Ecological Impact Assessment

BE-584.2a

Knabbs Hall Farm, Silkstone Common S75 4RD

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CONTENTS

1. INTRODUCTION 6

1.1. Background 6
1.2. Site Details 6
1.3. Development Proposals 6

2. LEGISLATIVE CONTEXT 7

2.1. Legislation 7
2.2. Policy 7

3. METHODS 8

3.1. Ecological Data Search 8
3.2. Phase 1 Habitat Survey 8
3.3. Bat Scoping Survey 9
3.4. Amphibian and Reptile Survey 10
3.5. Other Protected Species Survey 11

4. RESULTS 12

4.1. Constraints 12
4.2. Designated Sites 12
4.3. Habitats 12
4.4. Bats 13
4.5. Other Mammals 15
4.6. Reptiles and Amphibians 15
4.7. Bird Species 16
4.8. Invertebrates 17

5. INTERPRETATION OF SURVEY RESULTS 18

5.1. Habitats 18
5.2. Bat Roost Assessment 18
5.3. Other mammals 18
5.4. Reptiles and Amphibians 18
5.5. Birds 18
5.6. Invertebrates 18

6. IMPACT ASSESSMENT 19

6.1. Habitats 19
6.2. Bats 19
6.3. Other Mammals 19
6.4. Reptiles and Amphibians 19
6.5. Birds 19
6.6. Invertebrates 19

7. CONCLUSION AND RECOMMENDATIONS 20

7.1. Avoidance of Ecological Impacts 20
7.2. Mitigation and Ecological Enhancement 20

8. REFERENCES 21

9. APPENDICES 22

TABLES AND FIGURES

FIGURE 1.1 AERIAL IMAGERY OF SITE AND SURROUNDING AREA (GOOGLE EARTH PRO, 2019) 6
TABLE 3.1 IMPORTANCE OF ECOLOGICAL FEATURES 8
TABLE 3.2 BAT ROOST SUITABILITY, THE CORRESPONDING TI SCORES AND THE PERCENTAGE OF STRUCTURES FOUND TO HAVE EVIDENCE OF BATS DURING THE TESTING PHASE 9
TABLE 3.3 BAT ACTIVITY SURVEY DETAILS 10
TABLE 3.4 HSI SCORES AND PREDICTED PRESENCE OF GREAT CRESTED NEWTS 10
THE LAND USE IN THE NEARBY SURROUNDING AREA IS A MIXTURE OF AGRICULTURAL AND WOODLAND, WITH INTERMEDIATE LEVELS OF TREE COVER, AND GOOD TERRESTRIAL CONNECTIVITY TO AND FROM THE SITE. 12
TABLE 4.1 HABITATS AS DEFINED BY JNCC (2010) ON THE SITE 12
TABLE 4.2 SCOPING SURVEY OF THE BUILDINGS 14
TABLE 4.3 HSI CALCULATION FOR POND 1 16
TABLE 4.4 NATURAL ENGLAND RAPID RISK ASSESSMENT FOR THE POND (NATURAL ENGLAND, 2013) 16

Executive Summary

Bagshaw Ecology Ltd have been requested by Paul Matthews Architectural to undertake a Preliminary Ecological Appraisal of the building at Knabbs Hall Farm, Silkstone Common S75 4RD, in relation to an application for planning. The development proposals are to convert three existing buildings into residential dwellings and construct a new residential dwelling on the site, with a new road to provide access.

The survey found the habitats on the site to be of low ecological value, consisting of hard standing surfaces, improved grassland, scattered trees, ephemeral and tall ruderal vegetation.

An inspection of the site identified five buildings. Buildings 1 and 2 were both barns with features suitable for cavity roosting bats, including cracks in the interior and exterior walls, and holes in the roof enabling access into the building. No evidence of roosting bats was observed in either building. As both of the buildings had potential for roosting bats, in accordance with the Bat Conservation Trust guidelines (2016), further activity surveys were carried out.

A peak count of two common pipistrelles *Pipistrellus pipistrellus* were observed re-entering Building 2 during the dawn survey. It is anticipated that this comprises a day roost utilised by a low number of male/non-breeding female bats. As the conversion of the building will result in the destruction of the roost, a European Protected Species (EPS) licence will be required prior to work commencing. To mitigate for the loss of the day roost, three bat boxes of type Schwegler FF (or similar alternative) should be erected on trees on the site prior to commencement of works.

It is not anticipated that bats are roosting within Buildings 1, 3, 4 and 5, therefore no further surveys or recommendations are made regarding bats for these buildings.

To mitigate for the loss of the day roost and to ensure continuity of roosting habitat during development works, three bat boxes of type Schwegler FF (or similar alternative) should be erected on trees on the site. To avoid impacts to foraging and commuting bats in the adjacent woodland it is also recommended wildlife friendly lighting is used throughout the development

An inspection of a pond 60m from the site (Pond 1) found it to provide average potential habitat for great crested newts *Triturus cristatus*. Due to the distance of the pond from the site and the size of the development an eDNA test was performed on the pond to establish the presence or likely absence of great crested newts. This test was negative and therefore it is considered that great crested newts are likely absent from the pond and no further surveys or mitigation is recommended.

Several piles of stone and rubble to the north of the site provide suitable hibernacula for hibernating reptiles and amphibians. To avoid disturbing these species it is recommended that any hibernacula is dismantled outside of hibernation season (1st November – 31st February inclusive). If this is not possible then any potential hibernacula should be removed under the supervision of a qualified ecologist.

The trees on site provide suitable habitat for nesting birds and evidence of swallows *Hirundo rustica* previously nesting in building 1 was observed. It is recommended that no works are carried out to the trees or building 1 within bird nesting season (1st March – 31st August), unless a further survey can confirm that the nests are no longer occupied.

1. Introduction

1.1. Background

Bagshaw Ecology Ltd have been requested by Paul Matthews Architectural to undertake a Preliminary Ecological Appraisal of the building at Knabbs Hall Farm, Silkstone Common S75 4RD, hereafter referred to as 'the site'.

The purpose of the report is to identify the habitat types on the site, along with the presence or absence of any protected or notable species. The ecological impact of any proposed development is assessed, and mitigation, management and aftercare proposals are suggested when appropriate.

1.2. Site Details

The site located at grid reference SE 28802 03817 and is accessed via a private farm track off the west of Knabbs Lane in Silkstone Common

The site comprises two barns and a derelict farm house along with several outbuildings.



Figure 1.1 Aerial imagery of site and surrounding area (Google Earth Pro, 2019)

1.3. Development Proposals

The development proposals are to convert three of the buildings into residential buildings and to construct a new residential dwelling on the site, with a new road to provide access.

2. Legislative Context

2.1. Legislation

The Wildlife and Countryside Act 1981 (As Amended), makes it an offence to:

- Deliberately or recklessly injure, kill or capture any animal protected under Schedule 5 of the act.
- Deliberately or recklessly kill, injure or take any wild bird; to take, damage or destroy the nest of any wild bird while occupied or being built, or to take or destroy the egg of a wild bird. Additional protection is afforded to bird species listed under Schedule 1 of the Act.
- Intentionally pick, uproot or destroy any wild plant included in Schedule 8 of the Act.

