ECOLOGICAL SURVEY

JERRINGS HALL FARM, DICKENS HEATH, SOLIHULL

carried out by

CLARKSON & WOODS
ECOLOGICAL CONSULTANTS

commissioned by

THE ISLAND PROJECT

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ECOLOGICAL SURVEY

JERRINGS HALL FARM, DICKENS HEATH, SOLIHULL

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EXECUTIVE SUMMARY

- Clarkson and Woods Ltd. was commissioned by Sanderson Weatherall LLP on behalf of The Island Project in August 2018 to carry out an ecological survey of Jerrings Hall Farm (Grade II listed buildings), Dickens Heath, near Solihull, B90 4DX. The site is approximately 1.66ha in size, and the approximate centre of the site is at OS grid reference SP121763.

- Ecological surveys of the site were undertaken between August 2018 and September 2020. These included an Extended Phase 1 habitat survey, building inspection, bat dusk and dawn surveys, a badger survey and a great crested newt eDNA survey of the site pond. All surveys were carried out by experienced and licensed ecologists.

- The surveys were required to inform the redevelopment of Jerrings Hall Farm, a Grade II listed building complex. This work is required for the relocation of The Island Project, which is an independent school serving the needs of children with Autism. The school is being relocated due to its proximity to High Speed 2 (HS2) (The Island Project is named in the Bill). The proposals include minor renovations to the exteriors of buildings, alterations to the internal structures of the buildings, the construction of two modular buildings, installation of four sheds, construction of a car park, footpaths, a sewage treatment facility and associated landscaping.

- The surveys aimed to identify whether any protected or notable habitats or species occur within or directly adjacent to the site and monitor any populations recorded. The purpose of this report is to provide the methods and results of those surveys, along with the likely impacts resulting from the development proposals and appropriate mitigation/compensation strategies to ensure protected/notable habitats and species are protected for the long term. Enhancement measures are also included in accordance with the National Planning Policy Framework (NPPF).

- In addition to the buildings, habitats present on site comprised poor semi-improved grassland managed as amenity and rough grassland (formerly grazed by donkeys), hedgerows (all defunct), a range of tree species and ages, a pond, along with patches of tall ruderal vegetation and ornamental planting. A Local Wildlife Site (LWS), Dickens Heath Marsh, is located to the immediate north of the site boundary.

- The surveys identified the presence of roosting bats within the buildings (brown long-eared – small maternity roost, common and soprano pipistrelle – day roosts), badger foraging only (paths, dung and scrapes), grass snake (one snake was seen on site during a bat survey), and occasional bird nest in the open buildings. The great crested newt

eDNA survey was negative and this species was considered likely absent from the site and wider area.

- Most habitats and species within the site are considered to be of Site to Local conservation importance. Recommendations for avoidance measures and mitigation/compensation include the appointment of an Ecological Clerk of Works to ensure the mitigation strategy is fulfilled, the creation of wildlife buffers/corridors where possible around the site (to also protect the adjacent LWS during construction and operation of the site), protection of bats and their roosts during repairs to buildings (a bat Mitigation Licence will be required), pre-commencement checks of buildings and vegetation for active bird nests to ensure they are protected from harm, a pre-commencement badger inspection to check for any new setts, and the careful removal of potential reptile habitat, the creation of an orchard, along with native hedgerow and tree planting, amongst others. This will be secured through the production and implementation of a Construction Ecological Management Plan (CEMP: Biodiversity) and a Landscape and Ecological Management Plan (LEMP), and a bat Mitigation Licence, along with planning conditions.

- A sensitive lighting strategy has been designed for the site and lights will be switched off overnight when the site is not in use.

- Ecological enhancements include the addition of native and ornamental planting within the site with known benefits to wildlife, provision of additional bird, bat and insect boxes along with log piles and hibernacula within the site to benefit wildlife including amphibians and reptiles.

- In line with NPPF planning guidance, a Biodiversity Impact Assessment Score has been calculated for the site using the Warwickshire, Coventry and Solihull Biodiversity Impact Assessment Calculator (v19.1). According to the calculator, the score is -0.16 for Habitat Biodiversity and +4.13 for Hedgerow Biodiversity. Although this indicates there will be a minor loss of Habitat Biodiversity, there will be a significant gain for Hedgerow Biodiversity and it is highly likely that the scheme will deliver an overall positive impact and net gain for biodiversity.

- Assuming the successful implementation of the measures described above the proposed development can be considered in line with planning policy 10 of the Solihull Local Plan.

1 INTRODUCTION

1.1.1 Clarkson and Woods Ltd. was commissioned by Sanderson Weatherall LLP on behalf of The Island Project in August 2018 to carry out an ecological survey of Jerrings Hall Farm, Dickens Heath, near Solihull, B90 4DX.

1.1.2 The initial ecological survey was carried out in August 2018 by Paul Kennedy, an experienced ecologist who is an associate member of the Chartered Institute of Ecology and Environmental Management, and Chris Poole Grad CIEEM, an assistant ecologist. Subsequently bat surveys of the buildings were undertaken in August/September 2018, June/July 2019 and September 2020. An eDNA survey for great crested newt *Triturus cristatus* was carried out in April 2019 and an update badger survey was undertaken in September 2020. All surveys were undertaken by Clarkson and Woods' ecologists. Details of surveyors and weather conditions during surveys are provided in the methods section below.

1.1.3 The surveys were required to inform the redevelopment of Jerrings Hall Farm, a Grade II listed building complex, comprising the change of use of the existing building from a dwelling house (use class C3) to a special needs school (use class D1), internal and (minor) external alterations to the listed building, installation of two new modular buildings, construction of a car park, footpaths, a sewage treatment works, and associated landscaping. This work is required to enable the relocation of The Island Project, which is an independent school serving the needs of children with Autism (the most severe forms) and Asperger's Syndrome aged 5 to 19 years in Warwickshire and the West Midlands.

1.1.4 The school is being relocated due to its close proximity to High Speed 2 (HS2) (The Island Project is named in the Bill), specifically Phase One, which will link London and Birmingham, and the adverse impacts it will cause to the pupils.

1.1.5 In line with NPPF planning guidance, a Biodiversity Impact Assessment Score has been calculated using the Warwickshire, Coventry and Solihull Biodiversity Impact Assessment Calculator (v19.1). This assessment calculates the on-site habitat biodiversity net losses or gains as a result of the development proposals.

1.1.6 Unless the client indicates to the contrary, information on the presence of species will be passed to the county biological records centre in order to augment their records for the area.

1.2 Report Aims

1.2.1 The aims of this report are to:

- *Where possible identify and describe all potentially significant ecological effects associated with the proposed development;*
- *Set out the mitigation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects;*
- *Identify how mitigation measures will be secured;*
- *Identify appropriate enhancement measures; and*
- *Identify what habitat biodiversity net losses or gains are likely as a result of the development proposals.*

1.3 Site Description Summary

1.3.1 The site comprises four main buildings (Main House, Stables, Cottage and Barn), four fenced fields with scattered trees, a pond, and a concrete/gravel driveway. The site is bordered by the B4102 (Tanworth Lane) to the east, a field used for arable and grazing (on rotation) occurs to the west and south, and Dickens Heath Marsh Local Wildlife Site is present to the north. The wider landscape predominately comprises arable and pasture, with the villages of Dickens Heath and Cheswick Green both within 600m of the site. The large town of Solihull lies approximately 1km to the north of the site at its closest point.

1.3.2 The site is approximately 1.66 hectares (ha) in size, and the approximate centre of the site is at OS grid reference SP121763, as shown in Figure 1. Figure 2 provides an aerial photograph of the site, while Figure 3 provides the building layout within the site.

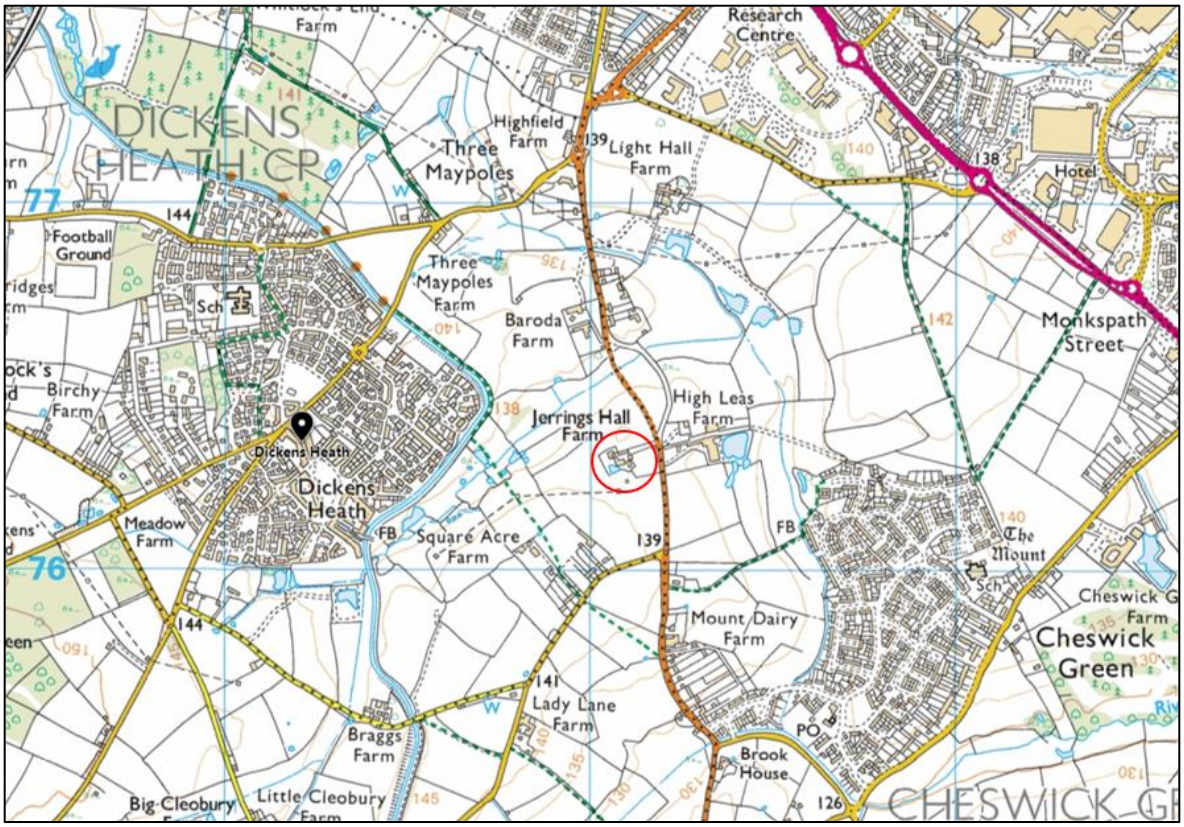


Figure 1: Ordnance Survey map showing the location of the site (red circle) (OS Licence 100050456)

Figure 2: Aerial photograph of the site boundary (red line) (©2020 Google)

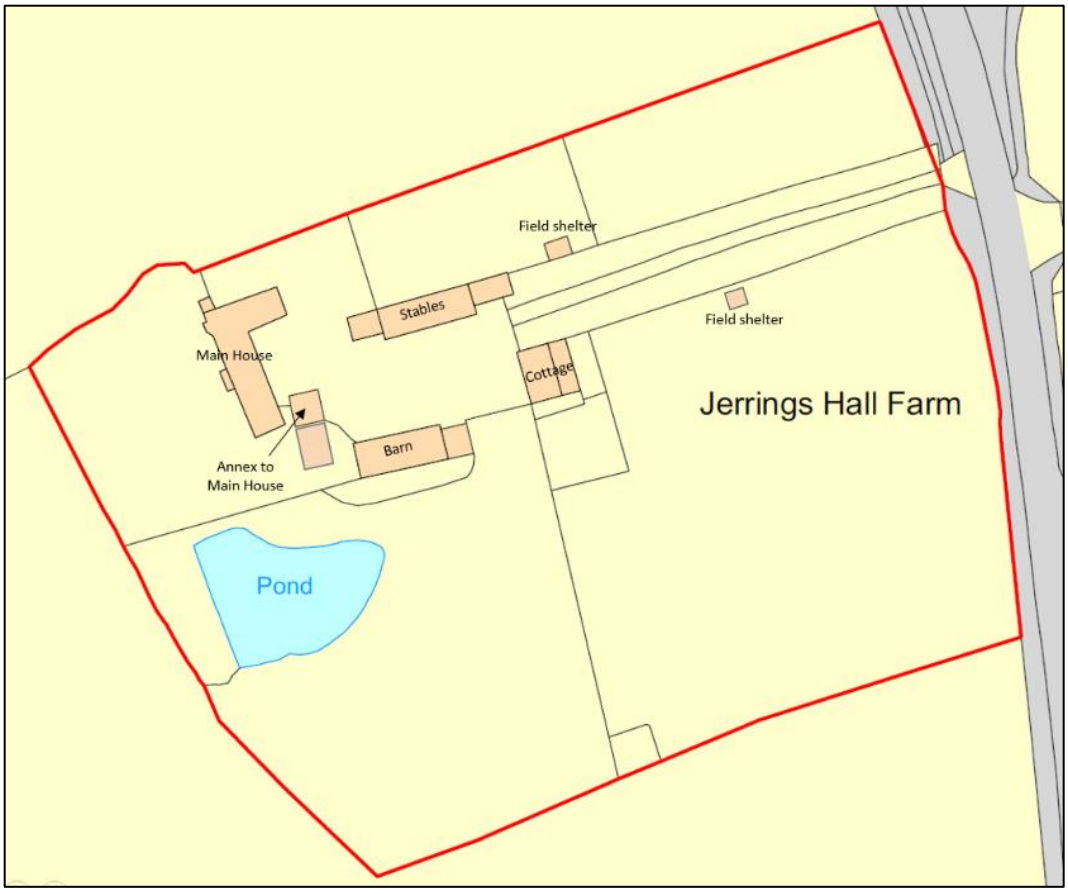


Figure 3: Building layout within the site

1.4 Development Proposals

1.4.1 The proposed development comprises the internal remodelling of Jerrings Hall (Main House), the Barn and the Annex/Cottage buildings to create teaching spaces, staff rooms and office space for a relocated special needs school as described above. Minor repair work to the external fabric of the buildings (including the roof structures) is also required. The Stables building will not be affected by the development, while the two existing field shelters will be removed. The proposals also include the construction of two, single-storey Modular buildings to provide additional teaching space; these will be located to the south of the Barn and Cottage and north-east of the Stables. In addition, the proposals include the installation of four timber sheds is proposed, the creation of a 40-space car park with a 10-space taxi drop-off point, construction of new drainage system (including a drainage mound) and a new sewage treatment facility (including a swale and basin), and the erection of security fencing around the site perimeter and the pond (Figure 4 refers).

1.4.2 Any significant changes to the building design and layout and landscaping prior to submitting for planning should be issued to Clarkson and Woods Ltd. for review. Ecological impacts and mitigation opportunities may be affected by these changes.

Figure 4: Development proposals (Drawing no. 1831-CMS-SP-00-DR-A-0002, CMS Architects 3rd March 2020)

2 SURVEY AND ASSESSMENT METHODOLOGY

2.1 Data Search

2.1.1 Statutory designated sites within proximity of the site were identified using the Natural England/DEFRA web-based MAGIC database (www.MAGIC.gov.uk).

2.1.2 Ordnance Survey maps (1:25,000) and aerial images of the site were examined online (bing.com/maps and maps.google.co.uk).

2.1.3 The following Environmental Records Centres were contacted and requested to provide data on protected/notable sites and species within 1km of the site boundary (4km with respect to bats):

- Warwickshire Biological Records Centre
- EcoRecord (Biological Records Centre for Birmingham and the Black Country area)
- Worcestershire Records Centre

2.1.4 The Solihull Local Plan – Shaping a Sustainable Future (December 2013) was consulted for details of planning policies relevant to designated sites, protected species and habitats, and general ecological and environmental protection.

2.2 Field Survey

Personnel

2.2.1 The Extended Phase 1 habitat survey was undertaken by Paul Kennedy ACIEEM assisted by Chris Poole Grad CIEEM. Paul has over 6 years' experience undertaking ecological surveys and has been assessed under the Clarkson and Woods QA processes as competent to complete the survey. Chris has 2 years' experience undertaking ecological surveys and holds a BSc in Zoology. Chris has been assessed under the Clarkson and Woods QA processes as competent to complete the survey.

2.2.2 Paul holds a licence for the survey of bats in England (Natural England Level 2 Reg. No. 2015-14471-CLS-CLS) and great crested newts *Triturus cristatus* in England (Natural England Level 2 Reg. No. 2016-19774-CLS-CLS).

2.2.3 Update surveys in 2019 and 2020 were undertaken by Paul, Chris and also Harry Fox MCIEEM (Natural England Bat Licence Level 2 ref. 2018-33520-CLS-CLS), Belinda Howell Grad CIEEM (Natural England Level 2 bat survey licence Reg. No. 2020-44726-CLS-CLS) and Mike Hockey ACIEEM (Natural England Level 1 bat survey licence Reg. No. 2020-44436-CLS-CLS).

Habitats

2.2.4 A habitat survey was carried out on 27th August 2018, based on standard field methodology set out in the *Handbook for Phase 1 Habitat Survey* (2003 edition)[1]. At the time of survey, the weather conditions were sunny, approximately 16°C and still.

2.2.5 An update inspection of the habitats on site was undertaken on 19th June 2019 and also on 3rd September 2020 to record any changes since the initial survey was completed in 2018.

[1] Nature Conservancy Council. (1990 - 2003 edition). *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit*, Joint Nature Conservation Committee

2.2.6 Botanical names follow Stace (1997)[2] for higher plants and Edwards (1999)[3] for bryophytes.

2.2.7 Habitats are mapped following the codes and conventions described within the Phase 1 Habitat Survey Handbook and Target Notes (Table 3) are used to describe habitats not readily conforming to recognised types and evidence of or suitability for protected species and species of conservation concern.

2.3 Protected and Notable Species

2.3.1 Details of the legislation protecting those species that have been identified as occurring or potentially occurring on the site are detailed in Appendix A.

Badgers

2.3.2 During each site visit a search was made for badger *Meles meles* setts, and any sett entrances found during the survey were checked for signs of use by badgers or other mammals. Any setts present were classified into the following categories; Main, Subsidiary, Annexe or Outlying. Main setts are typically large structures which constitute the principal shelter and breeding location for a single social group. Subsidiary setts are significant setts which receive regular or sporadic usage but are not the focal sett for a social group. Annexe setts are smaller structures closely associated with Main setts but are not connected by underground tunnels. Outlying setts are located away from other setts and usually comprise no more than two, infrequently used sett entrances.

2.3.3 Field signs such as 'snuffle holes' (holes dug by badgers when searching for invertebrates), pathways through vegetation, 'latrines' (small pits in which badgers deposit their faeces) and 'day nests' (nests of bedding material made by badgers for sleeping above ground) were also searched for and mapped where found.

Bats

2.3.4 The assessment of the suitability of the site for foraging and roosting bats was based on current guidance set out by the Bat Conservation Trust[4].

