspection considered suitable ingress points where species such as bats and birds could gain entry into any structures to roost and/or nest.

- Condition of roof i.e. missing or raised roof tiles
- Condition of windows and doors i.e. broken panes.
- Potential ingress points around ridges and apex of the buildings.
- Any anecdotal evidence of bats i.e. droppings, grease marks, feeding remains.
- Any evidence of birds i.e. nest material, droppings.

2.4.2.2 The external inspection incorporated visual assessment with the use of torch, endoscope and ladders to ascertain the following:

- Any potential internal roost features i.e. non-illuminated areas, joints, crevices, beams and cavities.
- To locate potential roost/nest sites.
- To listen for an bats and birds.
- To examine floors, walls and structural elements for anecdotal evidence i.e. droppings, urine stains, corpses and feeding remains.

- **Bat Roost Categories**

2.4.2.3 Daily food digestion, assimilation and availability, in association with annual embryonic gestation, parturition and lactation (females) are all factors that determine appropriate roost selection for different bat species and individual fitness of conspecifics.

- 4.4.2.4 Temperature, relative humidity, air flow, morphology, and protection from the external environment are all considered as predictors that may be used in determining roost potential. While none of these factors can be considered as being mutually exclusive, temperature is long regarded as being the most important physical influence regarding roost selection by bats. The optimal temperature for roosting bats can vary between species and body condition amongst conspecifics during different phases of their annual cycle.
- 4.4.2.5 A bat roost is interpreted as 'any structure or place, which any wild bat uses for shelter or protection' (i.e. buildings, trees, bridges, tunnels etc.). Bats tend to show a high fidelity to roosts. Subsequently, legal opinion regards a roost to be protected whether or not the bats are present at the time. There are many types of roost used by temperate bats during their annual cycle: Any structures found having evidence of bats will be further evaluated to assess which of the following roost categories may be present onsite (if any):

Status	Description
Maternity / Nursery Roost	<i>used by breeding bats, where pups are born and raised to independence (Anecdotal evidence may support this prospect despite sub-optimal survey period).</i>
Hibernation Site	<i>where bats may be found during the winter. (This is assessed within the context of this report).</i>
Satellite Summer Roost	<i>used by males and/or non-breeding females (Seasonal limitations prevent robust analysis of this).</i>
Night Roost	<i>where bats rest between feeding bouts during the night but are rarely present during the day.</i>
Feeding Roost	<i>where bats temporarily utilize feeding perches and stations to eat an item of prey.</i>
Transitional (or Swarming) Site	<i>where bats may be present during the spring or autumn (This can not be assessed within the context of this report).</i>

Table 5. Bat roost status definitions

Building Rating

- 2.4.2.6 In the absence of any evidence, trees and structures were assigned a rating of suitability from negligible to high potential for supporting bats. The rating is based on the number and type of features suitable for use by bats (such as rot holes, cavities and raised bark), location of the structure in the surrounding landscape and surveyor's experience (e.g. a structure with a high level of regular disturbance with few opportunities for access by bats, that is in a highly urbanised area with few or no mature trees, parkland, woodland or wetland would generally equate to having negligible potential. Conversely, a pre 20th century or early 20th century building with many features suitable for use by bats close to good foraging habitat would have high potential).

2.4.3 Activity surveys

- 2.4.3.1 Activity surveys combined an overall assessment of any *in-situ* roost onsite, and any other Valued Ecological Receptors (VERs) considered to be within the Zone of Influence (Zoi) of the development, whilst considering any important commuting and foraging routes used by bats.

All activity surveys were undertaken in accordance with the guidelines published by the BCT (2007) 2nd edition 2012 to ascertain the following:

- Determine the presence/absence of species, i.e. the species present in a given area
- Determine the intensity of bat activity both spatially and temporally
- Determine the type of activity i.e. foraging (by feeding buzzes); commuting (by high directional pass rates); mating (by mating social calls)
- Find roosts by tracking back bat flight paths or observing dawn swarming behaviour
- **Dusk emergence bat survey**

2.4.3.2 The object of this survey is to detect active bats leaving possible roost sites identified in the external and internal surveys. This was achieved by:

- Being at the site 1 hour before sunset;
- Listening for social calls at potential roost sites;
- Standing at different transect points around the buildings, to record any emerging bats and egress points;
- Standing at different transect points to assess foraging/commuting areas;
- Carrying out survey up to 1.5 - 2 hours after sunset to holistically consider interspecific differences between different bat species
- **Dawn re-entry bat survey**
- Being at the site 2 hours before sunrise;
- Listening for social calls at potential roost sites;
- Standing at different transect points around the buildings, to record any swarming behaviour around potential re-entry points;
- Standing at different transect points to assess foraging/commuting areas.

2.4.3.3 Bat ultrasound data was gathered using a number of heterodyne units (Batbox Duet and SSF Bat2) and real-time recording devices (*EcoObs* Batcorder). Real time recordings were subsequently analyzed using BatSound v4.03 and statistical algorithm analysis was carried out using *EcoObs* BcAdmi, BatIdent and BcAnalyze software to provide an unbiased discrimination of species onsite.

2.4.3.4 Evidence will be used to determine whether a European Protected Species (EPS) licence will be required to ensure legal compliance during development. This will also include identifying which mitigation measures [if any] would be most appropriate.

- Weather conditions and timing**

2.4.3.5 All surveys were carried out during optimal survey conditions.

Survey 1: Dusk emergence		Date: 17.06.2015	
Temp Start	13°C	Cloud Cover Start	90%
Temp Finish	10.8°C	Cloud Cover Finish	90%
Humidity Start	64.7%	Wind Speed Average	Nil <1
Humidity Finish	67.2%	Precipitation	Nil

Survey 2: Dawn Re-entry		Date: 23.05.2015	
Temp Start	9.7°C	Cloud Cover Start	50%
Temp Finish	11.2 °C	Cloud Cover Finish	40%
Humidity Start	69.5%	Wind Speed Average	Nil <1
Humidity Finish	68.9%	Precipitation	Nil

Survey 3: Dusk emergence		Date: 26.06.2015	
Temp Start	11.5°C	Cloud Cover Start	55%
Temp Finish	10.4°C	Cloud Cover Finish	60%
Humidity Start	69.5%	Wind Speed Average	Nil <1
Humidity Finish	71.9%	Precipitation	Nil

Table 6. Abiotic variables during survey periods.