The Conservation of Habitats and Species Regulation 2017 makes it an offence to deliberately capture, kill or disturb any animal protected under Schedule 2 of the regulations. It is also an offence to damage or destroy a breeding site or resting place of an animal, even if the animal is not present at the time.

2.2. Policy

The UK Biodiversity Action Plan (UKBAP) includes a list of 943 national priority species and 56 habitats of principal importance, with all species and habitats having specific action plans defining the measures required to ensure their conservation. Although the UKBAP has since been superseded by the UK-Post 2010 Biodiversity Framework and a focus on County Biodiversity Plans, it remains a useful point of reference.

Section 41 of the Natural Environment and Rural Communities Act (NERC) 2006 required that any public bodies take into consideration any species and habitats listed in the UKBAP when implementing their duty and exercising any normal functions.

The National Planning Policy Framework (NPPF) states that planning decisions should aim to protect or enhance biodiversity and conservation interests, and where possible any development should aim to increase net gains in biodiversity.

3. Methods

3.1. Ecological Data Search

The local biological record centre, Sheffield Biological Records Centre (SBRC), and local bat group, South Yorkshire Bat Group (SYBG), were consulted as to any protected/notable species within a 1km radius of the site.

The Department for Environment, Food and Rural Affairs' (DEFRA) Magic Maps website was consulted as to any land-based designations and priority habitats within a 1km radius of the site.

Aerial imagery was assessed using OS maps and Google Earth Pro to give an appraisal of the surrounding land use.

3.2. Phase 1 Habitat Survey

The habitat survey and mapping exercise was carried out in suitable weather conditions on the 10th of October 2017. The survey was undertaken by Amy Reddick BSc (Hons) MSc ACIEEM, an ecologist and licensed bat surveyor (2018-37680-CLS-CLS) with experience in carrying out phase 1 habitat surveys.

The study area was surveyed in accordance with JNCC (2010) guidelines. Habitat types were assigned an alphanumeric code, and target notes were made identifying important species, along with the presence of potential habitats for any protected or notable species.

Habitats and species present on or adjacent to the site were assessed using CIEEM's (2018) guidelines. Ecological features were classed as being of either international, national, regional, district, local, low or of negligible importance (see table 3.1).

Table 3.1 Importance of ecological features

Value of feature	Key examples
International	Internationally designated sites (SPA, pSPA, SAC, cSAC, Ramsar site, Biogenetic Reserve), or an area which meets designation for such sites; Internationally significant and viable areas of a habitat listed in Annexe 1 of the Habitats Directive; Any regularly occurring, globally threatened species; A regularly occurring population of an internationally important species, which is threatened or rare in the UK.
National	A nationally designated site (SSSI, NNR, LNR), or an area which meets designation for such sites; A regularly occurring significant number/population of a nationally important species (e.g. listed on the Wildlife and Countryside Act 1981 (as amended).
Regional/County	Viable areas of key habitat identified in the regional or county BAP; A regularly occurring significant population/number of any species important at regional/county level; Sites of conservation importance which exceed the district selection, but which fall short of SSSI selection guidelines.
District	Areas of habitat identified in District/City/Borough BAP; Sites that the designating authority has determined meet the published ecological selection criteria for designation; Sites/features which are scarce within the District/City/Borough; A regularly occurring significant population/number of any species important at District/City/Borough level.
Local	Areas identified in a Local BAP; Sites/features which are scarce in the locality or which are considered to appreciably enrich the habitat resource within the local context (e.g. species-rich hedgerows); Any populations, species or habitats of local importance.
Low/Site	Habitats of moderate to low diversity which support a range of locally and nationally common species, the loss of which can be easily mitigated.

3.3. Bat Scoping Survey

The survey was based upon methodologies prescribed by Collins (2016), Mitchell-Jones (2004) and Mitchell-Jones and McLeish (2004). This involved an inspection of the exterior and interior of the building. Any structural features with potential for use by roosting bats were recorded and any suitable access points were identified. Any direct evidence of bats, such as scratch marks, oil stains, dropping and feeding remains were also identified.

Taking account of the structural features of the building, the surrounding habitat, buildings were assigned a level of roost suitability based upon professional judgement (see table 3.2) and evaluation using the Bat Roost Trigger Index (TI) (Underhill-Day, 2017).

The Bat Roost Trigger Index (TI) is a tool that assesses the features known to influence roost selection to assign a roost suitability class to a building or structure. The list includes 28 features that reflect A) the location and environment around the building, B) the exterior features of the building such as roof materials, and C) the interior features of the building, particularly those within the roof void. By summarising the condition of each feature and assigning it a numerical score between a maximum of 1 and a minimum of 0.2, a geometric TI score between 0 and 1 is generated automatically. This score corresponds to one of the four bat roost suitability classes given in the Bat Conservation Trust guidelines (see table 3.2).

The TI is still undergoing review, and therefore its results should be viewed with a degree of caution. Therefore, although in most cases it provided an accurate assessment of the building, it is only used in addition to, rather than instead of professional judgement.

Table 3.2 Bat roost suitability, the corresponding TI scores and the percentage of structures found to have evidence of bats during the testing phase

Bat Roost Suitability Class	Description	Corresponding TI Score	Percentage of structures found to contain evidence of bats
Confirmed presence	Bat presence confirmed during the scoping survey	-	-
High	Buildings that have many areas suitable for roosting which are obviously suitable for use by a larger number of bats including maternity colonies.	>0.7	98%
Moderate	Buildings with a smaller number of areas suitable for roosting, but still supporting feature that could be attractive to bats and potentially support maternity colonies.	0.6 – 0.7	56%
Low	Buildings with limited roosting opportunities but which could be used on a sporadic or occasional basis by a low number of bats, but which are unsuitable for maternity roosts.	0.5 – 0.6	31%
Negligible	Buildings which appear unsuitable for roosting bats due to a clear lack of roosting spaces such as voids and/or absence of suitable access points.	<0.5	3%

Following the initial scoping survey, a dusk emergence survey was carried out on the 5th June 2019 and a dusk emergence survey was carried out on the 19th August 2019. The surveys were led by Amy Reddick and assisted by Frances Wrathall, Alice Harrison, Oliva Holmes and Annabel Mason.

Surveyors were equipped with Echo Meter Touch 2/bat box duet bat detectors and were augmented by infrared Canon Legria HF R205 with an illuminator and an Anabat Express.

The building was monitored for emerging/re-entering bats. Any additional bat activity, such as foraging and commuting bats, was also recorded. Bat calls were analysed using Analook and Kaleidoscope software. Table 3.3, below, shows a summary of the survey details.