2.3.5 *Buildings:* The buildings were surveyed on 28th and 29th August 2018 and an update inspection was carried out on 19th June 2019 and 3rd September 2020. The exteriors of the buildings were examined through the use of ladders, torches and binoculars for potential roosting features (PRFs). Wherever possible, these points were thoroughly investigated using ladders and a video fibrescope to determine the likelihood of their occupation and evidence of presence. Extra factors taken into consideration included the potential for noise disturbance to the potential roost feature, exposure to the elements, lighting levels, proximity/connectivity of vegetation and water and whether these PRFs led on to cavities further into the structure.

2.3.6 Internally, all accessible roof voids and accessible parts of the building were entered where safe and possible to do so in order to describe their characteristics and to look for PRFs. A 1 million candle-power torch, ladders and a video fibrescope were used where necessary. Any signs of occupation including urine staining, prey remains, fur rubbing marks and droppings were noted where found. Droppings were

[2] Stace, C. (1997). *New Flora of the British Isles Second Edition*. Cambridge University Press
[3] Edwards, S.R. (1999). *English Names for British Bryophytes*. BBS, Cardiff
[4] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.

compared against reference material to identify likely species, and DNA analysis was undertaken where droppings were found to confirm species identification. The DNA analysis was carried out by Ecotype Genetics Limited laboratory (EG) at Sussex University via Swift Ecology.

2.3.7 Following the inspections, each building was assigned a 'high', 'medium', 'low' or 'negligible' category as a guide to inform any necessary further survey effort as stipulated in the Bat Surveys Good Practice Guidelines (Bat Conservation Trust, 2016).

2.3.8 *Trees:* an inspection of trees on site was carried out from the ground, using binoculars, to record any signs of use of the tree by bat species. A ladder, powerful torch and a video fibrescope were available. Features such as frost cracks, rot cavities, flush cuts, split or decaying limbs (including hazard beams), loose bark and dense plates of ivy were inspected and recorded. Any signs of staining (from urine or fur rubbing) and scratch marks below potential access points were noted, and a search was made for droppings underneath these features.

2.3.9 *Habitat:* the habitats within the site were appraised for their suitability for use by foraging and commuting bats. In particular, the connectivity of the habitats on site to those lying beyond was taken into account. Vegetated linear features are typically important for many species to navigate around the landscape, while the presence of woodland, scrub, gardens, grassland and wetland features increases a site's foraging resource value to bats. The potential for noise or lighting disturbance which may affect commuting links was also recorded.

2.3.10 *Dusk emergence and pre-dawn re-entry surveys*: the Main House, Stables, Cottage and Barn were subject to dusk emergence and/or dawn re-entry surveys to identify the level of use by day roosting bats (Table 1 below provides the dates of the surveys). The survey methods were based on current guidance set out by the by the Bat Conservation Trust[5].

2.3.11 The surveys were undertaken by the following ecologists:

- HF - Harry Fox (BSc MCIEEM; Natural England Bat Licence Level 2 ref. 2018-33520-CLS-CLS)
- PK - Paul Kennedy (ACIEEM; Natural England Bat Licence Level 2 ref. 2015-14471-CLS-CLS)
- BH – Belinda Howell (Grad CIEEM; Natural England Bat Licence Level 1 ref. 2016-25311-CLS-CLS / Level 2 ref. 2020-44726-CLS-CLS)
- MH - Mike Hockey (ACIEEM) (Natural England Level 1 bat licence ref. 2020-44436-CLS-CLS)
- GW – Grant Wright (Natural England Bat Licence Level 2 ref. 2015-14133-CLS-CLS)
- CP - Chris Poole (Grad CIEEM)
- AR - Adele Remazeilles (Grad CIEEM)
- PE - Patrick Ellison (Grad CIEEM)
- JG - James Gilbert (MCIEEM)
- HP - Heather Parris (Grad CIEEM)
- BS - Bex Sandey (BSc)

[5] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.

- BJ - Bryony Jones (MScRes)
- MS - Maria Slade (BSc (Hons), PGDip)

2.3.12 During the surveys the ecologists were positioned around the buildings to ensure all elevations requiring monitoring could be adequately observed. Figure 5 (below) provides the surveyor locations during the surveys. Dusk surveys commenced 15 minutes prior to sunset and continued until at least 1.5 hours after sunset, whilst the pre-dawn surveys commenced at least 1.5 hours before sunrise and finished 15 minutes after sunrise. Surveyors were equipped with handheld bat detectors (Batbox Duet, iPad with EMTouch software) and recording devices (iRiver MP3 recorder and Zoom recorder). Recordings made were subsequently analysed using computer software (Kaleidoscope and Adobe Audition) to confirm or identify bat species recorded.

Figure 5: Surveyor locations during bat dusk and dawn surveys

2.3.13 Table 1 below provides the survey dates, timings, ecologists and weather details for the dusk emergence and dawn re-entry surveys.

Table 1: Survey Dates, Timings, Surveyors and Weather Conditions

Building	Survey Date	Surveyor	Dusk/Dawn Survey	Sunrise/Sunset Time	Survey Start/ Survey Finish	Weather Conditions
Main House	17/09/2018	HF/GW/MS	Dusk	19:20	Start – 19:05 End – 20:50	Dry, calm with slight cloud cover, 18 - 13°C

Building	Survey Date	Surveyor	Dusk/Dawn Survey	Sunrise/Sunset Time	Survey Start/ Survey Finish	Weather Conditions
	18/09/2018	HF/GW/MS	Dawn	06:45	Start – 05:15 End – 07:00	Dry, clear, breezy, 15 - 13°C
	20/06/2019	BH/AR/CP/JG	Dawn	04:45	Start – 03:00 End – 05:00	Dry, mostly clear, slight breeze, 10.1 – 6.8°C
	04/07/2019	BJ/HP/MH/JG	Dusk	21:32	Start – 21:15 End – 23:00	Dry, patchy cloud (20%), calm to 1B, 21 - 17°C
	04/09/2020	BH/PK/MH/CP	Dawn	06:24	Start – 04:35 End – 06:40	Dry, mostly cloudy, calm, 12 – 13°C
Cottage	28/08/2018	PK/CP	Dusk	20:06	Start – 19:50 End – 21:36	Dry, calm and overcast, 15 - 13.5°C
	28/06/2019	PE/BS	Dawn	04:47	Start – 03:15 End – 05:00	Dry, overcast, breezy, 10°C
	03/09/2020	CP/BH	Dusk	19:49	Start – 19:34 End – 21:20	Dry, mostly calm with occasional light breeze, some cloud cover, 17 -16°C
Barn	29/08/2018	PK/CP	Dawn	06:14	Start – 04:45 End – 06:30	Dry, overcast, light breeze, 12.5 – 13.5°C
	27/06/2019	PE/BS	Dusk	21:34	Start – 21:19 End – 23:15	Dry, clear, breezy, 15 – 11.5°C
	03/09/2020	PK/MH	Dusk	19:49	Start – 19:34 End – 21:20	Dry, mostly calm with occasional light breeze, some cloud cover, 17 -16°C

Building	Survey Date	Surveyor	Dusk/Dawn Survey	Sunrise/Sunset Time	Survey Start/ Survey Finish	Weather Conditions
Stables	19/06/2019	BH/AR/CP	Dusk	21:33	Start – 21:15 End – 22:54	Damp (recent light rain but dry during survey), overcast, light breeze, 17.7 – 13.3°C
	05/07/2019	MH/HP/BJ	Dawn	04:52	Start – 03:15 End – 05:12	Dry, calm to 1B, 45% cloud cover, 15.6 – 14.4°C

Dormice

2.3.14 The hedgerows, scrub and wooded areas present within the site were assessed during the survey for their suitability to support dormice *Muscardinus avellanarius*. Particular consideration was paid to the abundance of food sources within them, density for nesting and overnight shelter and the strength of connectivity to other suitable habitats leading off site. In addition, any direct sightings, nests or feeding signs during the site visit were also recorded. Where hazel *Corylus avellana* was recorded on site, a search for gnawed hazelnuts was conducted.

Great Crested Newt

2.3.15 All waterbodies within the site and 250m of the site boundary were identified using Ordnance Survey maps and aerial imagery. Waterbodies within the site ownership and on publicly accessible land were assessed during the field survey for their suitability to support amphibian species where access was possible.

2.3.16 Where suitable water bodies were identified on accessible land a Habitat Suitability Index (HSI) score was calculated for each one following the methodology described by Oldham *et al*[6]. HSI scores give a relative indication of the likelihood that a water body would support breeding great crested newts. Factors which increase these scores include the presence of other ponds nearby, water quality, pond size, absence of fish/waterfowl, vegetation cover, and shading.

2.3.17 Terrestrial habitats were also assessed for their suitability for foraging and sheltering great crested newts. This species requires habitats such as grassland, scrub, woodland and hedgerows for dispersal and hibernation. Further hibernation features include buried rubble and logs, or mammal burrows.

eDNA survey

2.3.18 The pond within the site was subject to an eDNA survey for great crested newt DNA (to determine presence or absence of this species within the site). Water samples were taken from the pond on 24th April 2019 by Charlie Durigan (great crested newt Natural England survey licence Level 1, ref. 2017-28064-CLS-CLS) and Chris Poole, which is within the window accepted by Natural England for

[6] Oldham. R.S., Keeble L., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155.

ascertaining presence of great crested newts (15th April- 30th June). The sampling was undertaken in line with the technical advice note issued by Defra WC1067 (2011) and following instruction given within the sampling kit provided by NatureMetrics.

2.3.19 The eDNA kit was provided and water samples analysed by NatureMetrics. Care was taken to strictly follow the field sampling protocol defined by Biggs *et al* (2014).

Reptiles

2.3.20 Features on site were assessed for their potential to provide suitable habitats for use by reptile species. These include rough, tussocky grassland, scrub, disturbed land or refugia such as wood piles, rubble or compost heaps. Where present, suitable existing refugia were inspected for sheltering reptiles, and the ground was scanned whilst walking to look for basking species.

Birds

2.3.21 The buildings and vegetation within the site were surveyed for signs of use by nesting birds and any birds seen or heard during the survey were noted. The site's potential to support bird species of particular conservation concern (i.e. Schedule 1, NERC S41 and Red List species) was assessed, taking into consideration the bird species assemblage observed during the survey, the habitats present on and around the site, the context of the site in the wider landscape and the results of the desk study.

Invertebrates

2.3.22 Any notable invertebrates identified during the survey were recorded. The habitat was also assessed for its suitability for notable invertebrates, including the presence of specific species known to be foodplants or larval plants or habitats which may be favoured by invertebrates (such as bare ground, deadwood or grass tussocks). The habitat in general was also considered, such as mosaics or unmanaged areas.

Invasive Species

2.3.23 Invasive species, such as Japanese knotweed *Fallopia japonica* and Himalayan Balsam *Impatiens glandulifera* were searched for within the site and recorded if found.

Other Notable Species and Species of Conservation Concern

2.3.24 Field signs indicating the presence of other species of conservation concern, such as common toad *Bufo bufo*, brown hare *Lepus europaeus,* harvest mice *Micromys minutus* and hedgehogs *Erinaceus europaeus* (Species of Principal Importance under the NERC Act, 2006) were recorded. Habitats were also assessed for their potential to support such species.

2.4 Quality Assurance

2.4.1 All ecologists employed by Clarkson and Woods are members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and follow the Institute's Code of Professional Conduct[7] when undertaking ecological work.

2.4.2 The competence of all field surveyors has been assessed by Clarkson and Woods with respect to the CIEEM Competencies for Species Survey (CSS)[8].

[7] CIEEM (2013 & 2019). *Code of Professional Conduct*. www.cieem.net/professional-conduct.
[8] CIEEM (2013 & 2019). *Competencies for Species Survey (CSS)*. www.cieem.net/competencies-for-species-survey-css-

2.4.3 This report has been prepared in accordance with the relevant British Standard: *BS42020: 2013 – Biodiversity: Code of Practice for Planning and Development*[9].

2.5 Ecological Evaluation

2.5.1 The evaluation of ecological importance builds upon the criteria provided within the CIEEM guidelines for Ecological Impact Assessment (2016)[10] and the Criteria for Nature Conservation Evaluation described by Ratcliffe (1977)[11]. These criteria are described further in Appendix B. With due consideration to the evaluation criteria ecological receptor importance is then classified on a scale between 'International' and 'Site' importance with an additional Negligible category included for those features which are of no intrinsic ecological value. Where further information is required to determine the true importance of a species or habitat present the importance of the receptor is marked as 'unknown'.

[9] The British Standards Institution (2013). *BS42020: 2013 – Biodiversity: Code of Practice for Planning and Development*. BSI Standards Ltd.
[10] *CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal.* Chartered Institute of Ecology and Environmental Management. www.cieem.net
[11] Ratcliffe, D.A. (1977). *A Nature Conservation Review*, Cambridge University Press

3 SURVEY LIMITATIONS

3.1 Desk Study

3.1.1 The data presented within the report should not be seen as exhaustive. Data obtained from within the search area is highly unlikely to constitute a complete record of habitats and species present within the search area. It is therefore possible that protected species may occur within the vicinity of the site that have not been identified within the desk study.

3.1.2 The data presented within the desk study section of this report constitutes a summary of the data obtained from the local records centre. Should additional detail be required on any of the records described within this report Clarkson and Woods Ltd. should be contacted.

3.2 Badgers

3.2.1 Areas with dense ground cover (hedges, scrub, woodland etc.) were examined closely. If impenetrable vegetation prevented entry then the perimeter was examined in order to detect badger paths suggesting a hidden sett within the area. It cannot be guaranteed that all the entrances have been located, especially if a small sett is currently inactive or used seasonally and concealed in an area of thick scrub. Badgers may dig new holes and create new setts in a very short space of time.

3.3 Bats

3.3.1 Bats are small animals, capable of accessing very small spaces and it is possible that they or their signs might have been missed during the survey if they are normally present opportunistically or in low numbers for a short period of time each year.

3.3.2 Not all features in trees or buildings suitable for use by bats are visible from the ground and there can be no external evidence of use of features by bats; consequently it is only possible to make a best effort when carrying out such a survey.

3.3.3 Bat detectors are known to be more sensitive to certain bat calls than to others for reasons such as varying bat call loudness and directionality of certain calls. This can result in certain bat species (notably long-eared bats *Plecotus* sp.) being under-recorded due to the limitations of the current bat detectors. The difference in recording efficiency may, therefore, bias any results and this has been taken into account where possible during the assessment of the results.

3.4 General

3.4.1 The surveys offer only 'snapshots' of the site and take no account of seasonal differences, or of any species which might choose to take up residence subsequently. At the same time a lack of signs of any particular species does not confirm its absence, merely that there was no indication of its presence during this survey.

3.4.2 If no action or development of this land takes place within twelve months of the latest update survey undertaken within the site, then the findings of this survey should be reviewed and may need to be updated. After three years the findings will be out of date and the full survey should be repeated.

4 RESULTS

4.1 Data Search – Designated Sites

International Designations within 5km of the Site

4.1.1 No internationally designated sites were found within 5km of the site.

National Designations within 2km of the Site

River Blythe Site of Special Scientific Interest (SSSI)

4.1.2 The River Blythe SSSI lies approximately 860m to the south of the site at its closest point. This site is a particularly fine example of a lowland river on clay, with riffles, pools, small cliffs and meanders. The diverse physical features of the Blythe are mirrored by its diverse plant communities and associated invertebrates. The SSSI includes several damp unimproved meadows and woodlands that are hydrologically dependent on the Blythe. Otter *Lutra lutra* has been noted on the river.

Local Designations within 1km of the Site

Dickens Heath Country Park Local Wildlife Site (LWS) and Local Nature Reserve (LNR)

4.1.3 This LWS/LNR lies approximately 860m to the south-west of the site, and consists of semi-improved grassland, scrub, ponds and wetland. The grassland contains a range of typical meadow species, and supports a good number of butterflies and moths such as common blue *Polyommatus icarus*, small copper *Lycaena phlaeas*, burnet companion *Euclidia glyphica*, speckled wood *Pararge aegeria*, holly blue *Celastrina argiolus* and purple hairstreak *Neozephyrus quercus*. Frog spawn *Rana temporaria* have been recorded in one of the ponds.

Dickens Heath Ponds LWS and LNR

4.1.4 This LWS/LNR lies approximately 1km to the south-west of the site, and consists of a large pool with surrounding alder *Alnus glutinosa*, oak *Quercus sp.*, willow *Salix sp.*, hawthorn *Crataegus monogyna*, hazel and holly *Ilex aquifolium*. Foxglove *Digitalis purpurea* and bluebell *Hyacinthoides non-scripta* occur on the drier banks.

Dickens Heath Marsh LWS

4.1.5 This LWS is directly adjacent to the northern boundary of the site, and comprises mostly semi-improved, dry and unimproved damp grassland, but also contains small stands of wet woodland scattered through the site. Plant species diversity is high, including plants associated with unimproved grassland and marsh. Ancient woodland indicator species recorded include wood anemone *Anemone nemorosa,* yellow archangel *Lamium galeobdolon*, dog's mercury *Mercurialis perennis,* enchanter's nightshade *Circaea lutetiana* and remote sedge *Carex remota*.

4.1.6 This LWS was grazed by Belted Galloway cattle at the time of the bat surveys in 2019.

4.2 Data Search – Protected and Notable Species

Data obtained from Warwickshire and Worcestershire Biological Records Centres

Bats

4.2.1 The data search returned records for several bat species, as follows: noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus*

nathusii, brown long-eared *Plecotus auritus*, *Myotis sp.*, Daubenton's *Myotis daubentonii*, serotine *Eptesicus serotinus*, and Brandt's *Myotis brandtii*. The closest bat records to the site pertained to brown long-eared, soprano pipistrelle and noctule bats, which were located approximately 650m to the south of the site. The majority of bat records were from the nearby villages of Dickens Heath and Cheswick Green.

Amphibians and Reptiles

4.2.2 The data search returned no records for great crested newt or any reptile species. One record was returned for each of common frog, smooth newt *Lissotriton vulgaris* and common toad since 2008 and within 1km of the site.

Mammals

4.2.3 Three records of otter *Lutra lutra* since 2008 were returned. The closest of these records pertained to an area approximately 730m to the north-west of the site.

4.2.4 Four records of west European hedgehog were returned, the closest of which pertained to an area approximately 850m to the south-west of the site.

Birds

4.2.5 Two records were returned for cuckoo *Cuculus canorus*, a BTO red-listed species of conservation concern. These records pertained to areas 520m and 650m to the south-west of the site.

MAGIC search for EPS Licences

4.2.6 Two granted European Protected Species Licences were found within 2km of the site during a search using the MAGIC website (accessed 09/07/19). One licence was related to common pipistrelle, and the other to common and soprano pipistrelle. The closest of these licences pertained to an area approximately 1.2km to the west of the site.

4.2.7 Three granted European Protected Species Licences relating to great crested newts were found between 2km and 2.5km to the south-east of the site.