- Surveyor location**



Figure 2. Surveyor location during activity surveys.

3. RESULTS

3.1 Pre-survey data search

3.1.1 Designated sites

- 3.1.1.1 The proposed application area is contained under **Area Green Belt 64 Potteries and Churnet Valley & Special Landscape Area**. The following statutory and non-statutory designated sites are recorded within a 1-2km radius of the proposed application area.

Table 7. Designated Areas of Ecological Significance (e.g. SSSIs / SPAs / Nature Reserves / SBIs / SACs)			
Churnet Valley		SK002489	SSI
There are no RIGs, SSSIs, SPAs, SACs or BASs recorded			
Non-statutory designated sites			
Site Name	Status	Grid Ref	Description
March Lane / Windycote Lane	Local Wildlife Site (LWS)	SJ963468	A diverse road verge with an associated ditch.
Platt (north of)	Retained Biodiversity Alert Site BAS	SJ962488 ca. 250m South	A small triangular section of semi-improved acidic grassland with marshy areas around the stream side.
Wetley Rocks	LWS	SJ966496	A linear, stretch of rock outcrop supporting a heathland community along the A520 through Wetley Rocks. The north predominantly supports a heathland community while the southerly area is less species rich with no mature stands of heather and bilberry.
Consall Scout Camp	LWS	SJ979474	A semi-natural broad-leaved woodland on dry acid soils. The site adjoins the Churnet Valley SSSI on its northern flank and is used as a scout camp. The major woodland type is birch/pedunculata oak wood over a sparse understorey of predominantly holly.
Consall Forge	Retained Grade 1 Site of Biological Importance (SBI).	SJ990480	The majority of the woodland surveyed in this area forms part of the SSSI, this includes Upper Ladypark Wood, Lower Ladypark Wood and Out Wood. The site is damp, ancient semi-natural woodland which is run by the County Council as a Nature Reserve.
Littlewood Wood & Hall Wood	LWS	SJ954509	Ancient semi-natural woodland (PAWG) with a stream on its northern boundary where wet woodland ground flora is present. Rhododendron has spread considerably across the site.
The Rookery	LWS	SJ958507	semi-natural, ancient broad-leaved woodland along a stream valley and its tributaries with associated ancient woodland indicators species and wet woodland species in the ground flora.
Felthouse Wood	Retained BAS	SJ979503	A block of woodland containing a compartment of young semi-natural birch woodland and a smaller section of planted oak woodland.
PAWS (Plantation on Ancient Woodland sites)			
Site name	Status	Site name	Status
Crowgutter and Booth's woods (SJ9842650303)	Ancient Replanted Woodland	Littlewood wood (SJ9542750567)	Ancient & Semi-Natural Woodland
Lawn and Ladyparks woods (SJ9899347886)	Ancient & Semi-Natural Woodland	The Rookery (SJ9577450594)	Ancient & Semi-Natural Woodland

3.1.2 Protected species

3.1.2.1 Pre-survey data finds seven British bat species are currently given UK BAP (2007) Priority Species Status. National Biodiversity Network and Staffordshire Wildlife Trust (SWT) records show that 11 of the 17 resident UK bat species occur in the county with two UK BAP species being recorded within 2km of the proposed application area (highlighted in grey):

UKBAP	Common name	Species	Recorded within 2km
<input checked="" type="checkbox"/>	Brown long-eared bat	<i>Plecotus auritus</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Barbastelle bat	<i>Barbastella barbastellus</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Bechstein's bat	<i>Myotis bechsteinii</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Noctule	<i>Nyctalus noctula</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Greater horseshoe bat	<i>Rhinolophus ferrumequinum</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	<input checked="" type="checkbox"/>

Table 8. UKBAP Bat species recorded in Staffordshire.

3.1.2.2 A further four/five bat species that are not currently given UK BAP consideration are also recorded within the county.

UKBAP	Common name	Species	Recorded within 2km
<input checked="" type="checkbox"/>	Natterer's bat	<i>Myotis Nattereri</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Daubenton's bat	<i>Myotis daubentonii</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Whiskered/ brandt's bat	<i>Myotis mystacinus/brandtii</i>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Common pipistrelle	<i>Pipistrellus pipistrellus</i>	<input checked="" type="checkbox"/>

Table 9. Non UKBAP Bat species recorded in Shropshire/Staffordshire.

3.1.2.3 At a local level, SER show a total of twenty-one recordings of three species of bat between 1980-2009 within a 2km radius of the proposed application area;

Species	Grid Ref	Nearest recording within 2km of site
Soprano Pipistrelle	SJ965488	Folly Lane Cheddleton 1092m
Common Pipistrelle	SJ95525062	Known roost at Cicely Haughton Special School 1849m
Brown long-eared bat	SJ95525062	Known roost at Cicely Haughton Special School 1849m

Table 10. Bat species recorded in 1km radius of proposed application area.

- Birds**

Bird species recorded in a 2km radius of the application area			
Short-eared Owl	<i>Asio flammeus</i>	Fieldfare	<i>Turdus pilaris</i>
White Stork	<i>Ciconia ciconia</i>	Eurasian Hobby	<i>Falco subbuteo</i>
Redwing	<i>Turdus iliacus</i>	Brambling	<i>Fringilla montifringilla</i>
Barn Owl	<i>Tyto alba</i>		

- 3.1.2.4 SER provide seven species of bird within a 2km radius given UKBAP, LBAP, SOS Priority, and are classified according to their status on Red and Amber lists of Birds of Conservation Concern (BoCC) in the UK. An internationally protected species, White Stork was recorded 495m at wetley Rocks (SJ9649). Whilst sightings of White Stork are on the increase in the UK, it is highly likely that the majority are of captive origin and potential zoo/falconry centre escapees, rather than migrants.
- 3.1.2.5 Eight records of Barn Owl *Tyto alba* are recorded within a 2km radius of the proposed application area, with the nearest sighting being 250m due West.

3.2 Field surveys

3.2.1 Habitat Description

- 3.2.1.1 Rockfields Farm is situated in the linear village of Wetley Rocks, which lies along the boundary between two landscape character types comprising of: Settled Plateau Farmland Slopes and Ancient Slope and Valley farmlands. Subsequently, the semi rural area comprises of open, agricultural farm land, woodland blocks and water bodies within a 2km radius. Overall there is good connectivity to the wider landscape, with excellent resources available for both bats and birds.