Table 3.3 Bat activity survey details

Date	Surveyors	Start time	Finish time	Sunset/Sunrise time	Weather
05/06/2019	Amy Reddick, Frances Wrathall Alice Harrison, Olivia Holmes	21:12	22:58	21:28	Dry Temp: 14°C Wind: Beaufort 2 Cloud: 50%
19/08/2019	Amy Reddick, Jack Delaney, Annabel Mason	04:21	06:06	05:51	Dry Temp: 13°C Wind: Beaufort 3 Cloud: 70%

3.4. Amphibian and Reptile Survey

An assessment of the site was undertaken for species of reptiles and amphibians (including great crested newts).

Any ponds on the site were assessed on their habitat suitability for great crested newts *Triturus cristatus* using the Habitat Suitability Index (HSI) (Oldham *et al,* 2000). The HSI produces a score of the habitat for great crested newts based on a number of factors including: geographic location, pond area, permanence, water quality, percentage shade, waterfowl presence, fish presence, number of nearby ponds, terrestrial habitat and macrophyte cover.

A score of between 0 and 1 is assigned which determines the suitability of the pond and the chance of great crested newts being present (see table 3.4 below).

Table 3.4 HSI scores and predicted presence of great crested newts

HIS Score	Pond Suitability	Percentage predicted presence of great crested newts
<0.5	Poor	3%
0.50 – 0.59	Below average	20%
0.60 – 0.69	Average	55%
0.70 – 0.79	Good	79%
>0.80	Excellent	93%

The eDNA sampling was undertaken on the 5th of June 2019. The eDNA sampling was undertaken by Amy Reddick and David Watts, a consultant ecologist who holds a class licence to survey great crested newts.

Twenty sampling sites were identified around the perimeter of the pond. These were spaced evenly, and all areas of the pond were accessible. A ladle full of water was transferred from each sampling site into a whirl bag. Once all samples were collected, the bag was shaken vigorously, and then using a pipette, six preservative filled sample tubes were each filled with 15ml of the water. The contents were then sent to a laboratory at Surescreen Scientifics for testing. Methodology of the laboratory testing method can be viewed in the Surescreen Scientifics report (see appendices).

3.5. Other Protected Species Survey

A search of the site was undertaken for signs of other protected mammal species (namely those protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), Schedule 2 of the Conservation of Habitats and Species Regulations 2017 and the Protection of Badgers Act 1992), including badger *Meles meles,* hazel dormouse *Muscardinus avellanarius*, otter *Lutra lutra* and water vole *Arvicola amphibius.*

An assessment of the site was undertaken for birds, including nesting birds and bird species protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) such barn owl *Tyto alba*. This included assessing the interior and exterior of the buildings for signs of nesting birds including nesting material, old egg remains, droppings and feathers.

An assessment of the site was undertaken for its potential for invertebrates, although a detailed invertebrate assessment was not carried out as part of the survey.

4. Results

4.1. Constraints

The site survey was conducted inside the optimum period for Phase 1 Habitat Surveys. Some species are only visible at certain times of the year and may not have been present during the survey.

4.2. Designated Sites

A search on Magic Maps (DEFRA, 2019) found several notable habitats within 1km of the site including:

- Twenty-three Deciduous Woodland Priority Habitats, the closest of which is approximately 20m north of the site.
- Five Ancient Woodland Priority Habitats, Calfhall Wood, Coates Great Wood, Hall Royd Wood, Icicle Wood and Stubbin Wood which was the closest to the site at 321m southwest.

SBRC hold no records of designated sites within the survey area but do hold records of one designated site adjacent to the site, Royd, Vicar, Lindley and Coates Great Woods, a Local Wildlife Site (LWS) consisting of a number of interconnected ancient woodlands.

4.3. Habitats

The land use in the nearby surrounding area is a mixture of agricultural and woodland, with intermediate levels of tree cover, and good terrestrial connectivity to and from the site.

The site consists of hard standing areas, ephemeral vegetation, tall ruderal vegetation and improved grassland. A line of trees is located towards the west of the site along with several other trees scattered throughout the site. The habitats on the site are of low importance. Table 4.1, below, summarises the habitat types found on the site. A map of the habitats can be viewed in the appendices

Table 4.1 Habitats as defined by JNCC (2010) on the site

JNCC Habitat Type	Description	Ecological Value
A3 Scattered trees	A line of trees located along the western border of the site. Species include sessile oak *Quercus petraea*, ash *Fraxinus excelsior,* wild cherry, bramble *Rubus fruticosus*, common nettle *Urtica dioica*, sheep's sorrel *Rumex acetosella*, milk thistle *Silybum marianum* and hedge bind weed *Calystegia sepium*. A stand of sycamore *Acer pseudoplatanus* is located towards the northwest of the site and several young eared willow *Salix aurita*, ash, sycamore and butterfly bush *Buddleia davidii.* are located adjacent to building 3.	Low

JNCC Habitat Type	Description	Ecological Value
B4 Improved grassland	Several areas of improved grassland are located northwest and southwest of the site. Dominant grass species are cock's foot *Dactylis glomerata*, perennial ryegrass *Lolium perenne*, common bent *Agrostis capillaris* and false oat-grass *Arrhenatherum elatius*. Other species include red clover *Trifolium pratense*, common dandelion *Taraxacum officinale*, star thistle *Centaurea solstitialis*, ragwort *Jacobaea vulgaris*, lesser trefoil *Trifolium dubium* and creeping buttercup *Ranunculus repens*. An overgrown farm track runs parallel to building 1 before curving towards the east. To the northeast were piles of stone and rubble which had overgrown with vegetation.	Low
C3.1 Tall ruderal	Towards the southwest of the site is an area of tall vegetation consisting of common nettle and rosebay willowherb *Chamerion angustifolium*.	Low
J1.3 Ephemeral vegetation	Located in the centre of buildings 1, 2 and 3 adjacent to hardstanding. Species include yarrow *Achillea millefolium*, broad-leaved dock *Rumex obtusifolius*, common nettle and tall melilot *Melilotus latissimus.*	Low
J4 Bare ground	Areas of hard standing located adjacent to the buildings and within a fenced area west of the stable block.	Negligible

4.4. Bats

Desk based study

Ten species of bat have been recorded within South Yorkshire, including Brandt's bat *Myotis brandtii*, Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus*, Natter's bat *Myotis natteri*, noctule *Nyctalus noctulaI,* Leisler's bat *Nyctalus leisleri,* Nathusius' pipistrelle *Pipistrellus nathusii*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auratus* (GMBP, 2003; Harris and Yalden, 2008; personal observations).

Seven of the 10 species recorded in South Yorkshire, including whiskered bat, Brandt's bat, Natterer's bat, Leisler's bat, common pipistrelle, soprano pipistrelle and brown long-eared bat are known to roost in buildings at some point throughout the seasonal year (Harris and Yalden, 2008; Dietz *et al,* 2011; Collins, 2016).

SBRC and SYBG hold records of bat species within the site or within 1km of the site, including:

- Common pipistrelle *Pipistrellus pipistrellus*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long eared bat *Plecotus auritus*
- Noctule *Nyctalus noctula*
- Natter's bat *Myotis nattereri*

The closest field record was held by SYBG of a Natter's bat roost located 250m northeast of the site within a railway tunnel.