Clarkson and Woods In-house records

4.2.8 Clarkson and Woods Ltd hold no in-house records within 2km of the site.

4.3 Planning Policy

4.3.1 The following policies are found in the Solihull Local Plan – Shaping a Sustainable Future (December 2013), and are considered relevant to the site.

Policy P10 – Natural Environment

- The Council recognises the importance of a healthy natural environment in its own right, and for the economic and social benefits it provides to the Borough. The full value and benefits of the natural environment will be taken into account in considering all development proposals, including the contribution to the green economy and the health of residents, and the potential for reducing the impacts of climate change. Joint working with neighbouring authorities will be supported, recognising the need for a landscape scale approach to the natural environment and conservation of biodiversity.
- The Council will seek to protect, enhance and restore the diverse landscape features of the Borough and to create new woodlands and other characteristic habitats, so as to halt and where possible

reverse the degrading of the Arden landscape and promote local distinctiveness. Development should take full account of national and local guidance on protecting and restoring the landscape and the areas in need of enhancement, including guidance relating to the countryside. Developers will be expected to incorporate measures to protect, enhance and restore the landscape, unless it is demonstrated that it is not feasible, disproportionate or unnecessary.

- The Council will seek to conserve, enhance and restore biodiversity and geodiversity, to create new native woodlands and other habitats and to protect, restore and enhance ancient woodland and green infrastructure assets across the Borough. Protection of ancient woodland, designated sites and priority habitats shall include the establishment of buffers to any new development. Development should be informed by the latest information on habitats and species, and take full account of national and local guidance on conserving biodiversity, opportunities for biodiversity enhancement and for improving and restoring the Borough's green infrastructure. When appropriate, development should seek to enhance accessibility to the natural environment, especially for disabled people.
- The Council will protect areas of national and local importance for biodiversity and geodiversity, where it is reasonable, proportionate and feasible to do so.
- Development likely to have an adverse effect on a Local Nature Reserve or a Local Wildlife or Geological Site will be permitted only if the reasons for the development clearly outweigh the nature conservation or geological value of the site and its contribution to wider biodiversity objectives. Where development would have an adverse effect on a site of local value, developers will be expected to incorporate measures to enhance the site or to restore the links between sites in accordance with the Green Infrastructure study, unless it is demonstrated that it is not feasible.
- Outside designated sites, developers will be expected to take full account of the nature conservation or geological value, and the existence of any habitats or species included in the Local Biodiversity Action Plan, or sites in the Local Geological Action Plan. Developers will be required to undertake a full ecological survey and to deliver a net gain or enhancement to biodiversity, unless it is demonstrated that it is not appropriate or feasible. In considering the need for green space improvements associated with new development, developers should have regard for the standards and priorities in the Green Spaces Strategy in relation to accessible natural green space.
- Where development is likely to have significant harmful effects on the natural environment, as a result of the development itself, or the cumulative impact of developments, developers must demonstrate that all possible alternatives that would result in less harm have been considered. Where development is permitted, appropriate mitigation of the impacts and compensation where relevant will be required to deliver a net gain in biodiversity, habitat creation, landscape character and local distinctiveness. Enhancements should be undertaken either on the site, or in its vicinity, but where it is demonstrated that this is not possible, offsetting in alternative strategic locations within the biodiversity or green infrastructure network, to deliver biodiversity or other objectives may be considered. Where appropriate, developers should demonstrate compliance with this policy through an ecological statement or by relevant information in the West Midlands Sustainability Checklist.

4.4 Data Search – Local Conservation Priorities

4.4.1 There are a collection of 52 Warwickshire, Coventry and Solihull *Biodiversity Action Plans,* each of which are dedicated to a particular habitat or species. The following each have their own Action Plan, and are considered of potential relevance to the site.

Habitats

- Acid, Neutral and Calcareous Grasslands
- Gardens
- Hedgerows
- Ponds

Species

- Adder
- Barn owl
- Bats
- Common Dormouse
- Farmland Birds
- Great Crested Newt
- Hedgehog

4.4.2 These habitats and species have been identified as local conservation priorities and will, therefore, be given appropriate additional weight within the site ecological evaluation.

4.5 Field Survey Results

4.5.1 The results of the ecological survey are included in map form on Figure 10 further below. Habitats are mapped following the codes and conventions described within the Phase 1 Habitat Survey Handbook and Target Notes (Table 3) are used to describe habitats not readily conforming to recognised types and evidence of or potential for protected species and species of conservation concern. Photographs of the site are provided in Appendix C at the end of this report (some photos are also included within the text for clarity).

4.5.2 Four buildings occur within the site, which are currently unoccupied, but have previously been utilised as residential buildings (the Main House and Cottage), and associated outbuildings (Stables and Barn). In addition, two open-fronted field shelters are also present within the site. A concrete/gravel driveway leads from the entrance to the east (from Tanworth Lane) to the buildings. The remainder of the site predominately comprised four fields and a large pond.

Buildings

<u>Main House</u>

4.5.3 The Main House, a Grade II listed farmhouse, lies to the north-west of the site. This comprises a complex of structures: the main building is two-storey and 'L'-shaped, and the oldest parts of the building dates to the 16th/17th century. The south wing is timber-framed and roughcast, and the north wing is of 18th century brick construction. The building features a pitched roof of varying heights, covered in clay tiles with a felt lining. The roof is generally in good repair as is the lead flashing around the chimneys. The north wing brickwork is in good condition with no obvious gaps or damage.

4.5.4 The interior of the main house is modern and well-sealed. A small basement/cellar is present and there was evidence that it is used as a drain, as a pump and pump alarm were noted within this area.

4.5.5 The building contains three roof voids (Figure 8 refers), one of which has been partially converted to living space (a bedroom); the remaining two roof voids are not converted. The northernmost void (east to west orientation) is approx. 2.5m high from floor to apex, 4m wide x 5m long. The southernmost void (north to south orientation) is divided into two connected sections, one of which is approx. 2m high and the other is 2.5m high; overall this void is approx. 4m wide and 7m long. Both voids are lined with type 1F bitumen felt.

4.5.6 The Main House also has two associated annexes linked to the house and situated to the southeast between the house and adjacent Barn. The northernmost of these annexes is a two-storey converted agricultural building, which is brick-built with a pitched roof covered with clay tiles. Internally the first floor is open to the rafters (which is lined) and has no roof void. The southern building is also linked to the northern annex and comprises a single storey brick built building in the style of a sunroom, with glazing all around, and open to the rafters (also lined) with no void present. This also has a pitched roof covered with clay tiles. The roof structures were in relatively good condition and contained few slipped or broken tiles.

Cottage

4.5.7 The Cottage is located in the north-western corner of Field 3. A walled pathway leads up to the Cottage from the gravel driveway, and there is a small garden associated with the building. The garden comprised a regularly mown grass lawn with a small length of species-poor ornamental hedgerow.

4.5.8 The Cottage is a two storey building of brick construction with a pitched roof covered with clay tiles. It would appear to have been converted from a hay barn at some point as there is a hay loft door and associated beam to anchor a winch on the northern aspect. A single-storey extension is present on the eastern side of the Cottage, also of brick construction, with a single-pitched tiled roof. A small porch is attached to this extension, which is of a brick and wood construction, with a tiled gable roof.

4.5.9 The building is in good condition with no obvious gaps in the external brickwork. There is the odd damaged/missing tile in the roof which provide potential bat access points, as the building lacks a chimney and there are no fascias, soffits or barge boards that would otherwise allow potential access by bats. There is a single roof light in the eastern aspect of the main roof and two in the extension on the same aspect. The eaves of the Cottage were covered with wire mesh on both the northern and southern elevations of the building presumably to exclude birds.

4.5.10 The interior of the Cottage was modern and well-sealed. Two roof voids are present in the building, which has been re-roofed in recent years; old timbers are still present in the roof void on the 2nd floor of the building. The main roof void is approximately 2m high by 7m long by 4m wide and has mineral wool insulation on the floor and the pitch is lined with modern breathable membrane. The smaller roof void was formed as part of the single storey extension, and was too small to enter, measuring approximately 8m long by 2m wide by 0.5m high and was insulated with mineral wool and lined with breathable membrane.

Stables

4.5.11 The Stables are on the southern boundary of Field 4. This building is of brick construction, with a pitched roof covered with clay tiles. The Stables comprises a long single storey section orientated east-west, with

an attached two storey store at the western end of the building. A single-pitched roof is present on the western side of this two-storey building, above the westernmost store room. A security light was present on the southern side of the building. No chimneys are present in this building; there was lead flashing noted at the gables and joins in the roof structure. The two-storey building also features dove holes in the eastern gable wall.

4.5.12 Although the building appeared to be sound and weatherproof, the roof had a number of lifted and missing tiles creating occasional crevices within the roof structure.

4.5.13 The interior of the building comprised four rooms, all of which were predominately used as storage areas and workshops. All four of the rooms contained windows, and were well lit internally as a result. Above was a single long roof void, uninsulated and lined with bitumen felt, measuring approximately 18m long by 1.5m high by 4m wide. The eastern-most room was used as a garage/workshop with exposed roof trusses and bitumen felt lining. The building was open at the eaves in this room.

Barn

4.5.14 The Barn is located on the northern side of Field 2, in close proximity to the pond. This building is a large, two-storey structure of brick and block construction with a tiled, pitched roof, which has been re-roofed in recent years, and is in a relatively good condition. No chimneys are present; lead flashing was noted at the gables.

4.5.15 The interior of the building was modern and well-sealed, with windows present on both the northern and southern elevations of the building. There was one roof void present in the building.

4.5.16 A single-storey timber store is attached to the eastern end of the Barn. The store featured a tiled, pitched roof, which was lined with breathable roof membrane (BRM).

Field shelters and garden structure

4.5.17 Open fronted field shelters are present within Fields 3 and 4. The shelter in Field 3 has a brick and concrete base, with blockwork walls and a bitumen covered pitched roof. The shelter in Field 4 is of timber construction and is also covered with a bitumen covered pitched roof, and is also in a poor condition.

4.5.18 A small timber covered seating area is located to the south west of the pond. This structure has a pitched roof covered in clay tiles and was generally in good condition with few gaps or crevices noted.

Habitats

Amenity / Improved and poor semi-improved grassland

Garden to the Main House (Field 1)

4.5.19 The garden (referred to as Field 1) comprised a short mown lawn (amenity grassland), which had been maintained as a short sward when inspected during the update surveys in June 2019 and September 2020. Species recorded included perennial rye-grass *Lolium perenne,* self-heal *Prunella vulgaris*, dandelion *Taraxacum officinale*, sorrel *Rumex acetosa*, greater plantain *Plantago major*, speedwell *Veronica* sp., creeping buttercup *Ranunculus repens*, common mouse-ear *Cerastium fontanum*, ragwort *Senecio jacobaea*, ribwort plantain *Plantago lanceolata*, white clover *Trifolium repens*, and willowherb *Epilobium sp.* This grassland is classified as poor-semi-improved based on the species

composition present and is labelled as 'amenity grassland' on the Phase 1 plan (Figure 10) as it is maintained as a lawn.

4.5.20 The garden was bordered to the east by the main house, to the west by a hedgerow, and to the north and south by wooden post-and-rail fencing.

Field 2

4.5.21 This was also short mown (maintained as a relatively short sward during the update survey in June 2019 and September 2020), poor semi-improved grassland. Species noted included perennial rye-grass, Yorkshire-fog *Holcus lanatus*, dandelion, sorrel, dock *Rumex sp.*, ragwort, yarrow *Achillea millefolium*, red clover *Trifolium pratense*, white clover, buttercup, and oxeye daisy *Leucanthemum vulgare*. Patches of ruderal vegetation comprising common nettle *Urtica dioica* and creeping thistle *Cirsium arvense* were recorded within this field.

4.5.22 The field was bordered on all sides by timber post-and-rail fencing.

Field 3

4.5.23 This field, to the south east of the site comprised a poor semi-improved grassland paddock that had in recent years been grazed by ponies and donkeys. Species present included perennial rye-grass, cock's-foot *Dactylis glomerata*, false oat-grass *Arrhenatherum elatius*, meadow grass *Poa* sp., sweet vernal grass *Anthoxanthum odoratum*, Yorkshire-fog *Holcus lanatus*, wood false brome *Brachypodium sylvaticum*, ribwort plantain, creeping buttercup, dandelion, broad leaved dock *Rumex obtusifolius*, common nettle, red clover, bird's-foot trefoil *Lotus corniculatus*, red clover, and creeping cinquefoil *Potentilla reptans*. When inspected in June 2019 and September 2020, the grassland had not been cut and was being managed as a hay meadow.

4.5.24 The field is bordered by wooden post-and-rail fencing on all sides. The concrete driveway runs along the northern boundary of the field, and the Cottage is adjacent to the north-western corner of the field.

Field 4

4.5.25 Field 4 comprised another poor semi-improved grassland paddock, with similar species to Field 3. Additional species recorded included willowherb, common knapweed *Centaurea nigra* and yarrow. Again, the grassland was being managed for hay during the update surveys.

4.5.26 The field was bordered on the northern side by a hedgerow, and on all other sides by wooden post-and-rail fencing.

Hedgerow

4.5.27 Three boundary hedgerows occur within the site, as described below. The hedgerow numbers provided correspond to those given in the arboricultural report[12].

4.5.28 H17 & 22 - A defunct hedgerow, comprising mainly hawthorn with holly also present, occurs along two-thirds of the western boundary of the site. This hedgerow was approximately 65m long, 2 to 2.5m high and 1 to 1.5m wide at the time of survey and a gate provided access into the field to the south-west of the site.

[12] Treework Environmental Practice (2020). *Arboricultural Impact Assessment, Jerrings Hall Farm*. Report Reference Number: 200604-1.2-JFH-AIA-MW, June 2020

4.5.29 H33 - Another species-poor, defunct hedgerow is present along the central and eastern section of the northern boundary (to the north of Field 4). This hedgerow comprises mainly hawthorn and bramble *Rubus fruticosus* agg. and was approximately 90 long, 2m high and 1 to 1.5m wide.

4.5.30 H51 - A defunct hedgerow is also present along the south-eastern boundary (along Tanworth Lane), which also contains regularly spaced mature trees. This hedgerow comprises hawthorn, elder, hazel, bramble, dog-rose *Rosa canina*, field maple *Acer campestre*, blackthorn *Prunus spinosa* and ivy *Hedera helix*, and was approximately 68 long, 1.8m high and 1.2m wide.

4.5.31 A section of formal laurel *Laurocerasus* sp. hedgerow (H57), approx. 26m long, is present to the south-east of the Cottage. This is box shaped and approx. 1.5m high by 1 to 1.5m wide, and is L-shaped bounding two sides of a small formal lawn area.

4.5.32 The remainder of the site boundary was demarcated by post and rail fencing and treelines.

Trees

4.5.33 The site contained a diversity of trees of various ages ranging from immature to mature. Hedge, single and clumps of trees were recorded within the site, as follows (the tree numbers relate to the arboricultural report[12], Figure 6):

- An apple Malus sp. and pear Pyrus sp. tree (T25 & T19) are present within the garden (Field 1), while a small damson Prunus sp. (T18) is present adjacent to the hedgerow (H22) to the west;
- A group of Scots pine Pinus sylvestris, rowan Sorbus aucuparia and cherry Prunus sp. trees (G50) are present in the south-eastern corner of Field 3;
- Seven mature and semi-mature horse chestnut Aesculus hippocastanum trees are present in Field 4 (T35 to 41), and a mature Prunus sp. is present in Hedgerow 1.
- The eastern boundary of the site, along Tanworth Road, comprises a line of immature, closely spaced trees (G34) with species including hawthorn, field maple and lime *Tilia* sp.
- Hedgerow 51 is interspersed with mature oak (T46 & 49), ash (T47), and field maple (T48) trees (4 in total).
- A semi-mature sycamore tree (T27) is present to the immediate north of the main house;
- Mature pedunculate oak tree (T56) and two large leaved limes (T53 & T54) are present on the south-eastern site boundary, along with an immature oak (T55).
- The pond was bounded by several mature and semi-mature trees including oak (T1, T3 & T8), sycamore (T2 & T16), cherry (T4), hazel (T7), holly (T11) and weeping willow *Salix babylonica* (T9). Other small groups of scrubby trees are also present in this area.

4.5.34 A number of other smaller trees, mainly ornamental, occur within the site, particularly within the garden and drive, including cypress *Cupressus* sp., willows *Salix* sp., laurels, and cherry.

4.5.35 During the update survey on 3rd September 2020 it was noted that a large branch had fallen from T52, a willow, which appeared to be a recent occurrence.