Geology

- 3.2.1.2 Underlying solid geology of Upper Carboniferous sandstone of Millstone Grit Series, being underlain by boulder clay superficial deposits producing soil types of a generally acidic nature. No records of Locally Important Geological and Geomorphological Sites LGS (formerly known as RIGS).

Topography



Figure 3. Location of the proposed development (yellow) and boundary (red) in context to the wider landscape..

3.2.2 Roost survey

- *External Inspection*



Figure 4. West elevation (outlined red)
*Ingress points around roof section (White dashed)



Figure 5. East elevation of house (outlined red)
*Ingress points around roof section (White dashed)

- 3.2.2.1 The main residential dwelling of Rockfields Farm comprises of an original two-storey block stone elevation, which has been extended at the rear by way of a bungalow and single-storey flat roof extensions. All doors and windows were found to be intact and well sealed. There are a number of pitched tiled roof elevations to both the two-storey building and bungalow section. A number of ingress points for bats were recorded around roof and hip sections, in the form of raised/missing roof and ridge tiles.



Figure 6. Dilapidated building section on north elevation.

- 3.2.2.2 There are attached garage/storage buildings around the north elevation, which are partially shrouded by dense vegetation and tree canopy, thus preventing a fuller inspection. These buildings were seen to be in a dilapidated state of repair, with roof areas missing. There is a central flat-roof extension which provides little opportunity for roosting bats. Overall, the main building is considered as having **moderate** potential for roosting bats, although **NO** evidence of bats or birds was recorded during the external inspection.

- Auxiliary buildings

[NEGLIGIBLE POTENTIAL]



Figure 7. Dilapidated shed on eastern boundary.



Figure 8. Dilapidated building on NE corner boundary.



Figure 9. Dilapidated shed on northern boundary.

3.2.2.3 There are two single-storey, wooden shed buildings to the rear of the property and a dilapidated brick building minus roof on the north-east corner boundary. These auxiliary buildings were considered as having negligible potential for roosting bats overall, being exposed to the elements and unsuitable for optimal thermoregulation requirements of bats.

- Internal Inspection*

3.2.2.4 Internal inspection was gained into all ground floor and first floor areas. The original two storey block stone building comprises of a boarded off dormer roof section in the first floor area. This was found to be well illuminated by a window on the south facing roof section. The area showed evidence of mice in the form of droppings, and an extirpated individual in a water tank located in the south-west corner. Two self-contained side compartments were present around pitching points in the lower eaves, with exposed rafters, plaster torching and roofing tiles. No evidence of bats or birds were recorded in these sections.



Figure 7. Dormer room in roof section. (NB. Access loft into apex void- red dash).



Figure 8. Corner compartments around eaves.

- 3.2.2.5 A roof void is located in the upper apex of the dormer, which was accessed by a small loft hatch. This void was found to be ca. 4m x 3m x 0.8m, with an overall cubic volume of ca.4.85m³. The A-frame timber truss roof void was found to be non-illuminated, and fitted with partial roofing underfelt on the northern pitched end, which prevented a fuller inspection of any intermediate areas between membrane and roofing tiles. Plaster torching was present present on the underside of the southern roof pitch.
- 3.2.2.6 A number of crevices were recorded around pinching points at gable ends. The floor was found to be heavily cobwebbed but relatively void of detritus. Minor evidence of bats was recorded by way of 3-4 bat droppings found at floor level, although these were not considered as being fresh, and more than a few seasons old. **NO evidence of HIGH IMPACT BAT ROOSTS** were recorded in this section, and **NO** nesting birds were observed.



Figure 9. Apex void above dormer section.



Figure 10. Roof part plaster torching and underfelt.

- 3.2.2.6 A further roof void area was recorded in the bungalow section. This was found to be ca. 8m x 5m x 1.6m, with an overall cubic volume of ca.36m³. Notices were present upon entering the roof void stating the fragility of the roof, thus preventing a full inspection of the entire area due to Health and Safety concerns.
- 3.2.2.6 Only partial assessment could be made from around the loft hatch area. The void was found to be well-sealed and non-illuminated, being tightly fitted with roofing membrane which prevented inspection of any intermediate layers between the roof sections. The floor was found to be heavily insulated with fibreglass, and was relatively free of detritus (Notices state that this insulation was carried out in August 2005). **NO** evidence of bats or birds was recorded around accessible areas of the roof void.



Figure 11. Apex roof void above bungalow.



Figure 12. Notice stating fragile roof.



Figure 12. Sealed off apex void above garage section

3.2.2.4 A further upper apex roof void was recorded in an attached garage section on the north-east elevation. However, this area was completely boarded over, thus preventing inspection of the enclosed void.

3.2.3 Activity surveys

- *Dusk emergence 1*

3.2.3.1 A total of 17 bat passes and two species of bat were recorded during the first dusk emergence survey. Common pipistrelle was seen to be the dominant species onsite, albeit it in individual low numbers, with no more than one bats recorded at any given time. Peak activity occurred between 22:02-22:30hrs. The vast majority of activity was recorded commuting and foraging along the tree line access track towards the rear of the property. A Noctule was characteristically recorded at height around 22:10hrs. **NO** bats were recorded emerging from any of the structures onsite during the dusk emergence surveys. **NO** evidence of Barn Owl was recorded.

Table 14. Survey 1 – Dusk emergence				Date: 16.06.2015
Species	Confidence	passes recorded	Notes	Roost
Noctule (<i>Nyctalus noctula</i>)	$\sigma = 100\%$	$n = 7$	characteristically recorded commuting at height at 22:10hrs	NO
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	$\sigma = 100\%$	$n = 10$	Overall activity low: Single individuals recorded commuting and foraging along tree lined access road to the rear of property. No more than 3-4 bats predicted overall.	NO
Number of species recorded	2	Level of Commuting / foraging (based on level of 'feeding buzzes')		LOW / MODERATE
Total number of bat passes	N = 17	Peak activity time		22:02 – 22:30hrs

- *Dusk emergence 2*

3.2.3.1 A total of 25 bat passes were recorded during the second dusk emergence survey. Peak activity occurred between 22:05-22:23hrs. Two Common pipistrelle bats were recorded in tandem flying over the building in a north to south direction at 22:13hrs, and were then recorded foraging intermittently along the tree lined access track. **NO** bats were recorded emerging from any of the structures onsite during the dusk emergence surveys. **NO** evidence of Barn Owl was recorded.