DEFRA (2019) holds no records of granted European Protected Species Licenses within 1km of the site.

Bat scoping survey

The scoping survey found five buildings on site with the potential to be affected by the development. Table 4.2, below, shows a summary of the building descriptions and their potential for roosting bats.

Table 4.2 Scoping survey of the buildings

Building	Description	Bat roost TI
Building 1	A large single-storey barn located in the centre of the site. The barn was of stone construction and was divided into two sections with the south section being in worse condition. The main section of the barn had a pitched stone tile roof, several lifted tiles and gaps under the ridge tiles were observed. The south section had a pitched corrugated metal roof. The exterior stonework had numerous cracks and gaps particularly on the south section. There were numerous ventilation slits in the north and south gables. A lean-to with a corrugated roof was adjoined to the east aspect of the south section. This had open sides and no features suitable for rooting bats. The interior of the barn was open to the roof. The interior of the building was also divided into two sections. The south section roof was supported by large purloins. Numerous cracks were observed and the ventilation slits on the south gable and two doors on the east and west aspects provided access into the building. It was divided from the main section of the barn by plastic sheeting. The main barn interior had a queen strut roof construction and the roof was unlined. Several gaps under lifted tiles were observed. A swallow nest *Hirundo rustica* with a large aggregate of old droppings was observed in the south section of the barn.	0.60 (moderate)
Building 2	A two-storey barn located towards the north of the site. It was of stone construction with a pitched English stone tile roof. There was a large hole at the top of the roof. The stonework was on good condition however some cracks were observed on the west gable along with a large pigeon hole into the second storey. There was a large wooden lintel above the door on the south aspect which also contained numerous cracks. The interior of the building was plastered, and no gaps or cracks were observed in the walls. There were numerous holes in the wooden floor of the second-storey. There was no roof void and the roof was unlined. The upper floor gables contained numerous gaps and cracks. No signs of bats were observed within the building.	0.60 (low)
Building 3	A small stone building with a pitched English slate tile roof located towards the northeast of the site. The building was a ruin with a collapsed roof which had suffered from fire damage. The exterior stonework of the building was in good condition. The interior of the building was exposed due to the collapsed roof and thick brambles were found within. No features suitable for roosting bats were observed.	0.49 (negligible)
Building 4	A disused corrugated metal shelter was located at the south of the site. This showed evidence of being previously used a kennel. The building was open sided with no roof void and no features suitable for roosting bats.	0.45 (negligible)

Building	Description	Bat roost TI
Building 5	A stable block towards the east of the site which was divided into three stables. It had a pitched felt roof and a wooden exterior. The interior of the building had no separate roof void and no features suitable for roosting bats.	0.48 (negligible)

Bat Activity Surveys

As Buildings 1 and 2 had potential for roosting bats, in accordance with the Bat Conservation Trust guidelines (2016) two further activity surveys were carried out.

During the dawn re-entry survey two common pipistrelles were observed re-entering the window on the western gable of Building 2 at 04:34. (See Appendix 3 for bat roost location).

No bats were observed emerging from or re-entering any of the other buildings during the surveys.

During both surveys, common pipistrelles and myotis bats were observed foraging close to the woodland to the south and several passes by noctules were recorded.

4.5. Other Mammals

SBRC hold records of brown hare *Lepus europaeus*, Europe stoat *Mustela erminea* and field vole *Microtus agrestis* within 1km of the site. The closest record was a field record of a badger 832m to the south from the site.

No signs or habitats suitable for any protected or notable mammal species were observed on the site.

4.6. Reptiles and Amphibians

SBRC hold records of common frog *Rana temporaria* which was located 760m to the northeast of the site.

DEFRA (2019) holds no records of granted European Protected Species Licences for great crested newts *Triturus cristatus* within 1km of the site.

The site provides areas of suitable habitat for reptiles and amphibians including areas of grassland and tall ruderal vegetation with piles of stone and rubble to the north east of the site providing suitable hibernacula for hibernation.

A search on aerial imagery (Google Earth Pro, 2019) revealed one pond (Pond 1) located 60m southeast of the site. An assessment using the HSI found the pond to provide average habitat for great crested newts, indicating a 55% chance of great crested newts being present.

Table 4.3 HSI Calculation for Pond 1

HSI Indices	
SI_1 Location	Optimal (1)
SI_2 Pond area	425m^2 (1)
SI_3 Pond drying	Sometimes dries (0.5)
SI_4 Water quality	Poor (0.33)
SI_5 Shade	65% (0.8)
SI_6 Fowl	Minor (0.67)
SI_7 Fish	Possible (0.67)
SI_8 Pond count	1.9/km^2 (0.67)
SI_9 Terrestrial habitat	Moderate (0.67)
SI_{10} Macrophytes	85% (0.9)
HSI Score	0.69 (Average)

The proposed development has a footprint of approximately 600m² (rounded to 0.06ha), which is within the footprint of the existing buildings. A new access road will be constructed over an existing farm track to provide access to the new dwellings. 450m^2 of the farm track is within an area of improved grassland which is suitable habitat for great crested newts. An assessment using the Natural England Rapid Risk Assessment Calculator (Natural England, 2013), found that if newts were present in Pond 1, then the risk of an offence resulting from the proposed development is likely. As such, it was recommended that a further eDNA survey was carried out to determine the presence/likely absence of great crested newts within the pond.

Table 4.4 Natural England rapid risk assessment for the pond (Natural England, 2013)

Component	Likely effect (select one for each component; select the most harmful option if more than one is likely; lists are in order of	Notional offence probability score
Great crested newt breeding pond(s)	No effect	0
Land within 100m of any breeding pond(s)	0.01 - 0.1 ha lost or damaged	0.3
Land 100-250m from any breeding pond(s)	No effect	0
Land >250m from any breeding pond(s)	No effect	0
Individual great crested newts	No effect	0
	Maximum:	0.3
Rapid risk assessment result:	AMBER: OFFENCE LIKELY	

The result of the eDNA test from Surescreen Scientifics was negative, indicating likely absence of great crested newts (See appendices for the report from Surescreen Scientifics)

4.7. Bird Species

SBRC hold records of brambling *Fringilla montifringilla* within 1km of the site which are afforded protection under Schedule 1 of the Wildlife and Countryside Act 1981.

The trees on site provide suitable habitat for nesting birds. Evidence of nesting swallows *Hirundo rustica* was observed within Building 1.

No evidence of roosting or nesting barn owls *Tyto alba* was identified within any of the buildings on the site.

4.8. Invertebrates

The site provides suitable habitat for invertebrates consisting of areas of improved grassland and ephemeral vegetation.

5. Interpretation of Survey Results

5.1. Habitats

The habitats on the site are considered to be of low ecological importance consisting of improved grassland, tall ruderal vegetation, ephemeral vegetation, building and hardstanding.

A Local Wildlife Site consisting of ancient woodland was situated adjacent to the northwest of the site.

5.2. Bat Roost Assessment

Buildings 1 and 2 had numerous features suitable for roosting bats including lifted roof tiles, gaps into the buildings and cracks in the interior walls. During the activity surveys, two common pipistrelles were observed re-entering the window in the west gable of Building 2, indicating that there is an active bat roost within the building.