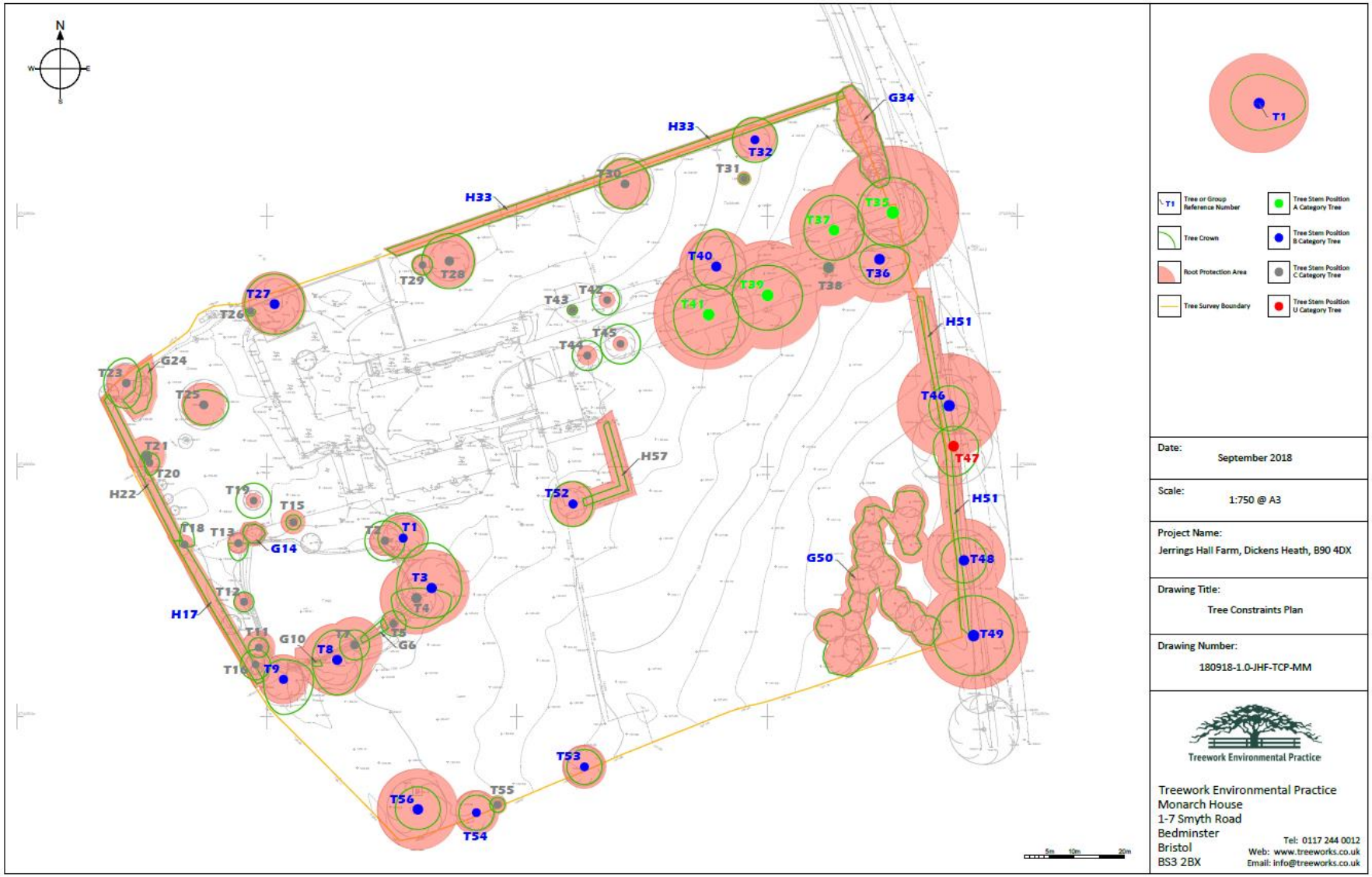


Figure 6: Tree identification (Table 2 below provides the species) (taken from Treework Environmental Practice, drawing no. 180918-1.0-JHF-TCP-MM, June 2020)

Table 2: Tree species recorded within the site (Figure 6 refers) (taken from Treework Environmental Practice, June 2020)

Tree no.	Species	Tree no.	Species
1	English oak	30	Cherry
2	Sycamore	31	Buckthorn
3	English oak	32	Lime
4	Cherry	H33	Hawthorn, bramble
5	Hazel	G34	Hawthorn, field maple, lime
G6	Holly, hawthorn	35	Horse chestnut
7	Hawthorn	36	Horse chestnut
8	English oak	37	Horse chestnut
9	Weeping willow	38	Horse chestnut
G10	Sycamore	39	Horse chestnut
11	Holly	40	Horse chestnut
12	English Oak	41	Horse chestnut
13	Cherry	42	Cherry
G14	False cypress, hawthorn	43	Cherry
15	Laurel	44	Cherry
16	Sycamore	45	Cherry
H17	Hawthorn	46	English oak
18	Damson	47	Ash
19	Pear	48	Field maple
20	Willow	49	English oak
21	Cypress	G50	Scots pine, cherry, rowan
H22	Hawthorn	H51	Hazel, hawthorn, blackthorn
23	Aspen	52	Willow
G24	Cypress	53	Lime
25	Apple	54	lime

26	Cypress	55	English oak
27	Sycamore	56	English oak
28	Cherry	H57	Laurel
29	Hawthorn		

Tall ruderal vegetation

4.5.36 Patches of tall ruderal vegetation were present around the site, particularly around the field shelters in Fields 3 and 4. Species diversity was limited to common nettle, dock, and willowherb.

Pond

4.5.37 Field 2 contained a large pond, measuring approximately 660m^2. The pond was fenced off using Heras fencing so close access for survey was restricted. However, species recorded within the pond included water lily *Nymphaea* sp., floating sweetgrass *Glyceria fluitans*, and pondweed *Potamogetum* sp. Vegetation on the pond banks included common reed *Phragmytes australis*, daylily *Hemerocallis* sp., flag iris *Iris pseudacorus*, common nettle and willowherbs.

4.5.38 As noted above, the pond is flanked by a range of trees and shrubs creating shelter and some shading of the pond. The small, open-fronted garden shelter was present on the south-western bank of the pond.

Ornamental planting

4.5.39 The gardens and around the buildings within the site were planted with ornamental plants including butterfly bush *Buddleia davidii*, laurel, climbers including ivy, *Clematis* sp. and firethorn *Pyrocantha* sp., Mahonia japonica and rose *Rosa* sp.. Herbs including lavender *Lavandula* sp., rosemary *Rosmarinus officinalis*, fennel *Foeniculum vulgare* are also present in beds.

4.6 Protected Species and Species of Conservation Concern

Badgers

4.6.1 Two badger latrines were recorded within the site boundary during the August 2018 survey, one comprising two pits and the other a single pit (Figure 10 refers, Target Notes 1 and 3). These had all been used relatively recently and were along or near to the site boundaries. No badger setts were found within the site or the immediate surrounding area and no obvious mammal paths were noted. It is likely that the grassland fields, lawns and fruiting trees on site form part of the foraging territory (used on occasion) of a local badger social group.

4.6.2 During the update survey on 19th June 2019, several mammal paths were noted within Fields 1, 3 and 4. A number of mammal foraging scrapes, attributed to badger, were recorded within the grassland. No setts or fresh dung pits or latrines were found although badgers are still evidently accessing the site for foraging and commuting purposes.

4.6.3 The update survey on 3rd September 2020 recorded two areas containing fresh latrines (two or three in each area) within the site (one to the east of the Stables building near the field shelter and the other to

the south-east of the Cottage in ruderal vegetation by a hedgerow). Mammal paths and numerous snuffle holes were also noted. No setts were found.

Bats

Main House

Building Inspection

4.6.4 During the August 2018 survey, the interior of the main house is modern and well-sealed, and no evidence of roosting bats was discovered within the main living area. A basement/cellar is also present, although there was limited potential for bats to access this room and no evidence of bat activity was found. During the update survey on 3rd September 2020, it was discovered that the loft hatches to the roof voids were open and approximately 100 relatively fresh bat droppings were distributed along the first floor landing and loft rooms (mostly near to Roof Void 2 – see below). No bats were seen but the droppings were attributed to brown long-eared bat *Plecotus auritus* (based on their size, shape and known brown long-eared roost in the roof void/structure of the Main House – also see below).

4.6.5 *Roof Void 1* is located in the north-eastern roof section of the house (Figure 8 further below). Part of the roof void has been converted in to a living space, and the remainder of the roof void was accessible via a ladder. Approximately 300-400 bat droppings were present in the void, with an accumulation of droppings in the centre directly beneath a loose panel of bitumen felt. Bat droppings were also recorded on the inner wall of the void next to the void entrance, and on the inner wall of the eastern gable end. A sample of these droppings was submitted for DNA analysis, which confirmed the presence of brown long-eared bat. This void is open and uncluttered due to the traditional construction of the building.

4.6.6 During the June 2019 update inspection several droppings were also found on a purlin directly below a small tear in the roof felt, in addition to the original evidence found in 2018, which was considered to be a possible access/egress point for bats. No bats were observed within the roof void during the survey.

4.6.7 The September 2020 survey found a number of fresh brown long-eared bat droppings in this void indicating recent activity.

4.6.8 *Roof Void 2* is located in the centre of the main house, and was accessible through a small crawlspace from the loft conversion. A small number of droppings (<10) was recorded in the crawlspace before entering the main part of the void. The main void is lined with bitumen felt, with the original timbers were present and, again, it is uncluttered and open. A window and an associated light had been installed internally between the roof void and the converted section of void to allow viewing of the original roof timbers present.

4.6.9 Bat droppings were scattered throughout the main part of the void, with a large accumulation in the centre of the void below a large cavity in a roof beam (overall 1000s droppings were present). Samples of the droppings were submitted for DNA analysis, which confirmed brown long-eared bats use this void for roosting.

4.6.10 The update survey in June 2019 and September 2020 found fresh accumulations of bat droppings within this void. Droppings were also found in the timber beam above the largest pile of droppings but no bats were observed here or within any part of the void.

4.6.11 *Roof Void 3* is a small void, which was accessed via a loft hatch from the kitchen on the ground floor. No evidence of roosting bats was recorded, although rat and mouse droppings were scattered throughout this void. These results were confirmed during the 2019 update survey. The September 2020 update survey found many more rat droppings in this void although several bat droppings (attributed to brown long-eared) were also found. No bats were seen.

4.6.12 This building is a confirmed roost site due to the presence of bat droppings. Hibernation potential for individual bats is moderate due to the roof voids and crevice features present in the roof structure.

Dusk Emergence Survey – 17th September 2018

4.6.13 Three common pipistrelles were observed emerging from the eastern side of the main house during this survey. Surveyor 1 saw the first of these bats emerge from under a roof tile at 19:45 (approximately 30 minutes after sunset), followed by another from a ridge tile at 19:46. The third bat emerged from under a roof tile at 20:04. The location of these sightings is illustrated in Figure 7 below.

4.6.14 A bat was also seen to emerge by surveyor 2 from the gable end (below the chimney) at the southern end of the main house at 19:43. This bat did not echolocate and, as such, identification cannot be confirmed but was thought to be a brown long-eared bat, based on its size and the fact it was quiet on emergence.

4.6.15 Common and soprano pipistrelle bats were recorded (foraging and social calling) throughout the survey, along with infrequent noctule bat passes. Brown long-eared bats were recorded foraging and commuting around the western and southern sides of the main house. In addition, a bat was seen to fly south between the buildings at the southern end of the main house by surveyor 2 at 20:32. This bat was not observed by surveyor 1 and, therefore, could have emerged from the building. Again, this bat was not echolocating and species identification cannot be confirmed (but was considered to be a brown long-eared bat).

Dawn Re-entry Survey – 18th September 2018

4.6.16 During the dawn survey, one common pipistrelle was seen by surveyor 2 to re-enter the building on the western side at 06:18, approximately 27 minutes before sunrise. The re-entry feature was a peg hole within the timber on the wall of the Tudor-style section of the house, as shown in Figure 7. Levels of bat activity were low during the dawn survey with only 7 common pipistrelle passes recorded.

Dawn Re-entry Survey – 20th June 2019

4.6.17 During this survey three to four brown long-eared bats were observed between 03:47 and 03:53 flying around the southern gable of the main house, around the chimney, and entered their roost at this location. A common pipistrelle bat was also recorded entering the roost at 03:55 located in a peg hole on the western elevation of the building.

4.6.18 In general, activity levels around the building were low and species recorded comprised brown long-eared and common pipistrelle, and a single pass by soprano pipistrelle.

Dusk Emergence Survey – 4th July 2019

4.6.19 No bats were seen to emerge from roosts within the building during this survey. Bat activity around the building was relatively low and comprised common pipistrelle (first bat recorded at 22:03; 31 minutes

after sunset, so evidently emerged from a roost nearby) and soprano pipistrelle (first bat recorded at 22.13).

Dawn Re-entry Survey – 4th September 2020

4.6.20 During the survey a number of bats were seen flying around the roof of the Main House and after approximately one hour of this activity, four brown long-eared bats were seen to enter their roost (under a tile) at the northern end of this building adjacent to the chimney at 05:45. Another two brown long-eared bats were also observed entering a roost under a tile at the southern end of the building at 05:55.

4.6.21 The only other bat species recorded during the survey was soprano pipistrelle (2 separate passes) although these bats were not seen to enter roosts in the building.

Additional data

4.6.22 In addition to the above survey results, during a dusk emergence survey of the Stables building on 19th June 2019, the surveyor positioned at location 1 recorded four common pipistrelle bats emerging from the Main House adjacent to the chimney in the centre of the building (at 22:10).

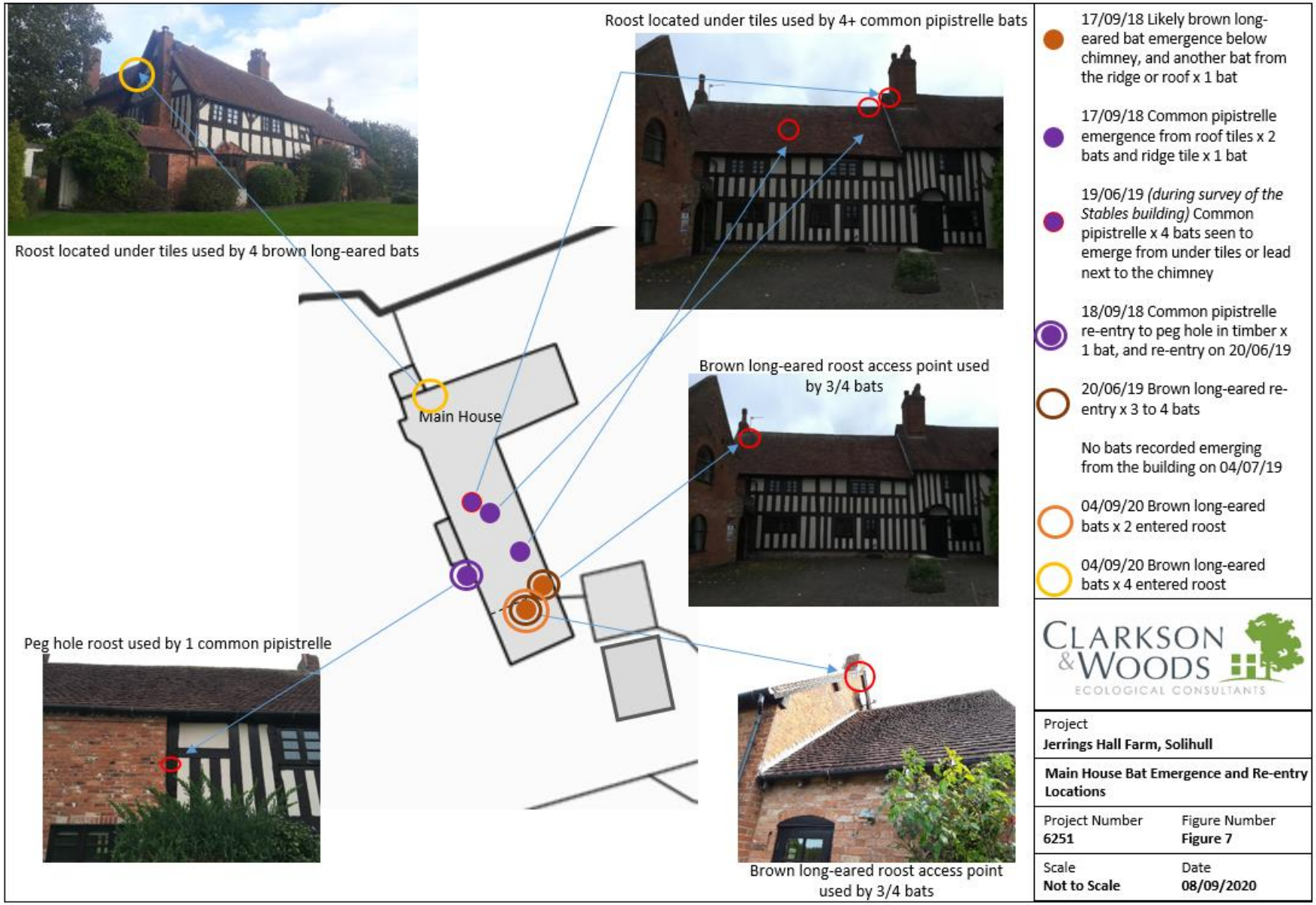


Figure 7: Main House Dusk Emergence and Pre-dawn Re-entry Survey Results 2018, 2019 and 2020

Stables

Building Inspection

4.6.23 The roof of the Stables building was found to contain potential roost sites for bats. There were a number of gaps underneath and between roof tiles on the pitches of the roof (which was suspected to be due to uneven rafters), and areas of missing mortar at the ridge. These features were all potentially suitable for crevice roosting bats.

4.6.24 The rooms within the Stables building are all well-lit and, therefore, of negligible suitability for roosting bats. No evidence of bat activity was recorded within any of the rooms of this building.

4.6.25 A small roof void is present in the western side of the building, which was accessed via a ladder. The roof is lined with plasterboard backed with a silver coloured foil. A west-facing window is present in this void, and the void is well lit as a result. Mouse droppings were spread throughout this void, although no evidence of bat activity was recorded.

4.6.26 A second roof void was present in the Stables building, which extended above the majority of the main room. The void is lined with bitumen felt. Mouse and rat droppings were recorded throughout the roof void, and a suspected squirrel dray was found composed predominately of metal foil and cardboard. The void was extensively cobwebbed, and no evidence of roosting bats was recorded. These findings were verified during the June 2019 update inspection; again no evidence of bat activity was found within the building.

4.6.27 The Stables building was assessed as having 'Low to Moderate' suitability to support crevice roosting bats, in accordance with BCT guidelines. Hibernation potential was also limited in this building due to the relatively shallow nature of the crevice features present.

4.6.28 Dusk and dawn surveys were undertaken in 2019 only and not updated in 2020 as this building will not be affected by renovations to the roof structure or voids.

Dusk Emergence Survey – 19th June 2019

4.6.29 No bats were recorded emerging from the Stables building during the dusk survey. Species recorded foraging and commuting around the building during the survey included common and soprano pipistrelle, *Myotis* sp. (probably Natterer's bat) and noctule. The first bat, a common pipistrelle, was recorded at 21:56, 23 minutes after sunset (the expected time of emergence for this species), so this bat was obviously roosting nearby. General activity levels were fairly high for this site, compared to other the surveys carried out.

Dawn Re-entry Survey – 5th July 2019

4.6.30 One possible re-entry was recorded during this survey. This was a common pipistrelle recorded at 03:50 flying very fast near the ridge of the building towards the western end, observed by surveyor 3, positioned at the northern side of the Stables. Surveyors 1 or 2 did not see this bat and it is possible that the bat entered a roost in the ridge at this location (shown in Photograph 1 below).

4.6.31 No other bats were observed entering roosts in the building during the survey. Other bat species recorded included soprano pipistrelle, brown long-eared and *Myotis* species.

Photograph 1: Location of possible re-entry (red star) of a single common pipistrelle bat during the dawn survey on 5th July 2019

Converted Barn

Building Inspection

4.6.32 No evidence of roosting bats was recorded around the Barn or attached boat house, although crevices at the joining points of the timber rafters provided potential roosting features for bats. The boat house was draughty and poorly insulated and subsequently of limited suitability for roosting bats.

4.6.33 Several lifted tiles were noted on the roof of the Barn, which provides several potential roosting features for crevice dwelling bats.

4.6.34 The interior of this building was modern, well-sealed and well-lit, and contained no obvious features that could be utilised by roosting bats. The roof void was lined with breathable roof membrane (BRM), although a small panel of bitumen felt was also present at the apex of the roof, close to the western gable end. A significant number of bat droppings (low 100s) was recorded scattered throughout the void, with a higher concentration of droppings at the western gable end. A small accumulation of droppings was also recorded directly underneath a loose panel of BRM in the centre of the void. This loose panel of BRM and the panel of bitumen felt at the western gable end of the void were identified as potential roost access points, based on the accumulations of droppings in close proximity to these features. Samples of the droppings were submitted for DNA analysis, which confirmed the presence of brown long-eared bat.

4.6.35 The Barn is a confirmed roost site due to the presence of bat droppings. Hibernation potential for individual bats is low due to limited suitable features present.

4.6.36 These findings remained the same during the June 2019 and September 2020 update inspection, with fresh brown long-eared droppings mixed in with older ones indicating continued use of the roost.