Table 15. Survey 2 – Dusk emergence			Date: 26.06.2015	
Species	Confidence (%)	passes recorded	Notes	Roost
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	$\sigma = 100\%$	$n = 25$	Overall activity low: Two Common pipistrelle recorded in tandem foraging along tree lined access road to the rear of property.	NO
Number of species recorded	1	Level of Commuting / foraging (based on level of 'feeding buzzes')		LOW / MODERATE
Total number of bat passes	N = 25	Peak activity time		22:05-22:23hrs.

- Dawn re-entry

3.2.3.2 Bat activity during the dawn re-entry survey was seen to be much busier, with a total of once again seen as being low overall, with a total of 187 bat passes recorded between 02:16 – 4:18hrs. Common pipistrelle was seen to be the dominant species onsite (N=179), with the majority of activity once again occurring along the tree lined access track to the rear of the property, with sustained foraging by individual bats recorded. A single Myotis bat, considered as being a Whiskered bat was recorded commuting over-site ca. 45minutes before dawn. A single Common pipistrelle was present onsite shortly before dawn, although **NO** bats were recorded swarming and/or re-entering into any of the structures proposed for development. **NO** evidence of Barn Owl was recorded.

Table 16. Survey 3 – Dawn Re-entry			Date: 23.06.2015	
Species	Confidence (%)	passes recorded	Notes	Roost
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	$\sigma = 100\%$	$n = 179$	Recorded transiently 45mins before sunset at 03:18 – 03:35 hrs. Single individual recorded at 4:10am (sunrise 4:15am) landing on house roof on west elevation, before departing off site in a north west direction	NO
Myotis sp.	Genus $\sigma = 100\%$ / Whiskered/Brandt's $\sigma = 44\%$	8	Myotis bat recorded flying over site ca.45mins before sunrise. Sonogram analysis considers Whiskered/Brandt's (<i>Myotis mystacinus</i> / <i>Brandtii</i>).	NO
Number of species recorded	2	Level of Commuting / foraging (based on level of 'feeding buzzes')		HIGH / HIGH
Total number of bat passes	N = 187	Peak activity time		02:16 – 4:18hrs

4. ASSESSMENT

4.1 Constraints on survey information

4.1.1 It was not possible to fully examine the intermediate areas between roofing membrane and tiles in some of the upper roof void compartments of the main dwelling; nor was it possible to inspect a small, sealed-off apex void area in the garage section to the rear. Furthermore, there were some survey constraints around the north-east elevation due to dense vegetation and tree canopy shrouding some of dilapidated building sections. However, these sections were seen to have overall view. However, based on activity surveys, assessment of buildings were considered to be robust overall.

4.2 Constraints on equipment used

4.2.1 No constraints were encountered on equipment used (i.e. bat detectors, endoscope, ladders and high powered binoculars).

4.3 Potential Impacts of development

4.3.1 Designated sites

4.3.1.1 Due to the scale of the proposed development, **NO** impact to any designated sites is predicted, and **NO** impact to habitat in the wider landscape is considered.

4.3.2 Roosts

4.3.2.1 The overall assessment is confident that **NO HIGH IMPACT BAT ROOSTS** (i.e. maternity roost) are currently present within any of the structures proposed for removal, nor within the Zone of Influence. However, given minor historic evidence of bat droppings recorded in the apex void in the original building section, coupled with moderate features for crevice-dwelling bats around pitched roof areas, and the ability of Common pipistrelle to switch between roosts and exploit a greater spectrum of regimes; there may be potential for individual Common pipistrelle to exploit this building over space and time.

4.3.2.2 Based on renovation and partial removal of selected flat-roof extensions, overall impact to roosting bats is considered to be as follows:

Impact roost assessment for bats			
BUILDING	Short-term: Disturbance	Long-term: Roost modification	*Long-term: Roost loss
Rockfields Cottage/ bungalow	LOW TO MODERATE Some minor historic evidence of individual bats although NO HIGH IMPACT ROOST(S) PREDICTED	NEGLIGIBLE	NEGLIGIBLE
Outbuilding(s)	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

Table 17. Summary of overall impacts for bats. (**The impact of loss of roosts on bat populations is poorly understood and difficult to study. There is variation in the impacts depending on the particular species of bat with some being more sensitive to disturbance than others. Synanthropic species such as Pipistrelle bats for example are crevice roosters, and are known to move between roost sites (such as maternity roosts). These bats may find it easier to locate suitable new roosts as their requirements are not as specific as other species*).

Impact roost assessment for birds (including barn Owl)			
BUILDING	Short-term: Disturbance	Long-term: Roost modification	*Long-term: Roost loss
Rockfields Cottage/ bungalow	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
Outbuilding(s)	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

Table 18. Summary of overall impacts for birds.

4.3.3 Foraging and commuting habitat

Impact assessment of bat foraging and commuting habitat		
Short-term: Disturbance	Long-term modification	Long-term loss
MODERATE	NEGLIGIBLE	NEGLIGIBLE

Table 19. Summary of impacts on foraging and commuting habitat.

- 4.3.3.1 It is considered that the proposed redevelopment would have **NEGLIGIBLE** impact on potential foraging and commuting habitat for bats over the long-term overall, although **MODERATE** short term disturbance is predicted for individual bats that utilize the tree-lined access track adjacent to the rear of the building (see recommendations).

4.4 Legislation and Policy Guidance

- 4.4.1 Unlike many smaller mammals, bats have low fecundity with a long and complex life cycle, which is played out over a large spatial landscape. Bats show a strong fidelity to different types of roosts throughout their annual cycle i.e. hibernacula, maternity, bachelor, satellite roosts and feeding perches. Linear features within the landscape such as hedgerows and tree lines are often used by bats for commuting, predator avoidance and foraging.
- 4.4.2 Bats are highly social animals and loss of a single habitat alone can have a serious impact on populations. The status of many bat populations is tentative, being based on relatively few records and are highly susceptible to habitat loss and fragmentation. As such bats are given protected consideration within the following legislation and policy guidelines:

Legislation and Policy guidelines:

PAS 2010	The published 'PAS 2010' 'Planning to halt the loss of biodiversity' which is the government's new policy aimed at all authorities and developers involved in the planning process in the UK to halt biodiversity decline by 2010 and deliver net biodiversity gains as part of the green infrastructure provisions.
National Planning Policy Framework, Section 11:	The recently published framework in 2012, replaces the previous Planning Policy Statement 9. Section 11: Conserving and enhancing the natural environment, reaffirms the Government's commitment to maintaining green belt protections and preventing urban sprawl, retains the protection of designated sites and preserves wildlife, aims to improve the quality of the natural environment, and halt declines in species and habitats, protects and enhances biodiversity and promotes wildlife corridors.
Article 10 of the EC Habitats Directive:	The published Article requires government to develop features such as 'stepping stones' on the landscape, such as clusters of ponds, tracts of rough grassland or scrubland and vegetated railway line embankments.
Wildlife and Countryside Act 1981:	All species of bat are fully protected under the Wildlife and Countryside Act 1981, the European Conservation (Natural Habitats etc.) Regulations 1994, and the Countryside and Rights of Way Act 2000. This legislation makes it illegal to possess or control any live or dead specimens, to damage, destroy or obstruct access to any structure or place used for shelter, protection or breeding, and to intentionally disturb a bat while it is occupying a structure or place which it uses for that purpose.
Conservation of Habitats and Species Regulations (2010)	The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994, in respect of England and Wales. It is an offence to possess, sell or offer, or transport for sale any European species of bat or any part derived from such a species. These Regulations also remove the 'incidental result defence'. In other words, it is no longer a defence to show that the killing, capture or disturbance of a species covered by the Regulations or the destruction or damage of their breeding sites or resting places was the incidental and unavoidable result of a lawful activity. Natural England can grant European Protected Species (EPS) licences in respect of development to permit activities that would otherwise be unlawful.
Natural Environment and Rural Communities Act (2006)	Under Section 40 of the Natural Environment and Rural Communities Act (2006), public bodies, including Local and Regional Planning Authorities, have a duty to 'have regard' to the conservation of biodiversity in England when carrying out their normal functions, which includes consideration of planning applications. In compliance with Section 41 of the Act, the Secretary of State has published a list of species considered to be of principal importance for conserving biodiversity in England. This is known as The England Biodiversity List, all of which make up the UK BAP Priority Species. Regional Planning Bodies and Local Planning Authorities will use it to identify the species that should be afforded priority to maintain, restore and enhance species and habitats.
Bird legislation	Most resident nesting birds are protected under the Wildlife and Countryside Act 1981, which protects birds, nests, eggs and nestling's. Some rarer species, such as barn owls, are afforded extra protection.

Table 20. Policy guidelines.

Please note: If bat species are present at the site, the purpose of this report will only summarize the potential requirements for a bat mitigation package or project.

RECOMMENDATIONS AND MITIGATION

5.1 Further survey

- 5.1.1 During the Preliminary Roost Assessment and bat activity surveys, which conform to the BCT guidelines 2nd edition (2012), all effort was made to establish the status of any bat and bird roost(s) onsite. Assessment onsite was undertaken during an optimal survey period and the report findings are considered to be robust overall and representative of protected species currently onsite. **NO** further survey recommendations for bats are considered.
- 5.1.2 **NO** further survey recommendations are considered for protected bird species (including Barn Owl), on the proviso that care and vigilance is carried out during works. Ideally works should be programmed outside of the bird breeding season, which runs from March to October inclusive. If this is not possible, a check for active nests should be incorporated into any site supervision that may be required for any roofing works (see below).

5.2 Mitigation measures

5.2.1 Proposed mitigation for roost sites

- 5.2.1.1 Mitigation should be proportionate, justifiable and avoid or minimize any harm to species found during works, and prevent any long-term detrimental effect on any local population. Mitigation for bat roost sites should be proportionate to:

- Type and scale of works and predicted impacts on bats
- Size, nature and complexity of the development site
- Likelihood of bats being present or affected
- Species and numbers of individuals concerned
- Type of roost and/or habitat affected.

- 5.2.1.2 Whilst **NO** evidence of roosting bats was recorded during the survey period, it should be noted, that there are sections of the building that pertain to features suitable for crevice-dwelling bats, with minor evidence recorded. As the proposed works will involve a degree of roofing works and removal of flat-roof extension buildings, mitigation should consider the potential of individual crevice-dwelling bat species which may utilize the building over space and time.

5.2.2 Proposed mitigation for foraging and commuting habitat.

- 5.2.2.1 It is considered that the proposed redevelopment would have MODERATE short-term disturbance on potential foraging and commuting habitat for low numbers of pipistrelle bats. The proposed development should therefore give careful consideration to excessive light-spill and disturbance (i.e. noise pollution) onto the adjacent habitat(s) during pre and post development (see section 6.4).

5.3 Mitigation Licences

- 5.3.1 As **NO** bats were recorded roosting within the proposed application area, **it will NOT** be necessary to apply for a European Protected Species (EPS) licence from Natural England. However, due to minor historic evidence of bats, coupled with survey constraints and selected removal of building sections, a number of **site safe-guard measures** are conditioned, in the event that individual Common pipistrelle may adopt the building over space and time. (see section 6.4).

6. SUMMARY

6.1 Bat presence/absence

- 6.1.1 Common pipistrelle was seen as the dominant species commuting and foraging over site, with individual Noctule and Whiskered bat recorded transiently also.

6.2 Roost ecology of species onsite

- 6.2.1 Activity surveys find **NO** evidence of any **HIGH IMPACT** bat roosts current in any of the structures onsite, with **NO** immediate impact to any VERs within the ZoI also considered. (A general summary of bat species transiently recorded during the survey period can be found in Appendices).

6.3 Ecological value of building unit

- 6.3.1 Whilst no active bat and bird roosts were recorded during the survey period, overall assessment considers the buildings to provide **moderate** ecological value for individual crevice-dwelling bats, and **low** ecological value for birds including Barn Owl.

6.4 Preliminary Recommendations

- **Bats**

- 6.4.1 Although no active roost(s) was confirmed as being present, assessment cannot fully rule-out the potential that individual bats may utilize intermediate layers of the roof section, over space and time. As the building is proposed for significant structural change, the following **site safe-guard** measures **SHOULD** be adhered to:

- **Onsite supervision:**

- 6.4.2 Due to proposed removal and renovation of selected building sections, it is considered prudent to undertake a precautionary '**soft demolition**' approach during any works intended. This should be carried out under the supervision of suitably qualified bat ecologist, in the event that individual bats may be present. All building contractors should be made aware of the possible presence of individual bats, their legal protection and of working practices to avoid harming bats, before any work commences.