In total, a peak count of two common pipistrelles were observed re-entering Building 2. Considering the number of bats identified during the surveys, it is anticipated that the building comprises a day roost of common pipistrelle bats, used by low numbers of males and/or non-breeding females. Common pipistrelles are a widespread and common species, able to exploit the majority of habitats within the UK. Day roosts of common pipistrelles are considered to be of low conservation status (Mitchell-Jones, 2004) although, as with all bats and their roosts in the UK, they are still afforded legal protection.

5.3. Other mammals

No evidence of any other protected or notable mammals were observed on the site.

5.4. Reptiles and Amphibians

The eDNA results indicate absence of great crested newts in the pond 180m from the site. Therefore, there is no foreseeable impact of the development proposals upon great crested newts.

The piles of stone and rubble to the north of the site provide potential habitat for hibernating reptiles and amphibians.

5.5. Birds

The trees on site provide suitable habitat for nesting birds and Building 1 has previously been used by nesting swallows.

5.6. Invertebrates

The site provides suitable habitats for generalist invertebrates of which there is an abundance of similar habitat in the surrounding area.

6. Impact Assessment

6.1. Habitats

As the habitats on the site are considered to be of low ecological importance, their removal will result in minimal ecological impact.

There is a Local Wildlife Site located adjacent to the northwest of the site however, as the work on the site will predominantly take place within the footprint of the existing buildings, the woodland is not due to be affected and it is not anticipated that the connectivity of the site will be affected by the development proposals.

6.2. Bats

In the absence of further mitigation, works to Building 2 will result in the destruction of a day roost and have the potential to kill or harm individual bats. The destruction of a day roost of common pipistrelles will result in a major impact at the site level, and a low impact at a local level. Common pipistrelles are, however, a generalist species found in most habitats in the UK, and there is an abundance of further suitable habitat in the surrounding area. Therefore, provided that adequate mitigative measures are implemented, the favourable conservation status of this species will not be affected.

6.3. Other Mammals

There are no foreseeable impacts of the development proposals upon any other notable or protected mammal species.

6.4. Reptiles and Amphibians

The rubble and other debris on the site may provide refugia for reptiles and amphibians which may be disturbed if these are removed during hibernation season.

6.5. Birds

Tree removals or work to Building 1 have the potential to impact upon nesting birds, if undertaken during bird nesting season (1st March – 31st August inclusive).

6.6. Invertebrates

There are no foreseeable impacts of the development proposals upon any notable invertebrate species. Although the habitats on site provide suitable pollination opportunities for invertebrates, they are only suitable for generalist species for which there is an abundance of suitable habitat in the surrounding landscape.

7. Conclusion and Recommendations

7.1. Avoidance of Ecological Impacts

A peak count of two common pipistrelles were observed entering the window on the west gable of Building 2, and it is anticipated that this comprises a day roost of common pipistrelle bats.

This roost will necessitate permanent destruction in order to convert the building. As bats are a legally protected species, a Natural England European Protected Species (EPS) licence will be required prior to the commencement of works. This can only be applied for once planning permission is in place. This will need to include a method statement to ensure that no bats are harmed during development works. An outline method statement can be viewed in Appendix 5.

As it is not anticipated that bats are roosting within Buildings 1, 3 or 4, there are no further considerations in regard to bats concerning these buildings.

It is recommended that any tree removals or work to Building 1 avoid the bird nesting season (1st March – 31st August inclusive). If this is not possible, a nesting bird check should be carried out within 48 hours prior to the commencement of works, and works should only commence if it has been established that nesting birds are not present.

The piles of rubble and stones provide suitable hibernacula for reptiles and amphibians. It is recommended that these are removed outside of reptile and amphibian hibernation (1st November – 28th February inclusive). If this is not possible then any potential hibernacula should be removed under the supervision of a qualified ecologist.

There are no foreseeable impacts of the development proposals upon any other protected or notable species. In the unlikely event that any protected species such as bats, reptiles or amphibians are identified during works, all works should cease, and a suitable qualified ecologist should be consulted.

7.2. Mitigation and Ecological Enhancement

To mitigate for the loss of the day roost and to ensure continuity of roosting habitat during development works, three bat boxes of type Schwegler FF (or similar alternative) should be erected on trees on the site prior to commencement of works. These should be located between 4 - 6m in height with clear flight paths to the entrances.

To prevent impacts upon commuting and foraging bats, outdoor lighting as part of the proposed development should be kept to a minimum. If outdoor lighting is considered necessary, the following recommendations prescribed by the Bat Conservation Trust (2014) should be followed:

- The spread of light should be at, or near horizontal level.
- The times that lights are used should be limited to provide some dark periods.
- Light sources to be used should emit minimal ultra-violet light.
- Lights should peak higher than 660nm.
- White and blue wavelengths of the spectrum should be avoided.