Dawn Re-entry Survey – 29th August 2018

4.6.37 No bats were seen to enter (or emerge from) roosts within the Barn during the dawn re-entry survey.

4.6.38 Overall bat activity was low, with small numbers of common and soprano pipistrelle recorded (including social calls), along with brown long-eared bats foraging in the main courtyard and around the pond.

Dusk Emergence Survey – 27th June 2019

4.6.39 One soprano pipistrelle bat was observed emerging from a roost in the ridge of the Barn roof at 22:11 during the survey (Photograph 2 below shows the roost location). No other bats were seen to emerge from the building.

4.6.40 Bat activity was relatively high during the survey and species including common and soprano pipistrelle, brown long-eared and serotine bats were recorded foraging and commuting around the building.

Photograph 2: Location of soprano pipistrelle emergence (one bat) during the dusk survey 27th June 2019 (red star)

Dusk Emergence Survey – 3rd September 2020

4.6.41 A single common pipistrelle was recorded (heard but not seen) at 20:11 (22 minutes after sunset) and it was considered highly likely that this bat emerged from the Barn, although the roost location was not confirmed. No other bats were recorded emerging from roosts in this building during the survey.

4.6.42 Other bat species recorded foraging and commuting nearby included soprano pipistrelle, brown long-eared, noctule, *Myotis* sp., and Leisler's *Nyctalus leisleri* (the first time this bat species has been recorded at the site).

Dawn Re-entry Survey – 4th September 2020

4.6.43 Although a dedicated dawn survey of the Barn on this date was not undertaken, it was noted that during the dawn survey of the Main House, the surveyor at location 4 recorded three brown long-eared bats flying repeatedly around the north-west corner of the barn at 05:40 (44 minutes before sunrise; Photograph 3 refers) and then disappeared soon after. It is likely these bats entered a roost in this part of the Barn.

Photograph 3: Location of brown long-eared (3 bats) re-entry (orange circle) during a dawn survey on 4th September 2020

Cottage

Building Inspection

4.6.44 Several potential roost features were recorded within the external roof structure of the Cottage, as follows: an area of mortar was missing from the ridge of the roof on the southern elevation, providing a potential access/egress point for bats, and a number of roof tiles were lifted, damaged, or missing, providing crevices that may be utilised by bats.

4.6.45 The interior of the living area within the Cottage is modern and well-sealed, and no evidence of roosting bats was recorded.

4.6.46 A very small void is present on the ground floor of the Cottage, which was accessed through a hatch in the hallway. This void is approximately 60cm in height, and is insulated with mineral wool on the floor, with a plastic underfelt and 'Kingspan' type insulation panels between the rafters. No evidence of roosting bats was recorded within the void.

4.6.47 A second roof void is accessed from the first floor. The void showed evidence of re-roofing with more modern timbers present, although the old timbers were also still present. A small quantity of bat droppings (<10) were found scattered throughout the roof void, and a small aggregation of bat droppings was recorded directly underneath a crevice in an old timber. Samples of the droppings were sent for DNA analysis, which confirmed the presence of common pipistrelle bat. Suspected shrew *Sorex* sp. droppings were also recorded within the void.

4.6.48 The Cottage is a confirmed roost site due to the presence of bat droppings. As with the other buildings, hibernation potential for individual bats is low due to limited suitable features present.

4.6.49 The above findings were confirmed during the June 2019 and September 2020 update surveys (no changes were observed). It was found that the loft hatch had been left open inside the Cottage during the 2020 survey although no evidence of bat activity was found inside the main building.

Dusk Emergence Survey – 28th August 2018

4.6.50 No bats were seen to emerge from (or enter into) roosts within the cottage during the survey.

4.6.51 The first bat recorded during the survey, a soprano pipistrelle, was heard approximately 9 minutes after sunset. Soprano pipistrelle and common pipistrelle were frequently recorded (foraging and social calling) throughout the survey. *Myotis* sp. and noctule were also recorded, although activity for each of these species was low. A single pass from a brown long-eared bat was recorded by surveyor 1 at 21:14 (approximately 1 hour 8 minutes after sunset) on the north-eastern side of the building.

Dawn Re-entry Survey – 28th June 2019

4.6.52 During the dawn survey a common pipistrelle bat was seen to emerge from a roost at the south west corner of the Cottage roof at 03:57 (Photograph 4 below refers). No bats were seen to enter roosts within the building during the survey. Other species recorded foraging and commuting around the building during the survey included soprano pipistrelle, serotine and brown long-eared bats.

Photograph 4: Location of common pipistrelle emergence (one bat) during the dawn survey on 28th June 2019

Dusk Emergence Survey – 3rd September 2020

4.6.53 No bats were seen to emerge from roosts within the Cottage during the survey. Regular common pipistrelle activity was recorded around the building along with occasional soprano pipistrelle, brown long-eared and noctule passes.

Field shelters and garden shelter

4.6.54 No evidence of bats roosting in the field shelters was found at the time of survey. It is possible that bats could use them for night roosting on occasion. They are not suitable as day roost or hibernation sites as they are open (light and draughty), and offer few crevices that would be protected from thermal fluctuations.

4.6.55 The covered seated structure in the garden adjacent to the pond was found to offer very limited day roost potential for bats due to the absence of suitable crevice roost features and the fact it is light and draughty inside the structure. This building could, however, offer night roost potential for bats such as brown long-eared.

4.6.56 The condition of these structures remained the same during the June 2019 and September 2020 update surveys.

Figure 8: Confirmed Bat Roost Locations

Trees

4.6.57 One tree on site was assessed as having 'moderate' potential to support roosting bats. This was a mature pedunculate oak (T56) in the south-western corner of the site, within Field 2. The tree featured several dead limbs and rot holes, which may provide crevices suitable for roosting bats.

4.6.58 Three trees on site were assessed as having 'low' potential to support roosting bats, in accordance with BCT guidelines. These were three horse chestnut *Aesculus hippocastanum* trees along the main driveway close to the entrance to the site (T35, 36 & 37). These trees held a small number of potential roosting features for bats; however, these features were somewhat exposed to the elements and only offered limited roosting potential.

Foraging and Commuting Bats

4.6.59 The hedgerows along the northern (H33) and western (H17, 22) boundary are fragmented and offer limited connectivity for bats navigating around the site. However, the hedgerow along the eastern boundary (H51) of the site (along Tanworth Lane) is more intact, contains trees and links to the north and south into other hedgerow and tree habitat and, as such, provides connectivity between the site and wider landscape. This hedgerow is cut low although the regularly spaced trees assist with creating a robust linear feature.

4.6.60 The grassland paddocks and gardens, pond, trees and ornamental planting within the site all provide varied foraging/drinking opportunities for bats along with connectivity around the site. The trees also provide shelter, which will benefit bats in poorer weather conditions. Fields 3 and 4 (rough grassland paddocks) may support a range of invertebrate prey species increasing the value of the site to foraging bats. Fields 1 and 2 are likely to be of little value for foraging bats, as they likely support a relatively restricted range of invertebrate prey species.

Dormice

4.6.61 The data search returned no records for dormice within 1km of the site.

4.6.62 The hedgerows present on site are defunct and gappy, providing few opportunities for foraging dormice.

4.6.63 In terms of the connectivity of habitats within the wider landscape, there is a regularly cut hedgerow that runs along the eastern site boundary along Tanworth Lane, which connects to some small blocks of woodland habitat to the north of the site. However, this hedgerow is somewhat gappy in places with a 15m (approx.) gap associated with the entrance to the site (although dormice will cross open ground between good habitat). This hedgerow is also likely subject to a significant degree of disturbance through heavy management, lighting, traffic noise and pollution, and thus is likely to provide less suitable habitat for dormice.

4.6.64 The remaining hedgerows present on site are gappy and regularly managed, and thus also provide suboptimal habitat for dormice. Dormice are also considered 'Rare' within the county of Warwickshire[13]. In conclusion, dormice are considered unlikely to be present within the site or immediate surrounding area.

[13] Wembridge, D., Al-Fulaij, N. & Langton, S. (2016) 'The State of Britain's Dormice 2016', *Peoples Trust for Endangered Species (PTES),* accessed November 2018.

Great Crested Newt and Other Amphibians

4.6.65 The pond within the site measures approximately 660m^2. A Habitat Suitability Index Assessment (HSI) was conducted on 29th August 2018 to give a relative indication of the likelihood of the pond supporting breeding great crested newts. The pond scored 0.749, indicating 'good' suitability for breeding great crested newt. Furthermore, eight other waterbodies were found to be present within 250m of the site using Ordnance Survey maps (Figure 9 below). As such it was considered that the pond on site may support a population of great crested newts in conjunction with other ponds and terrestrial habitat in the local landscape. Records of great crested newts are held for the wider area (at Blyth Valley Park, approx. 2km to the east of the site, and Dickens Heath within a km to the west of the site; Jenni Blakeman, Ecologist at Solihull Metropolitan Borough Council, email dated 08.10.18). The pond is also suitable for supporting common frog *Rana temporaria*, common toad *Bufo bufo,* and smooth and palmate newts *Lissotriton vulgaris/helvetica*.

4.6.66 The mown grassland lawns within the site (Fields 1 and 2) offer suboptimal terrestrial habitat for amphibians as the short sward height would provide little shelter from predation of foraging animals (although the pile of bricks and other construction materials on the south-western edge of the pond within Field 2 does provide a suitable refuge for amphibians and reptiles (Figure 9, Target Note 2). Fields 3 and 4 are less managed and provide more suitable terrestrial habitat for amphibians. The hedgerows and scattered trees may also provide suitable foraging habitat and refuges for amphibians in their terrestrial phase.

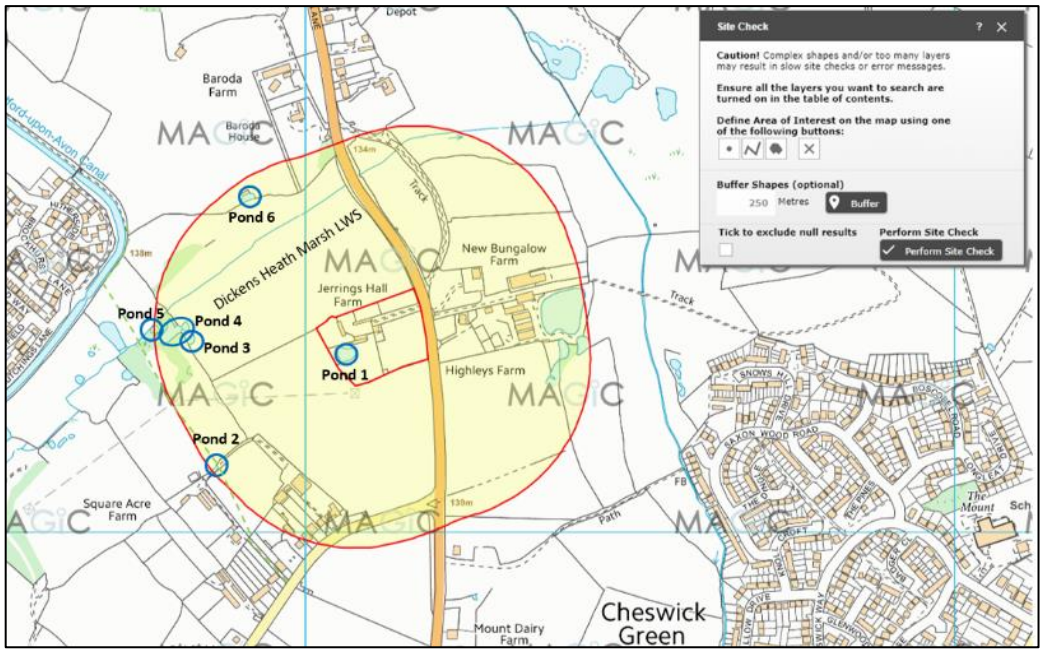


Figure 9: MAGIC map (https://magic.defra.gov.uk/) showing the location of ponds within 500m of the site boundary

4.6.67 The eDNA sample taken in April 2019, submitted to NatureMetrics for analysis, returned a negative result for great crested newt (Appendix D refers). It has been confirmed, therefore, that great crested newt is likely to be absent from the site.

4.6.68 Moreover, the HS2's Environmental Statement Ecology chapter (2015)[14] was consulted, which included eDNA survey results of Ponds 1, 3 to 6 (but not pond 2, possibly because it was dry). The surveys were conducted in May and June 2015 and all results came back negative for great crested newt DNA. The ponds to the east of Tanworth Lane were also tested and were negative.

4.6.69 Based on the current eDNA result for Pond 1 and the 2015 eDNA results for the other ponds (barring Pond 2), it is considered highly likely that great crested newts are absent from the area. This was agreed via email with Jenni Blakeman (Development Officer – Ecologist, Solihull Metropolitan Borough Council) on 8th May 2019.

Reptiles

4.6.70 A pile of bricks and other construction materials is present on the south-western edge of the pond (Figure 10, Target Note 2). This feature provides a potential refugia for animals such as reptiles and amphibians. However, the close mown lawns in Fields 1 and 2 are largely unsuitable for reptiles in their current state, due to the short sward height offering limited cover. Fields 3 and 4 provide more suitable habitat, as they are tussocky in nature and as such provide more shelter for basking and foraging reptiles.

4.6.71 A likely grass snake was recorded in Field 4 to the north of the Stables during the dawn bat survey of this building on 5th July 2019.

Birds

4.6.72 It is likely that the scattered trees and hedgerows around the site provide suitable nesting habitat for breeding birds typical of garden and farmland habitats. Signs of historic bird nesting was present in the roof void of the Stables building where a nest attributed to wren *Troglodytes troglodytes* was found and an active Robin nest was noted in the eastern end of this building during the update survey in June 2019. There was also evidence of birds nesting at the eaves of the void typical of house sparrow *Passer domesticus*. The gardens, grassland and meadows, hedgerows, trees and the pond within the site all offer good nesting and foraging potential for a range of bird species.

4.6.73 In addition to those species listed above, other birds recorded during the surveys include tawny owl *Strix aluco*, woodpigeon *Columba palumbus*, swallow *Hirundo rustica*, goldfinch *Carduelis carduelis*, carrion crow *Corvus corone* and blackbird *Turdus merula*.

Invertebrates

4.6.74 The hedgerows, trees and shrubs within the site are likely to provide suitable habitat for a range of widespread invertebrate species. It is likely that the lawns would support a fairly restricted range of common invertebrate species; however, Fields 3 and 4 (the paddocks) are likely to support a higher abundance and broader range of species due to the structural diversity and flowering plants present. No invertebrate species of conservation concern were observed during the site visits.

[14] High Speed Rail (London – West Midlands) Supplementary Environmental Statement 3 and Additional Provision 4 Environmental Statement SES3 and AP4 ES – VOLUME 5 www.gov.uk/hs2; Volume 5 Technical appendices Ecology (EC-001-001, EC-003-001, EC-001-002, EC-003-002, EC-001-003, EC-003-003, EC-001-004, EC-003-004) October 2015; www.gov.uk/hs2

Other Protected Species, Species of Conservation Concern and Invasive Species

4.6.75 Although no signs were observed during the survey, the site may support populations of hedgehog in combination with the neighbouring greenspace and arable fields. This species is typically found in rural/suburban habitats.

4.6.76 No invasive species were recorded during the survey.

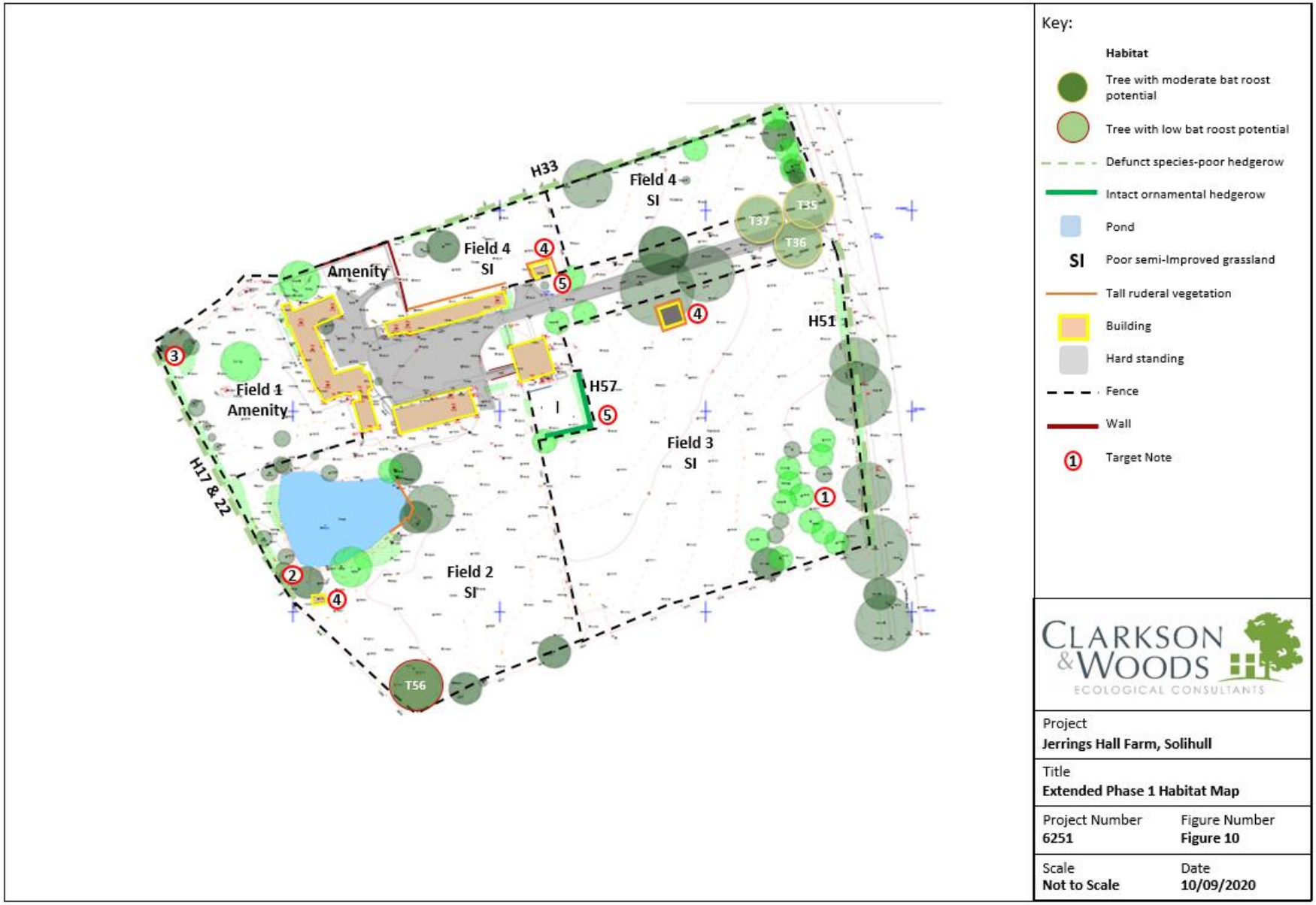


Figure 10: Extended Phase 1 Map and Target Notes

Table 3: Target Notes

Target Note No.	Description
1	Two badger latrines (both used relatively recently) recorded within the collection of trees near to the south-eastern boundary of the site
2	Pile of bricks and other construction materials – suitable refugia for reptiles and amphibians
3	A single badger latrine pit (used but dry) recorded behind cluster of cypress on the north-western boundary
4	Field shelters present within Field 3 and Field 4 and covered garden seat building in Field 2
5	Areas of badger latrines and snuffle marks found within the site on 3rd September 2020

5 ECOLOGICAL EVALUATION

5.1.1 This section provides an analysis of the value of ecological receptors (the designated sites, habitats and protected species) identified as actually or potentially occurring within or in proximity of the site. The valuation of the receptor reflects its legal protection, rarity and conservation status as well as its relative abundance on site and whether it is identified as a local or national conservation priority. Where appropriate the social and economic importance of ecological receptors has also been considered.