- **Timing of works**

6.4.3 In general, works can be carried out between October – April, when bats have vacated to hibernation roosts. However, due to the synanthropic nature of Common pipistrelle, it is recommended that any roofing works should be carried out between September to October, when bats are highly transient between autumn swarming sites and winter roosts. In the unlikely event that individual bats are encountered during works, any such individuals would be enabled to naturally disperse under their own volition, whilst there is still sufficient resources in the surrounding landscape for bats to utilize, prior to the onset of winter.

6.4.4 **Should any bats be discovered prior to, or during works (or suspicion arise about the possible presence of bats), then all works must cease immediately**, and a licensed ecologist should be consulted, if not already present at that time. The use of standard capture and exclusion methods can then be deployed to prevent harm to any bats found which will be relocated to a suitable roof void should natural dispersal not occur.

- **Roost compensation**

6.4.5 Where possible, all sustainable developments should consider providing sustainable roost compensation / enhancement for local bat populations, that may be inadvertently displaced or impacted upon during pre and post development.

6.4.6 As there is minor historic evidence of individual bats in the upper roof void section of the original cottage section, it is recommended roosting features for crevice-dwelling bats are retained/created during the re-roofing works proposed around this section. These features can be economically created by incorporating bat access tiles, and/or raising several ordinary ridge tiles along the length of a roof with a deeper bed of mortar, or by narrowing the gap tiles and resting the middle tiles on their neighbours. Gaps between 30 and 150mm should be left without mortar and provide access points for crevice-dwelling species. A minimum of two bat access tiles or raised ridge tile features are recommended on both north and south facing elevations.

6.4.7 It is further recommended that additional bat boxes (minimum 2) are incorporated into the landscaping of the development, being fitted to mature trees around the eastern boundary edges, or external elevations of the completed building where possible. Bat boxes should be located along a north-east and a south-east elevation where possible, and sited ca. 4-6m in elevation from the ground. Recommended commercially available woodcrete Bat boxes, such as schwegler 1FFH and the improved treble crevice bat box (The Nest Box company) for example, are considered to be suitable receptors for crevice-dwelling bats.



Figure 11. Schwegler 1FFH



Figure 12. Treble Crevice bat boxes

- Further information of increasing biodiversity prospects for roosting bats can be found on:
 - *Bat Conservation Trust website*: www.bats.org.uk/pages/new_build.html.
 - *The Nest Box Company*: www.nestbox.co.uk/Improved-Treble-Crevice-Bat-Box.html
 - *NHBS*: www.nhbs.com/schwegler_bat_boxes_eqcat_422.html

- **Timber treatments**

6.4.8 Where possible, any treatment of wooden timbering during any remedial roofing work around retained/created bat access tiles should be done using chemicals approved by 29 Natural England for use in bat roosts. Natural England will provide advice upon which chemical is most suitable and the time of year in which it can be applied. Pesticides containing the synthetic pyrethroids (permethrin, cypermethrin etc.) and boron compounds (Borester 7, disodium octoborate etc.) are considered as being relatively harmless to bats.

- **Breathable roofing membrane**

6.4.9 The most recent research on breathable roofing membranes (BRMs) show that all BRMs are unsuitable for use within a bat loft area, due to fraying and subsequent entanglement of bats (Waring, 2014). Should BRM be used during any re-roofing works, then Permo Air membrane manufactured by Klover (as opposed to Tyvek products), should ideally be considered to the underside of retained/newly created bat access tile areas. Should this not be possible, then a 1m² section of traditional 1F Bituminous Roofing Underlay should be sandwich between roofing tiles and BRM.

- **Scaffolding**

6.4.10 As a further precautionary measure, it is recommended that no plastic sheeting or mesh be used on any scaffolding erection during housing developments where possible, in order to prevent potential snaring and entanglement of any volant bats in the surrounding landscape.

- **Lighting**

- 6.4.11 Particular consideration should be given to potential light spill that can affect the foraging and commuting strategy of urban bat populations, and should not exceed 200 lumens (150 watts). Where possible, any security lighting should be on a timer setting and faced down to prevent upward light pollution. Height of any lighting columns around the development should not exceed eight metres to further reduce any ecological impact of light pollution. Low-pressure sodium lamps (SOX) fitted with hoods are recommended to direct light below the horizontal plane to minimize upward light spill.

- **Birds**

- 6.4.12 Whilst **NO impact** is predicted for birds (including Barn Owl), consideration should be given to nesting birds that may adopt structures proposed for redevelopment during the breeding season (mid March – August). Should this not be possible, then It is recommended that an inspection of the site for any active bird nests should be carried out by a suitably qualified ecologist, prior to any building works or ground clearance. Any active nests should be left undisturbed until offspring have fully fledged. It may be necessary to enforce an exclusion work zone of 5m to reduce disturbance and minimize potential displacement.
- 6.4.13 In order to increase long term sustainability for local bird populations, a minimum of four nesting boxes (suitable for different species) should be incorporated into any post-development, and should be positioned at ca. 2-4m above ground level, where possible. Once again, these nest boxes should be located along the eastern boundary, where there is good connectivity to the surrounding landscape.

- Further information can be found on the RSPB website:
<http://www.rspb.org.uk/advice/helpingbirds/nestboxes/smallbirds/siting.aspx>