8. References

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9. Appendices

Appendix 1: Photographs



Plate 1 East aspect of Building 1



Plate 2 East aspect of Building 1



Plate 3 West aspect of Building 1



Plate 4 West aspect of Building 1



Plate 5 South gable of Building 1



Plate 6 East aspect of Building 1



Plate 7 Interior of Building 1



Plate 8 Interior of Building 1



Plate 9 Aggregate of swallow droppings in Building 1



Plate 10 Detail of interior roof of Building 1



Plate 11 Interior of Building 1



Plate 12 Interior of Building 1



Plate 13 South aspect of Building 2



Plate 14 Northwest aspect of Building 2



Plate 15 West aspect of Building 2



Plate 16 Interior of Building 2



Plate 17 Detail of ceiling in Building 2



Plate 18 South aspect of Building 3



Plate 19 East aspect of Building 3



Plate 20 North aspect of building 3



Plate 21 Interior of Building 3



Plate 22 Building 4



Plate 23 Building 5



Plate 24 Detail of the roof of Building 5



Plate 25 Improved grassland on north of the site



Plate 26 Line of trees to the west of the site



Plate 27 Grassland and tall ruderal vegetation



Plate 28 Pond adjacent to the site

Appendix 2: Bat Roost Trigger Index for the buildings

Buildings 1 and 2

TRIGGER INDICES	CATEGORY	TI VALUE
A) Location, habitat and environmental context of structure		
T1: General location	Rural	1
T2: Foraging opportunities within 250 m	Good	1
T3: Foraging opportunities within 5 km	Good	1
T4: Commuting opportunities	Good	1
T5: Cover in vicinity of structure	Moderate	0.67
T6: External lighting in vicinity of structure	Low level	0.67
T7: Number and character of nearby buildings	Good variety of old buildings	1
T8: Structure/building exposure	Low	1
B) Exterior features and characteristics of structure or building		
T9: Structure/building age	Old	1
T10: Size of Building	Intermediate size	0.67
T11: Main wall construction material	Old	1
T12: Condition of wall/roof pointing/render	Some gaps, cracks or crevices noted	0.67
T13: Condition of lintel/door frame features	Tightly sealed	0.33
T14: Condition of eaves/soffits/bargeboards	Tightly sealed	0.33
T15: Condition of weatherboarding/cladding	No boarding present	0.2
T16: Condition of lead flashing	No flashing	0.2
T17: Roofing material	Older style tiling	1
T18: Bat access potential	Several small gaps noted	0.67
C) Interior features and characteristics of structure or building		
T19: Character of roof void/roof space	No void or very limited roof space	0.2
T20: Character and condition of roof supports	Some gaps or cracks noted	0.67
T21: Presence and extent of cobwebbing	Some cobwebs	0.67
T22: Presence and condition of roof lining	Unlined or cavity filled with insulation	0.2
T23: Light levels in roof void/space	Intermediate	0.67
T24: Protection from weather/wind	Intermediate protection	0.67
T25: Temperature regime	Intermediate	0.67
T26: Level of (human, animal) disturbance	High	0.33
T27: Flight Space	Good	1
T28: Flying Access (Horseshoe bats)	Potential	0.67
TRIGGER INDEX SCORE = **BAT ROOST SUITABILITY =**	**0.60** **LOW**	

Building 3

TRIGGER INDICES	CATEGORY	TI VALUE
A) Location, habitat and environmental context of structure		
T1: General location	Rural	1
T2: Foraging opportunities within 250 m	Good	1
T3: Foraging opportunities within 5 km	Good	1
T4: Commuting opportunities	Good	1
T5: Cover in vicinity of structure	Moderate	0.67
T6: External lighting in vicinity of structure	Low level	0.67
T7: Number and character of nearby buildings	Good variety of old buildings	1
T8: Structure/building exposure	Low	1
B) Exterior features and characteristics of structure or building		
T9: Structure/building age	Old	1
T10: Size of Building	Small size	0.33
T11: Main wall construction material	Old	1
T12: Condition of wall/roof pointing/render	Tightly sealed	0.33
T13: Condition of lintel/door frame features	Tightly sealed	0.33
T14: Condition of eaves/soffits/bargeboards	Tightly sealed	0.33
T15: Condition of weatherboarding/cladding	No boarding present	0.2
T16: Condition of lead flashing	No flashing	0.2
T17: Roofing material	Older style tiling	1
T18: Bat access potential	Substantial holes or collapsed roof	0.2
C) Interior features and characteristics of structure or building		
T19: Character of roof void/roof space	No void or very limited roof space	0.2
T20: Character and condition of roof supports	No apparent supports or flat roof	0.2
T21: Presence and extent of cobwebbing	Some cobwebs	0.67
T22: Presence and condition of roof lining	Unlined or cavity filled with insulation	0.2
T23: Light levels in roof void/space	Light	0.33
T24: Protection from weather/wind	Draughty and exposed	0.33
T25: Temperature regime	Cold, north-facing or too hot	0.33
T26: Level of (human, animal) disturbance	High	0.33
T27: Flight Space	Good	1
T28: Flying Access (Horseshoe bats)	Good	1
TRIGGER INDEX SCORE =	**0.49**	
BAT ROOST SUITABILITY =	**NEGLIGIBLE**	

Building 4

TRIGGER INDICES	CATEGORY	TI VALUE
A) Location, habitat and environmental context of structure		
T1: General location	Rural	1
T2: Foraging opportunities within 250 m	Good	1
T3: Foraging opportunities within 5 km	Good	1
T4: Commuting opportunities	Good	1
T5: Cover in vicinity of structure	Poor	0.33
T6: External lighting in vicinity of structure	Low level	0.67
T7: Number and character of nearby buildings	Good variety of old buildings	1
T8: Structure/building exposure	Low	1
B) Exterior features and characteristics of structure or building		
T9: Structure/building age	Less than 50 years	0.33
T10: Size of Building	Small size	0.33
T11: Main wall construction material	Modern	0.33
T12: Condition of wall/roof pointing/render	Tightly sealed	0.33
T13: Condition of lintel/door frame features	Tightly sealed	0.33
T14: Condition of eaves/soffits/bargeboards	Tightly sealed	0.33
T15: Condition of weatherboarding/cladding	No boarding present	0.2
T16: Condition of lead flashing	No flashing	0.2
T17: Roofing material	Corrugated metal/asbestos/similar	0.33
T18: Bat access potential	Numerous gaps or open-sided structure	1
C) Interior features and characteristics of structure or building		
T19: Character of roof void/roof space	No void or very limited roof space	0.2
T20: Character and condition of roof supports	No apparent supports or flat roof	0.2
T21: Presence and extent of cobwebbing	Some cobwebs	0.67
T22: Presence and condition of roof lining	Unlined or cavity filled with insulation	0.2
T23: Light levels in roof void/space	Light	0.33
T24: Protection from weather/wind	Draughty and exposed	0.33
T25: Temperature regime	Cold, north-facing or too hot	0.33
T26: Level of (human, animal) disturbance	Moderate	0.67
T27: Flight Space	Moderate	0.67
T28: Flying Access (Horseshoe bats)	Potential	0.67
TRIGGER INDEX SCORE =	**0.45**	
BAT ROOST SUITABILITY =	**NEGLIGIBLE**	