5.1.2 Table 4 includes an overall assessment for bats within the site; individual bat species evaluation is provided in Table 5 further below.

Table 4: Ecological Evaluation

Ecological Receptor	Description/Comments	Ecological Importance
Designated Sites		
River Blythe (SSSI)	Lowland river that supports diverse plant communities and associated invertebrates, with otter being recorded on the river	National
Dickens Heath Country Park (LWS/LNR)	Semi-improved grassland, scrub, ponds and wetland which supports a good number of butterflies and moths	Local
Dickens Heath Ponds (LWS/LNR)	Large pool with surrounding vegetation	Local
Dickens Heath Marsh (LWS)	Semi-improved dry and unimproved damp grassland which contains small stands of wet woodland	Local
Habitats		
Buildings	Due to their age, design and construction materials, the buildings on site support a range of bat species and roost types. They also support nesting birds	Local
Poor semi-improved grassland	The grassland contains a somewhat limited diversity of species although several plants were noted that indicate they may be more botanically diverse than first appears. The less managed areas offer more structural diversity compared to the western areas. This habitat is not rare in the local landscape but does provide diversity to the habitats present within the site. The grassland evidently supports foraging badgers, reptiles, invertebrates, bats and birds amongst other species	Local

Ecological Receptor	Description/Comments	Ecological Importance
Hedgerows	The hedgerows on site are generally species-poor with gaps although they are relatively tall and do link into other hedgerow habitat along the road to the east and a low hedgerow to the west of the site. Although they are of relatively poor quality, these habitats are likely to support a range of wildlife and add structure and diversity to the site	Local
Trees	The site supports many trees comprising a range of species and ages. Several of these are mature and over mature, and some contain features that may support roosting bats and nesting birds. It is likely they also support a range of invertebrates, which in turn will support foraging animals such a birds and bat	Site to Local
Tall ruderal vegetation	Limited species diversity and extent within the site and is a common habitat type within the locality of the site. However, it adds some diversity to the habitats present and is likely to provide foraging, egg laying and shelter opportunities for invertebrates and other wildlife	Site
Pond	This is one of several ponds (farm and ornamental) within the locality of the site. Water quality appeared to be good and it contained a range of submerged and emergent aquatic plants. The pond scored 'good' for its suitability for supporting breeding great crested newt, although the eDNA result was negative. It is located in relatively good terrestrial habitat and has good links with the wider landscape	Local
Ornamental planting	Although relatively limited in extent, the shrubs and climbing plants within the site add structure and diversity to the habitats present. They also provide shelter and foraging opportunities for invertebrates, birds and bats	Site
Species		
Badger	The habitats within the site evidently support foraging badgers on a seasonal basis. The presence of dung pits indicates the site forms part of the territory of a local badger social group	Site
Bats (overall assessment)	The surveys identified several roosts within the buildings on site. A brown long-eared small maternity roost is present along with small day roosts used by	Local

Ecological Receptor	Description/Comments	Ecological Importance
	common and soprano pipistrelle bats. Several buildings also contained bat droppings confirmed to be from these species. Habitats within the site support foraging and commuting bats including the grassland, trees, hedgerows and pond	
Dormouse	This species is considered rare in the local area and habitat on site offer limited potential to support this species. Connectivity with the wider landscape is reasonable but taking the above into consideration, it is likely this species is absent from the site	Unlikely to be present within the site or immediate local area
Amphibians	Great crested newt were confirmed to be absent from the site. The pond on site is suitable for breeding amphibians in conjunction with other ponds within the locality of the site. The terrestrial habitat on site is also moderate to good and provides opportunities for foraging and commuting newts, toads and frogs. Suitable refugia is also present on site offering shelter and foraging opportunities	Local
Reptiles	The site supports some suitable foraging habitat and refugia for reptiles within the grassland, hedgerows and other vegetation on site. The pond may support foraging grass snake (a likely grass snake was recorded within Field 4 in July 2019)	Site - Local
Birds	The trees and hedgerows provide suitable nesting habitat for breeding birds in conjunction with the large extent of suitable habitat within wider landscape. The grassland, trees, hedgerow and pond are likely to support a range of foraging birds looking for invertebrates and seeds	Site to Local
Invertebrates	The habitats within the site offer a relatively diverse structure, shelter and range of flowering plants that will inevitably support invertebrates looking for shelter, nectar and pollen and egg laying opportunities	Site to Local

5.1.3 Table 5 below provides an assessment of the bat species roosting within the site.

Table 5: Ecological Evaluation for Roosting bats

Bat species	UK status (current estimated UK population size)[15]	County status[16]	Level of activity on site	Ecological Importance
Roosting species				
Common pipistrelle	Common and widespread (2,430,000)	Common, widespread, not threatened	4 day roosts recorded used by approx. 7 bats in total: • 4 bats in Main House roof structure; • 1 bat in a peg hole of the Main House; • 1 bat in the Stables roof structure; and • 1 bat in the Cottage roof structure (droppings also present within roof void). No maternity roosts recorded although evidence suggests a maternity roost is located nearby and these bats are part of that colony. Moderate potential for hibernation within the buildings. Low to moderate levels of foraging and commuting activity recorded around the buildings	Day roosts = Site/Local Foraging / commuting = Site
Soprano pipistrelle	Common and widespread (1,300,000). UK BAP Priority Species	Common, widespread, not threatened	1 day roost recorded used by 1 bat (in the Barn). Moderate potential for hibernation within the buildings. Low to moderate levels of foraging and commuting activity recorded around the buildings	Day roosts = Site Foraging / commuting = Site
Brown long-eared	Common and widespread (245,000). UK BAP Priority Species	Common, widespread, not threatened	4 roost locations recorded (three in the Main House and one in the Barn), likely to be used by the same colony. Likely to be a small maternity roost (used by 5+ bats; small maternity roosts are common for this species) currently occupying roof structures or voids 1 & 2 of the Main House and potentially the Barn. The other roosts may be occupied seasonally. Moderate to high hibernation potential. Low level foraging/commuting activity recorded (but this species is difficult to detect so activity is likely to be higher than recorded)	Maternity roosts = Local to County Day roosts = Site Foraging / commuting = Local (as the habitats support a maternity roost)

5.1.4 Taking the site as a whole, although it is of limited size it contains a relatively diverse range of habitats and is known to support a range of protected and potentially notable species. Although the habitats

[15] Based on information provided by the Bat Conservation Trust http://www.bats.org.uk/
[16] Warwickshire, Coventry and Solihull Local Biodiversity Action Plan; Revised Plan February 2016: Bats; https://www.warwickshirewildlifetrust.org.uk/sites/default/files/2019-03/Bats%202016_1.pdf

are regularly managed (or have been up until fairly recently), there remains a diverse structure within them due to different management techniques, from mowing grassland/cutting hedgerows, to low level grazing and more 'wild' areas around the pond and site boundary. None of the habitats are rare and are likely to be commonly encountered within the local and wider landscape, and they are not particularly large in size; however, they are relatively fragile and could be easily damaged and lose their biodiversity value if, for example, management techniques changed and became more rigorous, such as intensive mowing/grazing or flailing, or removal of dead wood in trees.

5.1.5 The site is well connected to the wider landscape through hedgerows and the continuation of grassland to the north, which also provides connectivity between the ponds, particularly those located to the west and north of the site.

5.1.6 Taking the above into consideration, overall the site is considered to be of **Local to District ecological importance**.

6 IMPACT ASSESSMENT, FURTHER SURVEY, MITIGATION AND ENHANCEMENT

6.1 Introduction

6.1.1 This section considers the effects of the proposed development upon the ecological receptors identified in Section 5. Mitigation and compensatory measures are described to ensure adverse effects associated with the construction and operation of the proposed development can be eliminated or reduced as far as possible. Recommendations for ecological enhancement measures are also made that would be appropriate within the development in line with the National Planning Policy Framework.

6.2 Designated Sites

6.2.1 Dickens Heath Marsh LWS lies directly adjacent to the northern boundary of the site and features high botanical species diversity. The proposed development is relatively small in scale and will predominately comprise the internal refurbishment of existing buildings. The proposals also include the construction of two, single-storey modular buildings, as well as the creation of a 40-space car park with a 10-space taxi drop off point and a sewage treatment facility with drainage mound to the north of the access drive. However, this will be contained within the site and the measures described below will ensure that the risk of impacts on the LWS are avoided, which will include a buffer between any ground works and the LWS. As such, it is considered unlikely that the proposed development will result in significant impacts, either directly or indirectly on Dickens Heath Marsh LWS or any of the other designated sites identified within the desk study.

6.3 Construction Ecological Management Plan (CEMP: Biodiversity)

6.3.1 A strategy setting out how retained habitats and associated species will be protected during construction will be set out within the Construction Ecological Management Plan (CEMP: Biodiversity). This document will include information on key habitat features requiring protection, as well as the measures that will be employed on site on a daily basis to ensure accidental damage and pollution events are avoided wherever possible.

6.3.2 The CEMP will specify a buffer (minimum of 5m but less than this between the farmhouse and hedgerow boundary to the north due to restricted space in that location) between any construction activities and the adjacent Dickens Heath Marsh LWS. No works or storage of materials or compounds will be permitted within the buffer zone. Any works within the buffer zone will be discussed with the project ecologist first and additional measures may be required to ensure the LWS is protected at all times, including the presence of an Ecological Clerk of Works (ECoW) if required to reduce the risk of harm to retained habitats.

6.3.3 All retained hedgerows and trees will be protected during site preparation and construction in accordance with BS5837:2012, where applicable, using Heras fencing or similar. Root Protection Areas (RPA) will be put in place, which will include wider RPAs around the trees that offer bat roost potential (T35, 36, 37 & 56). The Arboricultural Impact Assessment (Treework Environmental Practice, June 2020)[12] provides the mitigation strategy to protect trees, hedgerows and their roots during construction works (car park, paths and drainage systems etc.). Similarly, the pond will also be protected from damage including pollution incidents during construction, through the incorporation of a buffer zone around this feature of at least 8m. Again, no chemicals or fuels or any other material will be stored within the buffer

zone. Habitat connecting the pond to the hedge to the immediate west will also be retained to enable wildlife to freely access the pond and wider landscape.

6.3.4 Any timing restrictions, including repair works to roofs of buildings used by roosting bats (under licence – see below), habitat works affecting amphibians and reptiles, and the clearance of vegetation suitable for nesting birds, will be detailed within the CEMP.

6.3.5 The CEMP will also include details on the locations of compound and parking areas, pollution avoidance strategies and incident responses, and also responsibilities of various tasks.

6.3.6 A suitably experienced ecologist will be appointed as an ECoW to ensure habitats and wildlife are protected throughout the construction phase.

6.4 Landscape and Ecology Management Plan (LEMP)

6.4.1 New and existing/retained planting and habitats will be included in a Landscape and Ecological Management Plan (LEMP) prepared for the operational site. This document will cover how retained habitats and newly planted areas, such as the buffer habitat, retained meadow grassland, amenity grassland, hedgerows, trees, pond, wildflower areas and orchard, as well as features created for wildlife such as the bat, bird and insect boxes, log piles and hibernacula (see further below), will be managed and cared for, for the long term to maximise their biodiversity value and achieve the objectives of ecological mitigation and compensation strategy for the site.

6.4.2 The LEMP will set out measures necessary to ensure bats and other protected species are appropriately accommodated within the operational site and any future monitoring that may be required.

6.4.3 The LEMP will also specify responsibilities for individual tasks including monitoring of habitats and species by the ECoW.

6.5 Artificial Lighting at Night

6.5.1 Given the importance of the site to roosting bats and other wildlife, external lighting has been limited and carefully designed to avoid/reduce associated impacts on protected/notable species. A sensitive lighting strategy has be designed for the site by a specialist lighting engineer (Box Twenty) with input from Clarkson an Woods Ltd to minimise, as far as possible, impacts on bats and other light sensitive species, such as invertebrates and birds, while meeting the lighting requirements of the School. The lighting strategy has followed best practice guidelines[17] wherever possible. The lighting specification is provided in Appendix E.

6.5.2 The school will be used during the daytime only; it is not residential. People will arrive at the school from approximately 06:00 (for cleaning purposes – the cleaning regime has increased due to Covid-19 so will take longer than pre-Covid conditions), with staff arriving about 07:30, and staff will leave at approximately 18:00 (very occasionally later if contractors are attending site for maintenance work). Pupils will be present between 09:30 am 15:30. External lights will only need to be in use during the early evening and mornings, and will be switched off for the majority of the night (outside of the operational hours). This will reduce impacts on bats and other wildlife using the habitats within the site for foraging and commuting.

[17]Bat Conservation Trust and Institution for Lighting Professionals Guidance Note 08/18 – Bats and Artificial Lighting https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/

6.5.3 The impacts will be most apparent during the spring and autumn months when bats are active and sunset and sunrise times coincide with times when the school will be active. However, the times the external lights will be used will be relatively minimal and the measures described below aim to avoid and reduce such impacts where possible.

Buildings

6.5.4 Night time light-spill onto bat roosts in the buildings, the bat flight paths and the surrounding habitat will be avoided through the careful positioning of external and security lighting around the buildings. A number of existing luminaires will be retained, which will be inspected to ensure they are suitable and meet the requirements for both lighting and PIR controls, otherwise they will be replaced with similar or a JCC Lighting Centurion L65 CENLH14KEM fitting (LED 4000K 12w 890 lumens). The external lights are controlled by PIR and photocell, and will be mounted above doorways to also provide emergency lighting. These lights have an integral shield over the top to prevent upward light-spill.

6.5.5 The pathway leading from the Main House building to the Willow Unit (one of the new modular buildings) will be fitted with lights (Whitecroft Lighting Broadwalk Quad BQS14K (LED 4000K 3.3w 171 lumens)) to provide safe access, which will replace existing non-functional luminaires, which are very low output and also controlled by timeclock. These lights will be recessed and due to the limited area they will be used, their low wattage and lumens, will not impact the bat roosts located within the roof structures of the buildings or the bats flight paths to and from the roosts.

6.5.6 These lights will be triggered by a motion sensor and fitted with short duration timers (ideally set to 60 seconds) to limit the extent of time they are in use. Glare from individual lights will also be reduced through the use of shields and recessed lighting.

Car park and driveway

6.5.7 All lighting will be LED lamps. Nine bollard lights (Whitecroft Lighting Kolo Bollard) will be installed along the driveway (9.1W; 687 lm; no more than 1m high), 14 'Innolumis Public Lighting - Nicole - BAT lamp 56W (2700 lm)[18]' will be installed around the perimeter of the car park mounted at a height of 4.8m, and 4 'Thorlux JUNO B SYMMETRIC 44.0W (5155 lm)' also mounted at 4.8m, will be installed around the central car park area.

6.5.8 The 4 central Thorlux luminaires will be 4000K to provide the required lighting in the centre of the car park. The 9 bollards will be 3000K, while the 14 Innolumis Public Lighting 'Bat Lamps' will be 2700K (a warm white spectrum as recommended by the guidelines to reduce blue light component, which reduce the risk of invertebrates being attracted to the lights). The Innolumis Public Lighting 'Bat Lamps' are designed to emit a monochromatic golden colour, which apparently is not on the visible spectrum to bats (based on studies undertaken in the Netherlands).

6.5.9 A horizontal illuminance lux contour plan for the car park and driveway has been prepared by Box Twenty (Figure 11). The aim was to achieve lux limits no more than 0.2lux on habitat surrounding the car park, which has been achieved for the most part although certain areas, most notably the hedgerow to the east (Hedgerow 51) and the trees along the drive and to the south of the car park, will be affected by slightly higher lux levels. The three trees along the driveway (T35 to 37) that were recorded as offering low bat roost potential appear on the lux contour plan to be affected by relatively high levels of light-

[18] Innolumis, Ariane 2, 3824 MB Amersfoort, T +31 (0)33 760 04 34, info@innolumis.com, https://www.innolumis.com/?lang=en

spill (10 lux maximum). A vertical plane lux contour plan was not available so the height at which the trees will be affected by varying lux levels is not known, although given that the bollard lamps (described further below) are no higher than 1m high and emit downwards lighting, while the adjacent column lamps are designed to avoid backwards light-spill, it is likely the lux levels affecting the surrounding trees and shrubs will be minimal. As such, light-spill onto potential bat roost sites will be minimal. An update inspection of these trees by a licensed bat ecologist will be carried out prior to any pruning required to enable emergency vehicles to access the driveway and school (this may require a climbing assessment for close inspection of potential roost features). This work will also consider lighting impacts on any roosts found. Should a roosts be identified during this work that would be affected by either pruning or lighting impacts, appropriate surveys will be carried out and a licence will be obtained subject to mitigation to ensure there is no net loss of bat roost habitat within the site.

6.5.10 It should also be noted that the vegetation has not been factored into the contour plan (Figure 11) so the extent of light-spill into non-target areas will appear greater on the plan than in reality. Although vegetation cannot be relied upon as a long term screening mechanism (as its effectiveness can change through management or failure), it will assist in controlling any remaining light-spill.

6.5.11 Landscape planting within the site will, in time (once established) provide additional cover and navigational aids for the bats to utilise within the site, although this cannot be factored into the lighting strategy as the effectiveness of vegetation cannot be guaranteed.