- **Biodiversity enhancement**

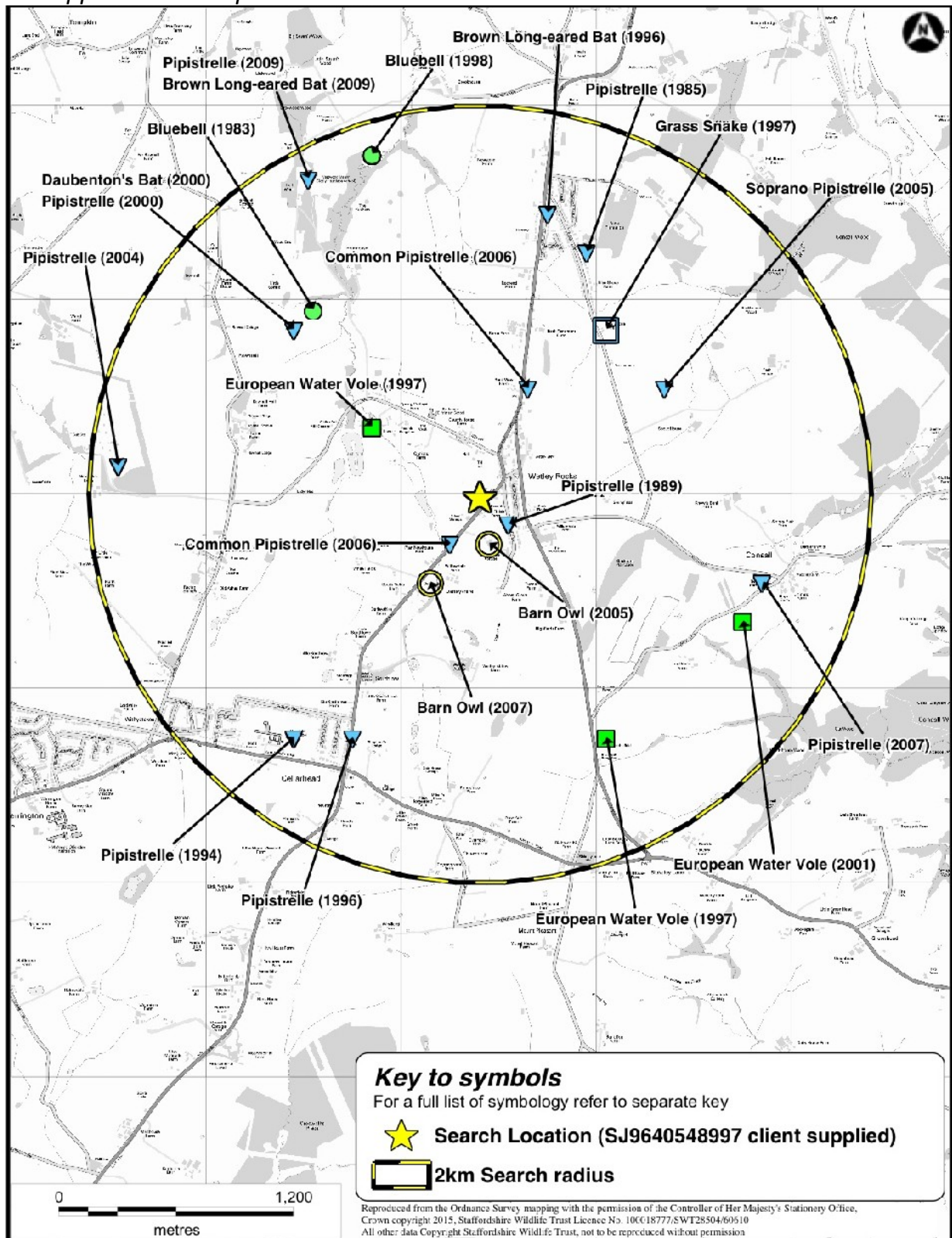
- 6.4.14 It is encouraged that any landscaping relating to the proposed development should encompass native grasses, trees and shrub species to encourage trophic food webs and increase foraging potential for species. No plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 should be planted during any landscaping within this development. For further details of Schedule 9 plants visit the Defra website: www.defra.gov.uk/wildlife-pets/non-native.

7. REFERENCES

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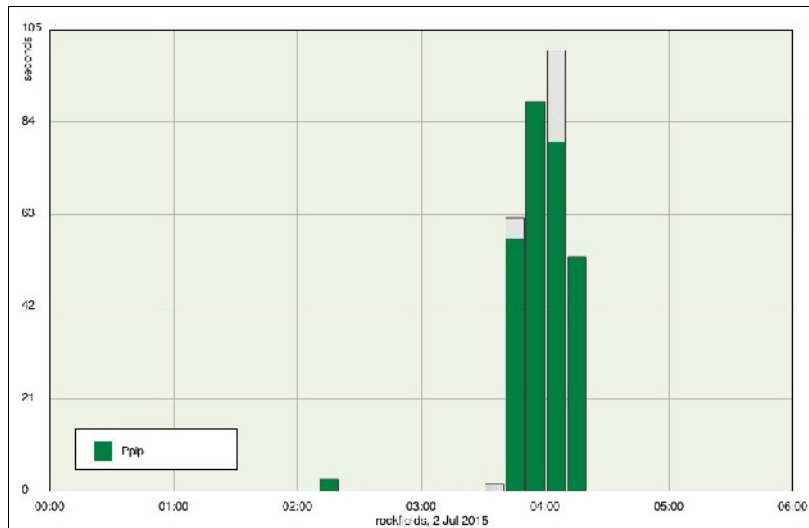
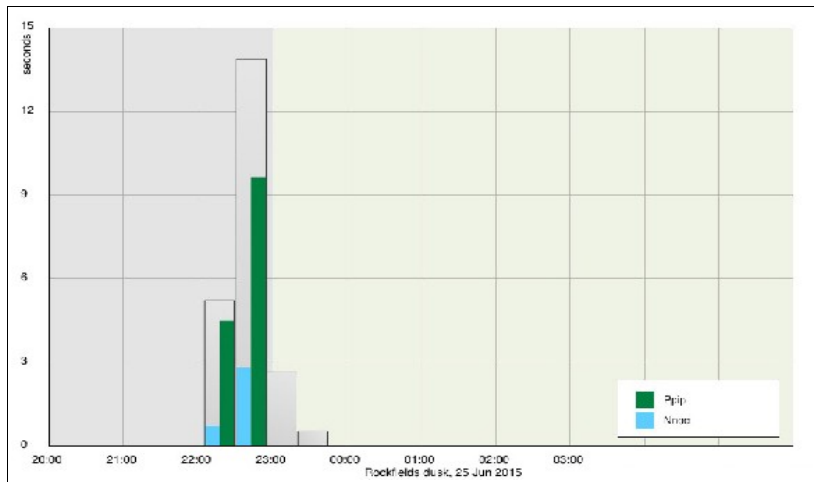
8. APPENDICES