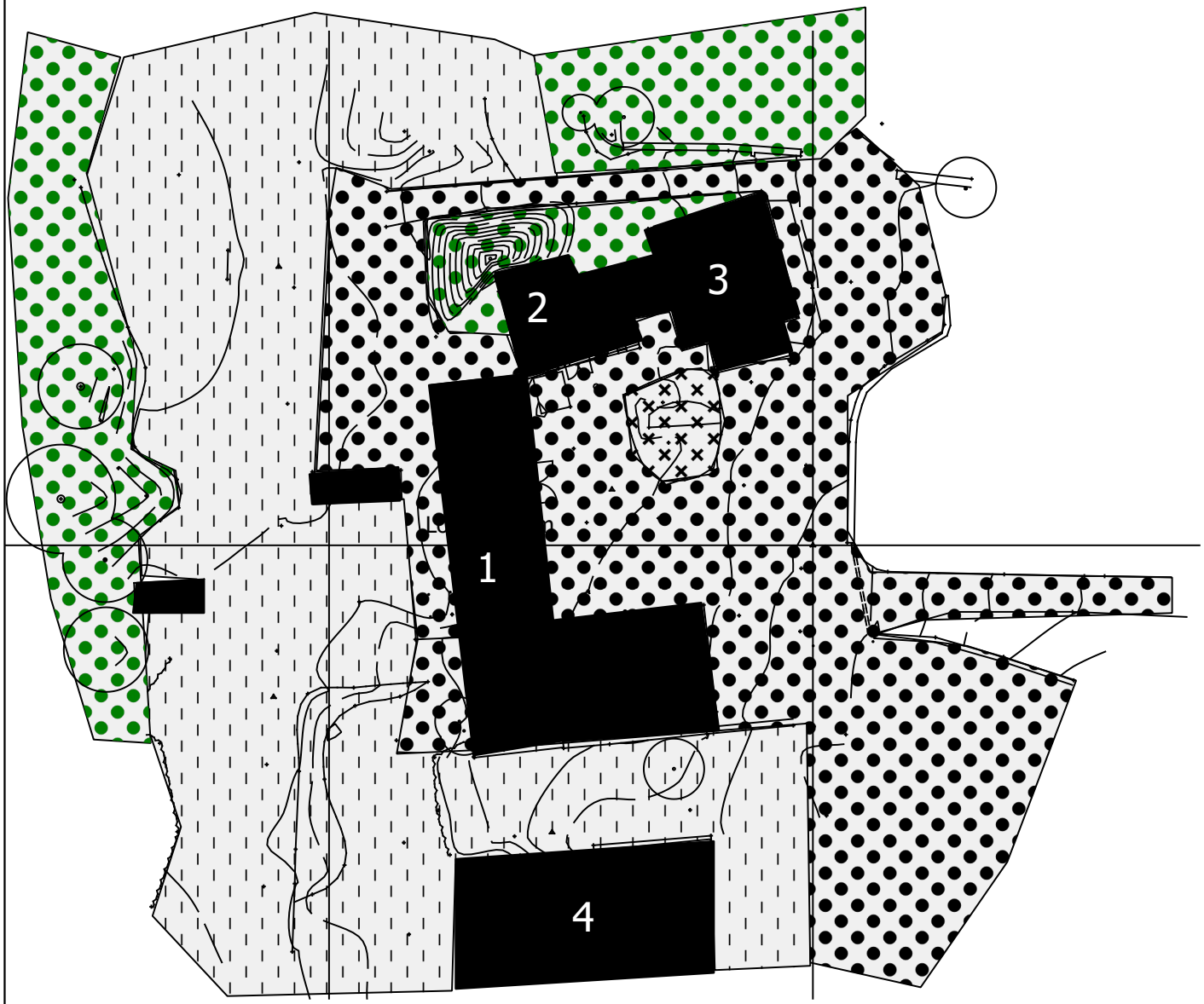
Building 5

TRIGGER INDICES	CATEGORY	TI VALUE
A) Location, habitat and environmental context of structure		
T1: General location	Rural	1
T2: Foraging opportunities within 250 m	Good	1
T3: Foraging opportunities within 5 km	Good	1
T4: Commuting opportunities	Good	1
T5: Cover in vicinity of structure	Poor	0.33
T6: External lighting in vicinity of structure	Low level	0.67
T7: Number and character of nearby buildings	Good variety of old buildings	1
T8: Structure/building exposure	Low	1
B) Exterior features and characteristics of structure or building		
T9: Structure/building age	Less than 50 years	0.33
T10: Size of Building	Small size	0.33
T11: Main wall construction material	Mixture of materials	0.67
T12: Condition of wall/roof pointing/render	Tightly sealed	0.33
T13: Condition of lintel/door frame features	Tightly sealed	0.33
T14: Condition of eaves/soffits/bargeboards	Tightly sealed	0.33
T15: Condition of weatherboarding/cladding	Tightly sealed	0.33
T16: Condition of lead flashing	No flashing	0.2
T17: Roofing material	Modern tiling or mixture	0.67
T18: Bat access potential	Numerous gaps or open-sided structure	1
C) Interior features and characteristics of structure or building		
T19: Character of roof void/roof space	No void or very limited roof space	0.2
T20: Character and condition of roof supports	No apparent supports or flat roof	0.2
T21: Presence and extent of cobwebbing	Numerous cobwebs in roof space	0.33
T22: Presence and condition of roof lining	Unlined or cavity filled with insulation	0.2
T23: Light levels in roof void/space	Light	0.33
T24: Protection from weather/wind	Intermediate protection	0.67
T25: Temperature regime	Cold, north-facing or too hot	0.33
T26: Level of (human, animal) disturbance	Moderate	0.67
T27: Flight Space	Moderate	0.67
T28: Flying Access (Horseshoe bats)	Potential	0.67
TRIGGER INDEX SCORE =	**0.48**	
BAT ROOST SUITABILITY =	**NEGLIGIBLE**	

Appendix 3: Phase 1 Habitat Map

Project:	Knabbs Hall
Drawn by:	Amy Reddick
Date:	09/09/2019

Not to scale



Pond 1

Key:

JNCC Habitats:

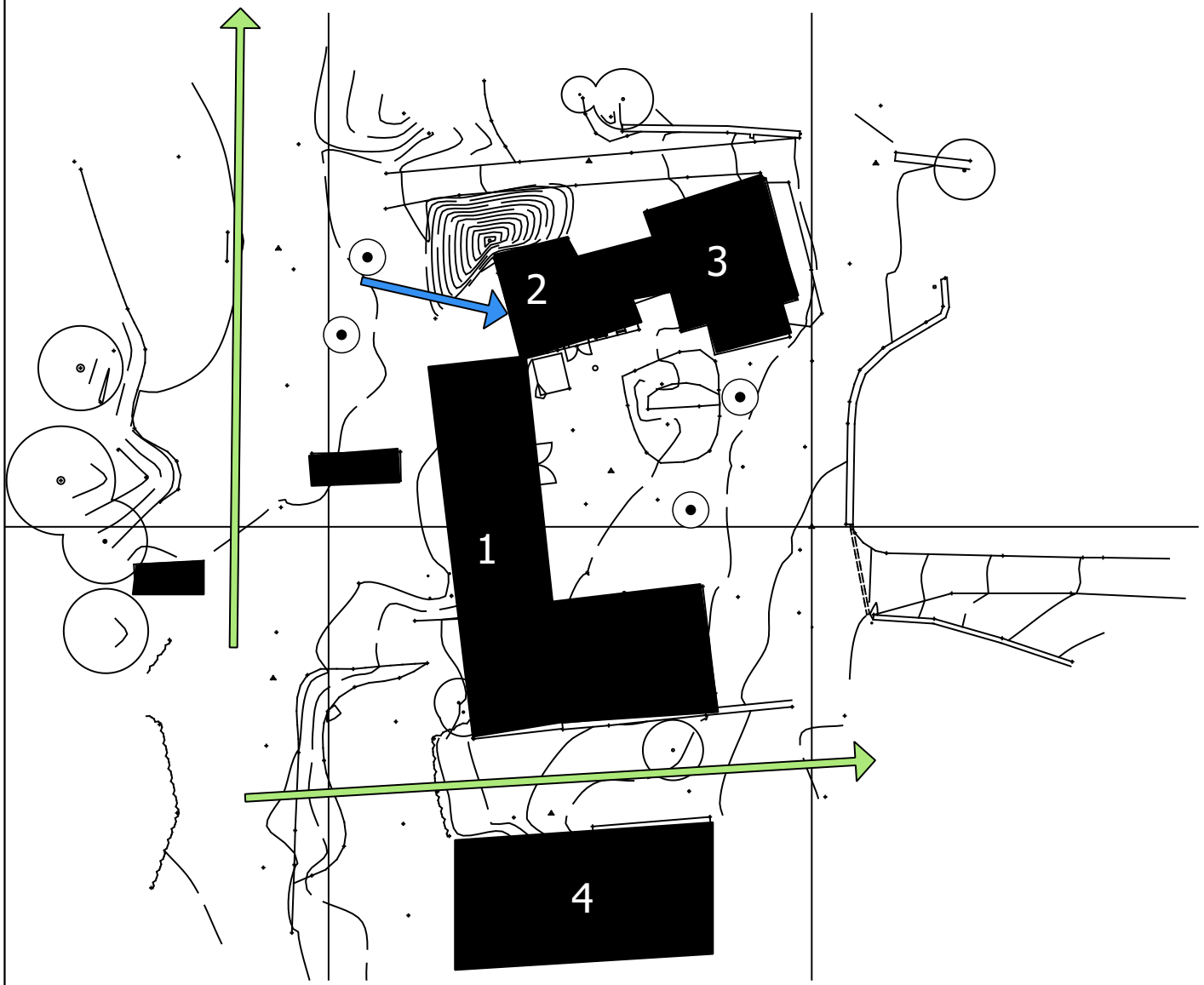
- A3.1 - Scattered trees
- B4 - Improved grassland
- G1 - Standing water
- J3.6 - Buildings
- J4 - Bare ground