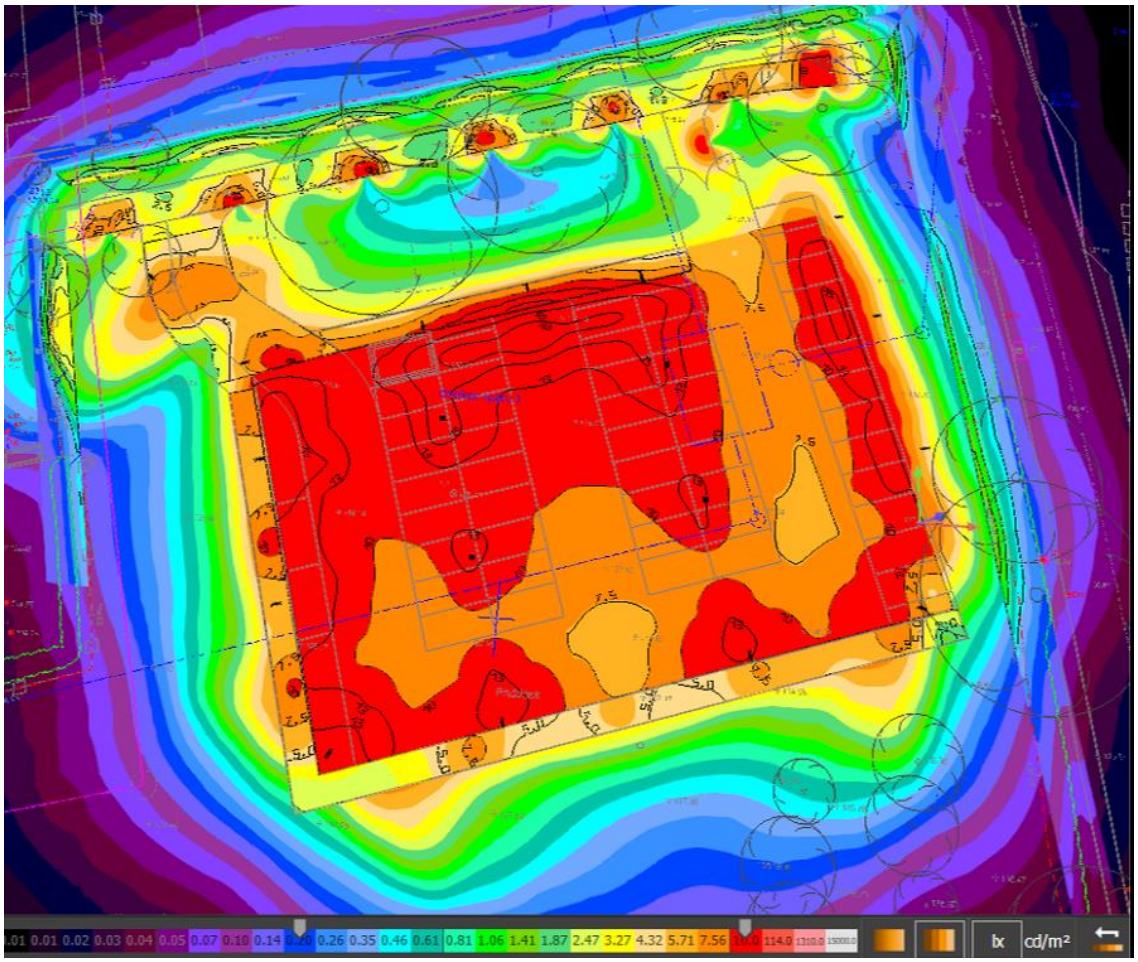


Figure 11: Image of the false colour plot of lighting around the car park and driveway (Box Twenty)

6.6 Habitats

6.6.1 The development proposals will result in the following impacts or loss, and addition of habitats within the site:

- The total grassland area within the site is approx. 1.26ha. The development proposals will result in the removal of approximately 0.29ha of the poor semi-improved grassland to facilitate the construction of the new car park, the new footpath/grass area, and the creation of the two new modular buildings and four sheds (although two of these are replacing the two field shelters so the grassland loss would equal 18m^2 in total), which amounts to approximately 0.19ha, not including 0.1ha of amenity grassland in Field 1. This means the retained grassland will equate to approximately 0.97ha in area;
- The total length of hedgerow habitat within the site is approx. 245m. The proposals will retain this hedgerow within the site, with the exception of minimal loss at the site entrance and along the northern boundary, which will be replanted. In addition, native, species-rich hedgerows with trees will be planted around the site where the existing hedgerow is gappy or missing to create a continuous linear habitat (400m of hedgerow will be planted). This will significantly improve the hedgerow network around the site and provide enhancements for associated wildlife;
- A total of 28 trees within the site will be felled as a result of the proposals. These comprise the following:
  - T2 sycamore, T11 holly, T15 laurel, T20 willow, T21 cypress, G24 cypress x 11, T43 & T44 cherries, all to be felled to enable the security fence to be installed;
  - T38 horse chestnut, T45 cherry and G50 x 4 (Scots pine, cherry and rowan); to be felled to facilitate the car park construction;
  - T26 cypress, T27 sycamore and T42 cherry; to be felled to enable drainage systems to be constructed;
  - T47 ash; to be felled due to dieback (situated along the adjacent road;
- The six mature horse chestnut trees along the avenue (T35, T36, T37, T39, T40 and T41) will require remedial tree work to facilitate post development emergency access of high vehicles (fire engine). This will comprise of crown lifting over the existing driveway to achieve a 3.5m clearance;
- Tree felling and surgery may impact on bat roosting potential associated with some of these trees, particularly the horse chestnuts along the driveway and the ash tree (T47). Pre-felling/surgery surveys will be carried out by the licensed bat ecologist, and mitigation will be provided should a roost be identified;
- In addition, 2 trees and 1 hedge (T48, T49, H51) will be subject to drainage runs within their root protection areas. The mitigation to protect these habitats is discussed in the Arboricultural Impact Assessment[12];
- Renovation and remodelling of the buildings on site as required to accommodate autistic children and staff, resulting in roof repairs and works within the roof voids where bat roosts occur;
- The perimeter of the site will be fenced using welded mesh security panels softened with native hedge planting;
- Landscaping of the perimeter of the site and land outside the high security fence (to the east) will occur to create attractive surroundings.

6.6.2 The boundary habitats (hedgerows) and trees within the site, along with the pond and remaining grassland will be retained. Although 0.29ha of grassland habitat will be lost, the remaining 0.87ha of semi-improved grassland will be sensitively managed to create a tussocky structure and increase the species diversity (NB the 0.1ha of amenity grassland will be managed as short mown lawn for the children to play on). This will allow flowering and the setting of seed to create attractive areas that also to benefit associated wildlife including invertebrates, potentially reptiles and amphibians, badgers, bats and birds. In addition to the area of grassland on the earth mound covering the soakaway and also beneath the orchard (discussed further below) in the north-west of the site will be seeded with a species-rich grassland mix appropriate to the area and conditions. These areas will also be managed to promote botanical diversity and structure. The management of the species-rich and semi-improved grassland within the site will improve the potential of this habitat to support foraging and sheltering wildlife and thus will be an improvement on the existing site conditions. As such, overall a positive impact will be achieved for grassland habitat within the site and the wildlife this habitat supports.

6.6.3 Additional planting will be undertaken along the site boundaries and within the site, including additional hedgerow planting using native, species-rich shrubs and trees. Species will include hawthorn, hazel, guelder-rose *Viburnum opulus*, spindle *Euonymus europaeus*, wayfaring tree *Viburnum lantana*, field maple *Acer campestre*, goat willow *Salix caprea* and pedunculate oak. There is currently approximately 245m of hedgerow habitat bounding site and the majority of this will be retained (two short sections, equating to approx. 50m long, by the site entrance and the northern boundary will be removed and replanted); the replacement and additional planting (of approx. 400m) will result in approx. 645m of species-rich hedgerow and tree habitat within and around the perimeter of the site (trees will be planted at approx. 20m intervals within the hedgerows; approximately 17 hedgerow trees will be planted comprising field maple, hornbeam *Carpinus betulus*, beech *Fagus sylvatica*).

6.6.4 A further 15 trees will be planted within the gardens and fields within the site, comprising 9 orchard trees (apple *Malus* sp. and plum *Prunus* sp.), and an ornamental tree (Amelanchier x grandiflora 'Robin Hill'), which attracts pollinators. In total 32 new trees will be planted within the site, which will compensate for the loss of the 28 existing trees. The new hedgerow and tree habitat will also compensate for the small loss of hedgerow, and enhance the structure of the hedgerows and diversity of habitats and species associated with the site.

6.6.5 The existing defunct hedgerows will also be enhanced through the infilling of gaps and addition of species. This will result in a significant increase in this valuable habitat within the site and will benefit a range of associated wildlife including invertebrates, birds, bats and reptiles/amphibians amongst others, and will improve the commuting potential for wildlife around the site and between the site and wider landscape. Species used for this enhancement will include those listed above.

6.6.6 As noted above, an orchard (comprising 9 trees) will be planted within the grassland habitat to the north-east of the site. This will comprise apple and plum varieties, which will provide valuable nectar and pollen resource for pollinating insects. This habitat will also enhance the site for foraging/commuting bats and foraging birds.

6.6.7 The landscaping of the gardens will include additional ornamental hedgerows (i.e. beech), rough grassland, flower beds and grassy banks, which will add to the diversity of habitats and species within the site.

6.6.8 The above measures will ensure that the existing habitat quality, diversity and structure will be retained as far as possible and augmented with new habitat types and planting appropriate to the site, which will create a more robust and connected habitat structure, with intrinsic appeal, to benefit people and wildlife alike.

Biodiversity Impact Assessment Calculator

6.6.9 In line with NPPF planning guidance, a Biodiversity Impact Assessment (BIA) Score has been calculated for the site using the Warwickshire, Coventry and Solihull (WCS) Biodiversity Impact Assessment Calculator (v19.1). This metric has been used to calculate the biodiversity values of habitat within the application site both before and after development, and was used as a proxy measure to determine if the development is likely to result in an on-site habitat biodiversity net loss or gain. This biodiversity calculator adheres to the DEFRA scores and is considered to be a suitable tool to calculate the on-site habitat biodiversity net loss or gain. The DEFRA metric is currently a beta-test version; whereas the WCS calculator is a tried and tested method, previously subject to extensive pilot studies and testing, which has now been rolled out for use by all LPAs within Warwickshire, Coventry and Solihull for minor and major applications.

6.6.10 The Biodiversity Impact score is -0.16 for Habitat Biodiversity and +4.13 for Hedgerow Biodiversity. Although this indicates there will be a minor loss of Habitat Biodiversity, there will be a significant gain for Hedgerow Biodiversity and it is highly likely that the scheme will deliver an overall positive impact and net gain for biodiversity.

6.6.11 The completed BIA Summary Sheet is provided in Appendix F. This BIA reflects what will be included within the Construction Environmental Management Plan (CEMP) and Landscape and Ecological Management Plan (LEMP).

6.7 Protected Species and Species of Conservation Concern

Badgers

6.7.1 Given that badger latrines were recorded within the fields along with mammal paths and snuffle holes, but no badger setts were recorded, the site is likely to comprise part of the foraging territory of a nearby social group. The habitats currently offer good foraging resources for badgers; the short grassland would allow badgers to forage for earthworms and grubs and the trees and hedgerows are likely to provide seasonal fruit and berries. The majority of the suitable foraging habitat on site will be retained, and the additional planting of species-rich hedgerows, trees and the orchard, will ensure there is no loss of foraging opportunities for badgers (there is likely to be an enhancement). As such the development is likely to result in positive impact on foraging badgers.

6.7.2 However, half of the site will be fenced with welded mesh security panels (around the buildings and lawns to the west of the site), which could exclude badgers from foraging within that area site. The eastern half of the site will still be available to badgers and it is likely that they will gain access under fencing to the western half so the fencing is unlikely to exclude them for long.

6.7.3 As badgers may dig new holes and create new setts in a short space of time, an update walkover survey will be conducted at least one month prior to construction commencing, to ensure that no badger setts have been excavated that may be affected by the proposed development.

6.7.4 Although no active setts are anticipated to be directly affected by construction of the scheme, the following precautionary measures will be adopted during the construction phase to prevent harming badgers:

- Hazardous substances and materials should be stored in locked compounds;
- Any trenches or excavations over 1m in depth should be covered overnight to prevent badgers (and other mammals) from becoming trapped. Alternatively, a scaffold plank or similar will be used to create a ramp, and left at a shallow angle in the excavation overnight to provide any animal a means of escape;
- Any temporarily exposed open pipe system larger than 100mm in diameter should be capped overnight to prevent badgers gaining access when contractors are off-site.

Bats

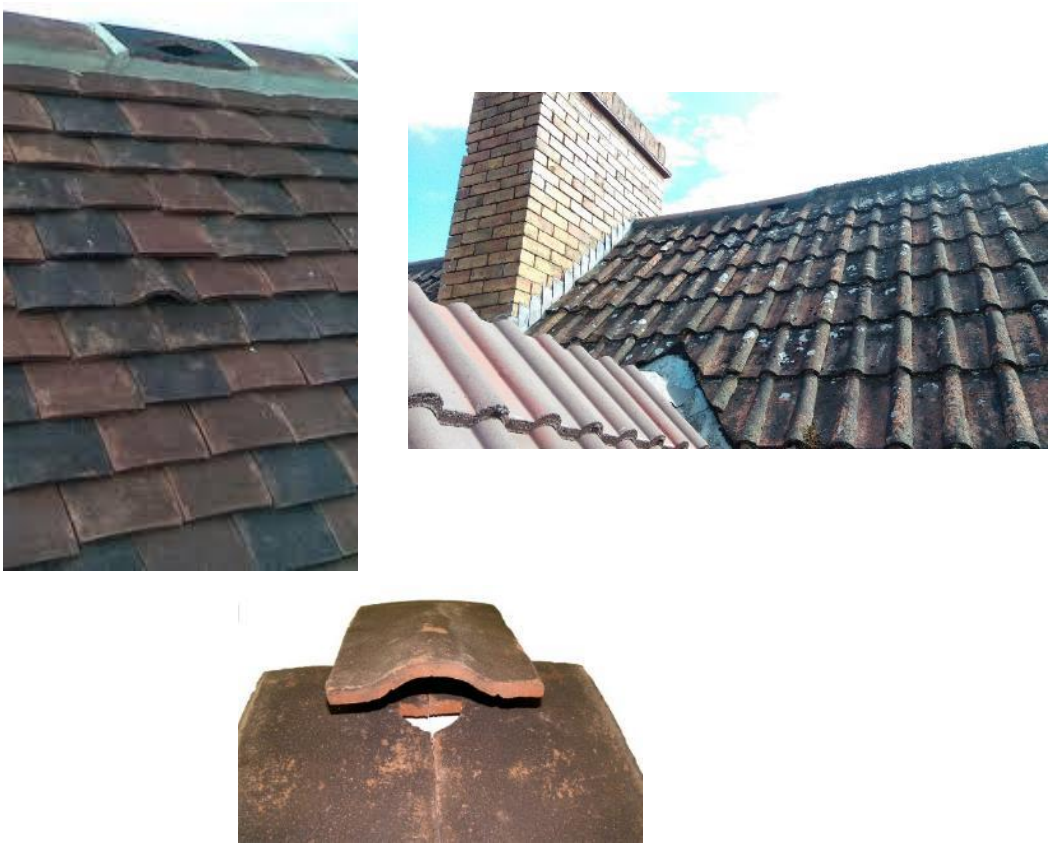
6.7.5 The bat surveys have confirmed the presence of bat roosts in all of the buildings on site. In summary, the Main House was found to support common pipistrelle day roosts used by 4 to 5 bats, and brown long eared bat roosts, likely to be a small maternity roost. The Cottage was found to be used by roosting common pipistrelle bats although only one bat was recorded using the roost during the surveys. The Barn is used by brown long-eared bats and also a single soprano pipistrelle bat. The Stables was found to be used by a single common pipistrelle bat.

6.7.6 Bats are European Protected Species and, as such, the presence of bat roosts within the buildings means that a full Mitigation Licence from Natural England will be required if the roosts or bats using the roosts will be affected by the renovation works. The licence can only be applied for once the planning permission is in place and any conditions relating to wildlife that can and are intended to be discharged prior to commencement of construction, have been discharged. Mitigation measures will be a requirement of the licence. Once the licence application is submitted, Natural England can take a minimum of 6 weeks to determine it and issue the licence.

6.7.7 Specific mitigation measures necessary to minimise the impacts of the development upon bats and to safeguard the confirmed bat roosts are detailed below:

- Necessary works that may impact the roosts should be completed outside of the bat hibernation season (November-March inclusive), and, as a maternity roost is present in the Main House, works impacting this roost should also avoid the maternity season (the maternity season typically runs between May to August inclusive).
- All bat roosts known to be present within the buildings will be retained and reinstated during the renovation works.
- Contractors will be briefed on the potential to encounter bats and advised on the correct procedure that should be followed if bats are encountered during any part of the works. This will be in the form of a tool-box talk provided by an appropriately qualified and licensed Ecological Clerk of Works (ECoW; who holds a Level 2 bat licence) prior to works commencing on site. The tool-box talk will cover bat ecology, where they may be found within the buildings, the need for a pre-works inspection by the ECoW, timing of works, soft-stripping procedure, what to do if a bat is found in the absence of the ECoW and health and safety relating to bats.
- Existing access/egress points to the roosts will be preserved where this is possible. Where this is not possible, this will be mitigated for by the creation of new access points into the roost in appropriate

locations. Ridge tile access can be created either by purchasing a pre made clay tile with an opening for bats (Photograph 4 below refers), alternatively a gap in the mortar under the ridge tile can provide access. The access points for pipistrelle bats will be 25mm wide by 25-30mm long in size and will lead to a small void under the ridge tiles, which should connect to crawl spaces under the tiles below and adjacent to the access. Bat access tiles can also be used to replace roost access points on the roof pitch or can be created using Code 6 lead, as shown in Appendix G (Morris Bat Slate).



Photograph 4: Examples of a bat ridge tile and bat access tile for clay tiles

- The common pipistrelle peg hole roost in the western elevation of the Main House will be retained as it is, i.e. remain unaffected by the proposals. Should this change, the roost will be replaced by a crevice roost feature in the roof structure or eaves close to the peg hole.
- The brown long-eared bat roost access points will need to link directly into the roof voids. The locations of some of these access points are known (particularly around Roof Voids 1 & 2, and the Barn). When the roofs of these buildings are repaired, a careful inspection of the roofs will be made by the ECoW to search for possible/likely access points and these will be reinstated during the renovation works. In addition when tiles are removed, the ECoW and contractors will search for droppings indicating an access point and these will also be recorded on a plan and access provided at these locations. The brown long-eared access points will measure between 25-30mm wide and 50mm long depending on where it is to be located and the materials to be used. The ECoW will advise on the exact dimensions required for each access point to be provided.
- Mitigation measures will include supervision of the early stages of works to the roofs by the ECoW, to ensure that these works are completed sensitively, and to reduce the risk of killing or injury to any

bats present. This will include a pre-works inspection of the roost area by the ECoW prior to the commencement of any works that may impact a roost.

- Necessary works to the roost areas will be undertaken using a careful soft-strip approach (lifting materials rather than sliding) to minimise risk of injury or death to bats roosting beneath tiles or other roof materials.
- Regular inspections of the bat roost within the roof voids will be conducted by ECoW throughout the duration of works impacting the roof structures/voids, to monitor the use of the roost by bats, and ensure that the works are being completed sensitively and in accordance with the bat licence.
- Only Type 1F bitumen felt[19] will be used or timber sarking (whichever is most appropriate for the building) in the roof structure. Breathable Roof Membrane (BRM) **will not** be used as this is known to be harmful to bats (they can create a fluff on the surface of BRM and become entangle in it and die as a result). The same or similar roof tiles will be used during the repairs.
- Six bat boxes (Schwegler 2F double front panel and 2FN or similar) will be installed on trees within the grounds to be used (if required) to accommodate any bats found during works on the roof structures. These will be permeant features and eventually provide roosting enhancements within the site. It should be noted that common pipistrelle bats do not often use bat boxes. As such, to ensure this species always has roosts available to them during the renovation works, only one or two buildings at a time will be affected (the Stables building will not be subject to any roof works so this building will be available to displaced common pipistrelle bats). Roosts in each building will be retained and reinstated prior to another building being affected.
- The window between the loft room on the first floor and the northern end of Roof Void 2 in the Main House (Photograph 5 below) will be covered over using ply board or similar. This will ensure that light and noise from the adjacent room does not impact on the bat roost (brown long-eared maternity roost) in Roof Void 2.