Appendix 1 – Maps and forms

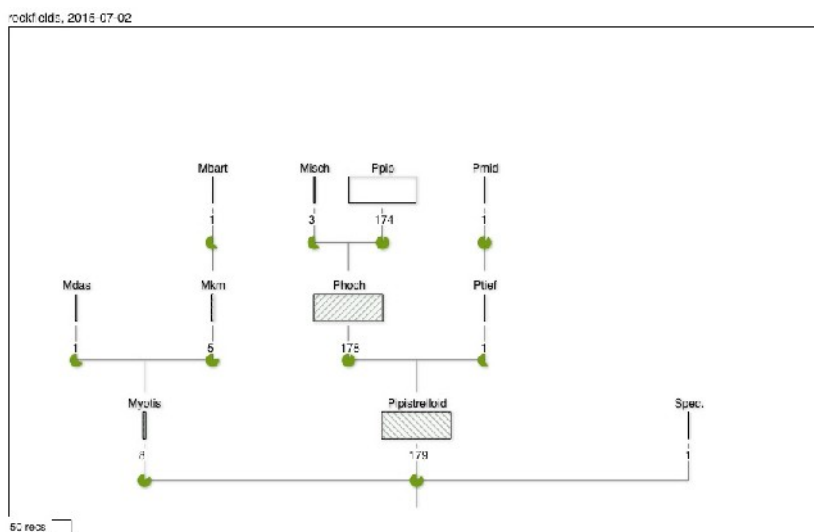


Appendix 2 – Data analysis

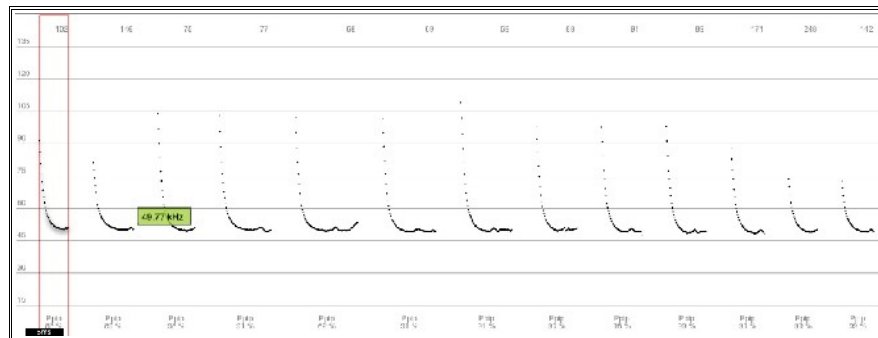
- Activity histograms representations



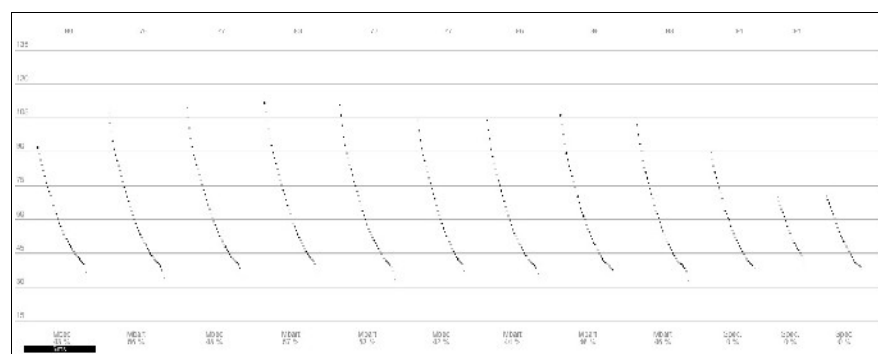
- Species discrimination analysis



- Echolocation sonogram analysis



Sonogram recording showing Common pipistrelle with 100% probability















Sonogram recording showing Myotis bat ($\sigma = 100\%$) possible Whiskered/Brandt's bat ($\sigma = 44\%$)

Additional information concerning the ecology of dominant species onsite

Common pipistrelle

- Common pipistrelle was the most dominant of species across site, albeit transient with **NO** High status roosts recorded. However, all buildings pertain features suitable for crevice-dwelling bats,
- Common pipistrelle *P. pipistrellus* is considered common and widespread across local, county and regional levels (Population Estimate: UK 2,430,000, Battersby *et al.* 2005). This species tends to have less roost fidelity overall and are known to switch between roost sites, being more opportunistic in their behaviour. This species may be regarded as being a generalist in behaviour and capable of enduring a greater spectrum of temperature regimes, compared to other crevice-dwelling species.
- Common pipistrelle is generally sedentary in its nature and summer maternity colonies generally number 25-50 individuals (although colonies of >200 have been recorded). Pipistrelle bats are less loyal to roosts than other synanthropic species and are known to alternate (Dietz *et al.* 2009).

Appendix 3 – Annual cycle of a temperate bat

<p>January</p> 	<p>February</p> 	<p>March</p> 
<p>Jan: Bats spend most of the winter hibernating, a state of inactivity characterised by lower body temperature, slower breathing, and lower metabolic rate. Feb: Bats are still hibernating. They have little fat left to live off of now. They may leave the roost on warmer nights to find food and a drink of water. March: Bats may begin to emerge and signs of limited activity can be seen. There are small numbers feeding as it gets warmer. In bad weather, they may become torpid.</p>		
<p>April</p> 	<p>May</p> 	<p>June</p> 
<p>April: Bats have mainly come out of hibernation and are hungry and active, feeding on most nights. They may be moving between several roost sites. They may become torpid (cool and inactive) again when cold. May: Bats are fully active and feeding. Females start forming maternity colonies and looking for suitable nursery sites, such as buildings or trees. Males will roost on their own or in small groups. June: Female bats usually give birth to a single pup, which they feed on their milk. Young bats are very small (less than an inch) with thin, slightly grey fur. Adult bats will catch thousands of insects each in a night.</p>		
<p>July</p> 	<p>August</p> 	<p>September</p> 
<p>July: Mothers continue to suckle young. Some young are growing fast and almost full-size; others are still very small. At around three weeks old, young bats are sometimes found on the ground as they learn to fly. Aug: At six weeks old, the young bats begin to catch insects for themselves and no longer need their mothers' milk. The summer maternity colonies begin to disperse and bats may move to mating roosts. Sept: Mating season begins, with males of most species using special mating calls to attract females, which can include purrs, clicks, and buzzing. Bats are also concentrating on building up fat stores for the coming months.</p>		
<p>October</p> 	<p>November</p> 	<p>December</p> 
<p>Oct: More mating is taking place, and building up fat reserves is becoming crucial to survive the winter season. Bats are seeking suitable hibernation sites, and beginning periods of torpor. Nov: Periods of torpor are lasting longer. Some begin hibernation, to save energy over the colder months, when insects are harder to find. They are using stored fat as fuel. Dec: Bats are hibernating. They may roost on their own or in small groups, often in cool, quiet places like disused buildings, old trees or caves, where they hopefully won't be disturbed. (Source: Bat Conservation Trust).</p>		

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