Bagshaw Ecology

Appendix 4: Bat Activity Map

Project:	Knabbs Hall
Drawn by:	Amy Reddick
Date:	09/09/2019

Not to scale



Key:

- Surveyor positions
- Bat foraging and commuting paths
- Bat re-entry point

Bagshaw Ecology

Appendix 5: Outline Bat method statement for work at Knabbs Hall Farm

To ensure that bats are not harmed or disturbed by development works, it is recommended that the following precautionary methods are followed:

1. Prior to the commencement of works, three bat boxes of type Schwegler 1FF should be erected onto trees on the site.
2. Contractors will be given a 'toolbox talk', to ensure they are aware of the signs of bats, and to ensure that they know how to respond if bats are encountered.
3. Prior to the demolition suitable roost features will be inspected with an endoscope.
4. The ecologist will then supervise the demolition of the roost features. All roof tiles and ridge tiles should be removed by hand. To enable close supervision, scaffolding should be in place during the demolition works, or the roof should be accessed suing a mobile elevated working platform (MEWP).
5. If any bats are encountered during the demolition, they will be captured by the ecologist. They will either be stored in a ventilated box with a soft cloth and a shallow dish of water, and then released at dusk if weather conditions are suitable; or transferred to the bat box located on the tree on site.
6. Should any injured bats be found they will be placed in a ventilated box with a soft cloth and a shallow dish of water, and transferred to the care of a BCT registered bat carer.
7. When the ecologist is satisfied that all potential roost features have been removed safely, then work may continue unsupervised. However, in the event that a bat is encountered during this period then all work should stop and the licenced ecologist should be contacted.

As bats are a legally protected species, a Natural England European Protected Species (EPS) licence will be required prior to the commencement of works. A method statement will be required as part of the EPS Licence.

SureScreen Scientifics

Folio No: E5419
Report No: 1
Order No: 1028
Client: BAGSHAW ECOLOGY
Contact: David Watts
Contact Details: david@bagshawecology.co.uk
Date: 13/06/2019

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 10/06/2019
Date Reported: 13/06/2019
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
2907	28, Knabbs Hall	SE 28861 03777	Pass	Pass	Pass	Negative	0

SUMMARY

When Great Crested Newts (GCN); Triturus cristatus inhabit a pond, they deposit traces of their DNA in the water as evidence of their presence. By sampling the water, we can analyse these small environmental DNA (eDNA) traces to confirm GCN habitation, or establish GCN absence.

The water samples detailed below were submitted for eDNA analysis to the protocol stated in DEFRA WC1067 (Latest Amendments). Details on the sample submission form were used as the unique sample identity.

RESULTS INTERPRETATION

Lab Sample No.- When a kit is made it is given a unique sample number. When the pond samples have been taken and the kit has been received back in to the laboratory, this sample number is tracked throughout the laboratory.

Site Name- Information on the pond.

O/S Reference – Location/co-ordinates of pond.

SIC- Sample Integrity Check. Refers to quality of packaging, absence of tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to results errors. Inspection upon receipt of sample at the laboratory. To check if the Sample is of adequate integrity when received. Pass or Fail.

DC- Degradation Check. Analysis of the spiked DNA marker to see if there has been degradation of the kit since made in the laboratory to sampling to analysis. Pass or Fail.

IC- Inhibition Check- PCR inhibitors can cause false results. Inhibitors are analysed to check the quality of the result. Every effort is made to clean the sample pre-analysis however some inhibitors cannot be extracted. An unacceptable inhibition check will cause an indeterminate sample and must be sampled again.

Result- NEGATIVE means that GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as no evidence of GCN presence. POSITIVE means that GCN eDNA was found at or above the threshold level and the presence of GCN at this location at the time of sampling or in the recent past is confirmed. Positive or Negative.

Positive Replicates- To generate the results all of the tubes from each pond are combined to produce one eDNA extract. Then twelve separate analyses are undertaken. If one or more of these analyses are positive the pond is declared positive for the presence of GCN. It may be assumed that small fractions of positive analyses suggest low level presence but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive.

METHODOLOGY

The laboratory testing adheres to strict guidelines laid down in WC1067 Analytical and Methodological Development for Improved Surveillance of The Great Crested Newt, Version 1.1

The analysis is conducted in two phases. The sample first goes through an extraction process where all six tubes are pooled together to acquire as much eDNA as possible. The pooled sample is then tested via real time PCR (also called q-PCR). This process amplifies select part of DNA allowing it to be detected and measured in ‘real time’ as the analytical process develops. qPCR combines PCR amplification and detection into a single step. This eliminates the need to detect products using gel electrophoresis. With qPCR, fluorescent dyes specific to the target sequence are used to label PCR products during thermal cycling. The accumulation of fluorescent signals during the exponential phase of the reaction is measured for fast and objective data analysis. The point at which amplification begins (the Ct value) is an indicator of the quality of the sample. True positive controls, negatives and blanks as well as spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared so they act as additional quality control measures.

The primers used in this process are specific to a part of mitochondrial DNA only found in GCN ensuring no DNA from other species present in the water is amplified. The unique sequence appropriate for GCN analysis is quoted in DEFRA WC 1067 and means there should be no detection of closely related species. We have tested our system exhaustively to ensure this is the case in our laboratory. We can offer eDNA analysis for most other species including other newts.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. Kits are manufactured by SureScreen Scientifics to strict quality procedures in a separate building and with separate staff, adopting best practice from WC1067 and WC1067 Appendix 5. Kits contain a ‘spiked’ DNA marker used as a quality control tracer (SureScreen patent pending) to ensure any DNA contained in the sampled water has not deteriorated in transit. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd also participate in Natural England’s proficiency testing scheme and we also carry out inter-laboratory

checks on accuracy of results as part of our quality procedures.

Reported by: Chris Troth **Approved by:** Yaroslav Terentyev

End Of Report