Photograph 5: Window looking into the brown long-eared maternity roost – to be covered over as part of the renovation proposals

[19] Type 1f bitumen felt is the only roofing felt approved by Natural England for use in bat roosts.

Bats and Trees

6.7.8 Trees to be felled or subject to limb removal will first be inspected by a licensed bat ecologist to look for potential and evidence of roosting bats. Where necessary a climbing inspection will be carried out to investigate potential roost features in more detail using a video-fibrescope. This inspection will be carried out at least two months prior to works commencing so that additional survey work can be carried out or a licensing can be obtained, subject to mitigation, should a roost be identified. Mitigation would most likely include careful timing of works to avoid hibernation and maternity periods, provision of suitable bat boxes for the species and type of roost affected and overseeing of the works by the ECoW.

Bats and Lighting

6.7.9 As discussed in section 6.5 above, best practice measures to minimise light pollution have been adopted to prevent the exclusion of light-sensitive species from the site. External lighting within the development will adhere to overarching principles beyond that which is necessary to minimise the potential impact of artificial lighting on bats roosting within the site and also those using the surrounding area. These principles include the following[20]:

- Column height has been carefully considered to ensure minimal light-spill is achieved.
- A warm white spectrum (<2700 Kelvin) has been specified where possible as this will reduce impacts of blue light upon wildlife.
- LED lamps have been specified.
- External lighting on the buildings will be set on motion-sensors and/or timers to decrease the light pollution impacts.
- External lighting has been designed so it is located away from the known roost locations (and includes shields where necessary), and is of the lowest intensity/brightness necessary for their purpose.
- External lighting will be turned off outside of operational hours (likely to be between 18:00 and 06:00).

6.7.10 These lighting principles also protect other wildlife from the impacts of night time lighting, including invertebrates, song birds, amphibians and reptiles, and potentially hedgehogs.

Amphibians

6.7.11 Great crested newts are not present within the site although other amphibians such as common toad are likely to be present. The modular buildings will be located in the meadow grassland habitat, which are may be used by amphibians in their terrestrial phase. The remaining grassland and buffer habitat around the site will provide cover and foraging opportunities for amphibians and connect into other retained habitats within and directly adjacent to the site, such as the grassland, hedgerows and pond buffer. The car park and paths will result in the loss of more valuable grassland as it is rough/tussocky in structure and managed as hay meadow. The remaining grassland to the immediate south of the pond is currently fairly short in height but relatively rough in structure and is likely to offer moderate terrestrial habitat for amphibians. There is no hedgerow to the south and south-west of the pond (at the site boundary), which somewhat diminishes connectivity around the site for amphibians, although the tree

[20] Taken from: Bat Conservation Trust & The Institute of Lighting Professionals, Guidance Note 08/18: Bats and artificial lighting in the UK; https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/

and scrub habitat around the pond will provide good shelter and be used when amphibians move between the pond and wider landscape.

6.7.12 The negative impacts on amphibians as a result of the proposals can further be reduced through the creation of good habitat structure through mitigation planting and habitat management/creation. Measures to protect amphibians during site preparation and construction will also be adopted. These measures will include the following:

- Management of the retained grassland to the east and within the buffers around the site (including around the pond) to create rough/tussocky structure, which is species-diverse (attracting more invertebrate prey items for newts and providing good cover and shelter for them);
- Temporary compounds within the site, which are small in size, will be located as far away from the pond as possible. If they are located within grassland areas, the areas affected will be subject to fingertip searches for amphibians (and other wildlife) by a suitably experienced and licensed ecologist prior to commencement of work. This will be followed by a destructive search in the presence of the ecologist. These areas will be restored to rough/tussocky grassland following completion of construction;
- No chemicals or other toxic materials will be stored within 50m of the pond and the CEMP will include measures to ensure the pond and amphibian habitat is protected from harm during construction;
- The creation of ecological buffers around the perimeter of the formal gardens, comprising rough/tussocky grassland and scrub patches, to ensure connectivity around the site for newts and other wildlife;
- The planting of native scrub patches within the grassland to provide shelter and foraging areas for amphibians;
- The planting of new hedgerow around the perimeter of the site and the planting up of existing hedgerows with native species to create robust linear features for amphibians to use (improving connectivity around the site and wider landscape);
- The creation of 2 habitat log piles and 2 hibernacula within the grassland, near to the pond, to enhance shelter and overwintering habitat for amphibians;
- Control of night time light pollution onto the pond and terrestrial habitat.

Reptiles

6.7.13 The site as a whole offers suitable habitat for reptiles particularly Fields 3 and 4, which are more rank/tussocky and may provide greater foraging and shelter opportunities for reptiles (a likely grass snake was recorded within Field 4 in July 2019). The pond may also provide foraging habitat for grass snake, which predates amphibians (and fish if present). The presence of reptiles on site also cannot be ruled out given the potentially suitable habitat within the Dickens Heath Marsh LWS to the north and on site.

6.7.14 The relatively limited extent of habitat proposed for removal includes the grassland under the modular buildings, and the meadow where the car park and new footpath will be constructed, which are mostly affected by shading from trees along the eastern boundary of the site making it less suitable for reptiles. As such, the risk of harming reptiles is reduced although precautionary measures will be used to further minimise the risk of injuring/killing reptiles during site preparation and construction. These will include the following:

- Areas to be affected will be clearly marked out and the grassland within those areas will be cut short (over several stages if necessary) and arisings will be removed. This will encourage reptiles to move out of these areas of their own accord;
- A fingertip search of the grassland by an experienced ecologist will be carried out prior to works commencing. Any reptiles found will be captured and immediately released into safe and suitable habitat within the site boundary;
- Following completion of a fingertip search a destructive search will be undertaken using a machine and toothed bucket under an ecological watching brief (Ecological Clerk of Works). The ecologist will search for reptiles (and other wildlife) while the top layers of grass are carefully stripped (approx. 50mm at a time) until a depth of approx. 100 to 150mm is reached (at the discretion of the ecologist), which will depend on the ground conditions;
- Provision of 2 hibernacula and 2 habitat log piles in suitable locations (reptile habitat) around the site. These can be the same as those created for amphibians.

6.7.15 These measures will be detailed in the CEMP: Biodiversity along with personnel responsible for each task.

Birds

6.7.16 The site contains suitable nesting habitat for birds within the buildings, trees, hedgerows and shrubs within the grounds. Nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended). Any building works or vegetation clearance affecting nesting habitat should be timed to occur outside the bird nesting season (usually March to August but seasonally variable). If this is not possible, a suitably experienced ecologist will be required to check the vegetation for active nests first. This check would identify individual nests and life stages of the occupants (eggs, chicks or fledglings). Any active nests found would need to be protected until eggs have hatched and young fledged. This would be ensured through the creation of at least a 5m buffer zone (exact distance to be agreed with the ECoW and will depend on the bird species affected) free of any building works or vegetation clearance. Until the young have fledged, the nest should be subjected to regular monitoring to ensure that a second brood is not raised once the first brood has fledged.

6.7.17 As bird nesting material was found within the Stables building, it is recommended that this building is also checked for nesting birds prior to internal refurbishment, if demolition will occur within the bird nesting season (usually March to August inclusive but seasonally variable).

6.7.18 Replacement nesting sites will be provided for any nesting sites affected by the proposed works. These will comprise artificial nest boxes (made by Schwegler) for species such as robin, blackbird and house sparrow, attached to buildings and trees within the site. These will be installed prior to works affecting nesting habitat commencing and will be permanent features within the site and their maintenance will be included within the LEMP.

Invertebrates

6.7.19 The existing habitats will be retained for the most part (some grassland habitat will be lost) and managed sensitively to maintain their value to invertebrates, i.e. providing good structure, allowing vegetation to flower and fruit, thus providing foraging and breeding opportunities. New native, species-rich hedgerows and trees will be planted and the grassland within Fields 3 and 4 will be managed as hay meadows, thus maintaining and enhancing habitat to support invertebrates. Areas of new landscaping will use a mix of locally appropriate, native species, or species of value to wildlife. Flowering plants such

as the following will be included in the landscaping to provide valuable foraging resources for bumble and honey bees: lavender *Lavandula angustifolia*, native honeysuckle *Lonicera periclymenum* and native ivy *Hedera helix*.

Other Protected Species, Species of Conservation Concern and Invasive Species

6.7.20 Habitat for hedgehogs (a Species of Principal Importance) was recorded on site during the survey; however, the impacts on these habitats as a result of the development are expected to be minimal, and consequently no specific mitigation for hedgehogs is considered necessary. If hedgehogs are found during the construction phase of the development (for example, during site clearance), the ECoW will provide advice as necessary. A minimum of ten gaps (100mm x 70mm in size) under the perimeter fencing will be created around the site to ensure hedgehogs can continue to access the site if they are present in the area.

6.8 Ecological Enhancements

6.8.1 The revised National Planning Policy Framework[21] (NPPF), issued in February 2019, states that the planning system should "promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity".

6.8.2 Enhancements for biodiversity, such as the following, are additional to specific mitigation measures mentioned above and are not expressly required. Any adopted enhancements would however, make a positive, permanent contribution to local biodiversity.

6.8.3 Many of the landscaping proposals will also provide significant ecological enhancements within the site, such as the planting of species-rich hedgerows and trees within and around the site boundary, enhancing existing hedgerows, and the creation of a new orchard. Opportunities for additional ecological enhancements are listed below:

- Planting of the drainage swale and basin with wetland/bog loving flora to provide habitat for invertebrates and amphibians;
- Provision of additional bird and bat boxes within the site (3 of each and of Schwegler design if possible due to their proven success and durability);
- Provision of 3 insect boxes to accommodate solitary bees, bugs and other invertebrates;
- The 5m and 10m wide buffers around the perimeter of the gardens and buildings should be maintained as rough grassland and scrub to create a robust wildlife corridor around the site, linking into the grassland meadows and pond habitat;
- Creation of an additional 1 habitat log pile near to the pond and hedgerows for amphibians, reptiles and invertebrates to use; and
- Creation of an additional 1 hibernaculum (one near the pond and the other along the northern hedgerow in Field 4) as overwintering habitat for reptiles and amphibians.

[21] DCLG (2012) revised 19 February 2019. National *Planning Policy Framework*. www.communities.gov.uk

6.9 Summary of Recommended Further Work

6.9.1 Below is a summary of the recommended further work which should be carried out prior to works commencing on site.

Task, Habitats or Species	Scope of work	Timescale
Ecological Clerk of Works (ECoW)	An ECoW will need to be appointed to ensure the protected and notable species on site, and their habitats, are protected and the mitigation strategy detailed in this report is implemented in full	Prior to commencement of works on site
Construction Management Plan (CEMP: Biodiversity)	A CEMP: Biodiversity will be prepared to cover all aspects of habitat protection	Prior to commencement of works on site
Landscape and Ecological Management Plan (LEMP)	Preparation of a Landscape and Ecological Management Plan (LEMP)	Prior to commencement of works on site
Wildlife corridor	Installation of a 5m and 10m wide buffer between the development/landscaping and boundary hedgerows (as specified) to create a wildlife corridor and buffer between development and adjacent LWS	Prior to commencement of works on site
Trees	Any trees to be removed or managed as a result of the proposals should first be inspected by the ECoW for bat roost potential and also nesting birds (if carried out between March and August)	Prior to trees being affected by works
Retained trees and hedgerows	Protection of retained habitat using Heras fencing or similar to BS5837:2012; creation of a 5m wide (min) buffer for hedgerows (10m along the northern boundary between the site and LWS); Hedgerows - plant up with a mix of native, woody species of local provenance where possible	Prior to commencement of works on site During the first planting season
Badgers	A walkover of the site by the ECoW to check for any new setts that may have been constructed since the survey was undertaken	No more than one month prior to the commencement of ground works
Bats	A bat licence will be required prior to works affecting the buildings. A further site inspection will be necessary immediately prior to the application being submitted (as 3 months will have elapsed since the surveys were completed). The licence can only be obtained once full planning permission is in place and all conditions relating to wildlife have been discharged (i.e. those that can be and are intended to be discharged). Once licence is obtained works affecting bat roosts will be preceded by inspections by a licensed ECoW and specific	Update site walkover required prior to licence submission. Apply for bat licence on receipt of planning permission. Licenced work to take place between September and

Task, Habitats or Species	Scope of work	Timescale
	methodologies will be required as in accordance with the mitigation strategy	October or March and April to avoid the winter hibernation and summer maternity periods
Reptiles	The CEMP: Biodiversity will provide details on reptile mitigation, which will include a destructive search of the grassland to be lost (i.e. in the locations of the modular building, car park and footpaths) to first make these areas unsuitable for reptiles, then search for them carefully during the removal of grassland habitat. Any reptiles found will be captured by the ECoW and immediately released into adjacent safe habitat away from the affected area (and next to habitat log piles/hibernacula created within the site)	Reptile mitigation to be undertaken between the months of April to September only (when reptiles are active). Creation of 3 x habitat log piles and 3 x hibernacula at the earliest opportunity on site to allow establishment prior to works affecting reptiles commencing
Birds	If any vegetation and/or buildings are to be directly affected by construction activities (including site clearance) during the months of March to August inclusive, a check of suitable habitat for nesting birds prior to site activity in that area must be carried out by the ECoW	Nesting bird checks should take place no more than 48hrs prior to works affecting nesting habitat commencing. March to August

7 CONCLUSIONS

7.1.1 The proposed development will result in **adverse impacts** upon a number of ecological receptors ranging from **Site** to **Local** importance. Avoidance and mitigation measures have been proposed to ensure that these adverse impacts are reduced as far as possible. The scheme can be considered to offer a net gain in site biodiversity retaining habitats of ecological value, limiting adverse impacts on surrounding habitats and creating new ecological valuable habitats.

7.1.2 Mitigation measures include the appointment of an Ecological Clerk of Works to ensure the mitigation strategy is fulfilled, protection of bats and their roosts during repairs to buildings, pre-commencement checks of buildings and vegetation for active bird nests to ensure they are protected from damage, and the careful removal of potential reptile habitat, amongst others. This will be secured through the production and implementation of a CEMP: Biodiversity and LEMP, and a bat mitigation licence, along with planning conditions as appropriate.

7.1.3 Overall, although some grassland habitat and 28 trees will be lost, the development has the potential to provide ecological benefits within the site through the planting of native hedgerows and trees, the creation of new reptiles and amphibian hibernacula and log piles, a new orchard, swale and wildlife buffers around the site. The bat mitigation strategy will also result in additional roost habitat for bats, along with enhanced foraging and commuting habitat within the site boundary, while ensuring the site remains unlit for the most part. The sensitive lighting strategy will also ensure associated impacts are minimised.

7.1.4 Assuming the successful implementation of the measures described above the proposed development can be considered in line with planning policy 10 of the Solihull Local Plan.

APPENDIX A: WILDLIFE LEGISLATION & SPECIES INFORMATION

BADGERS

Badgers and their setts are protected under the Protection of Badgers Act 1992 (as amended) against damage or destruction of a sett, or disturbance, death or injury to the badgers. The Act defines a sett as "any structure or place which displays signs indicating current use by a badger". The definition of current use is subject to considerable debate. Natural England have produced guidance on the definition of current use. (*Badgers and Development – A guide to best practice and development. Natural England 2011*). Given the ambiguity surrounding the definition in all circumstances we would recommend an assessment of current use is always undertaken by a qualified ecologist. Natural Resources Wales (NRW) have a slightly different definition of current use. Please see the NRW website for further information. Penalties for offences against badgers or their setts include fines of up to £5,000 and/or up to six months in prison.

Disturbance of badgers could be caused by any digging activity or scrub clearance within 30 metres of an occupied sett and therefore every case needs to be assessed individually. Felling of trees close to a badger sett may also cause disturbance in some situations. Some activities such as pile driving may cause disturbance at even greater distances, and should be discussed with Natural England or NRW.

Licences are issued by Natural England (or NRW in Wales) to allow the disturbance of badgers, and the destruction of their setts in certain circumstances, in relation to development. Full planning permission must be obtained before a licence application will be considered. Although licences can be applied for at any time of year, disturbance of badgers or exclusion of badgers from a sett can only take place between 1 July and 30 November, to avoid the breeding season when dependant young may be underground. This restriction may be relaxed in some cases where a sett is seasonal and badgers can be shown to be absent from a sett at that time of year.

BATS

All 17 species of bat known to breed in England and Wales, and their roost sites, are protected under the Conservation of Habitats and Species Regulations 2017, known as the 'Habitats Regulations'. This makes it an offence to deliberately kill or injure a bat, or to deliberately disturb a bat such that its ability to hibernate, breed or rear young, or such that the species' distribution, were significantly affected. It is also an offence to damage or destroy any breeding site or resting place. Intentional or reckless disturbance of bats in their resting places, and damage to or obstruction of resting places are also offences under the Wildlife and Countryside Act 1981 (as amended). Under UK law a bat roost is "any structure or place which any wild [bat]...uses for shelter or protection". As bats tend to reuse the same roosts, legal opinion is that the roost is protected whether or not the bats are present at the time. Penalties for offences against bats or their roosts include fines of up to £5,000 and/or up to six months in prison.

As a result, development works which are likely to involve the loss of or alteration to roost sites, or which could result in killing of or injury to bats, need to take place under licence. Works which could disturb bats may also be licensable, though this needs to be assessed on a case by case basis, as bats' sensitivity to disturbance varies depending on normal background levels, and the definition of disturbance offences under the Habitats Regulations is complex. In practice this means that works involving modification or loss of roosts (typically in buildings, trees or underground sites) or significant disturbance to bats in roosts are likely to be licensable.

Licences can be obtained from Natural England or the Welsh Government to permit works that would otherwise be illegal, provided it can be demonstrated that the proposed works are needed to protect public health or safety, or for other reasons of overriding public interest including social and economic reasons. It is also necessary to demonstrate that there is no satisfactory alternative to the proposed works, and that the conservation status of bats in the area will be maintained. Appropriate mitigation and post-construction monitoring are therefore a requirement of all licences.

DORMICE

Dormice and their nests are protected in England and Wales under the Conservation of Habitats and Species Regulations 2017, known as the 'Habitats Regulations'. This makes it an offence to deliberately kill or injure a dormouse, or to deliberately disturb a dormouse such that its ability to hibernate, breed or rear young, or such that the species' distribution, were significantly affected. It is also an offence to damage or destroy any breeding site or resting place. Intentional or reckless disturbance of dormice in their nests, and damage to or obstruction of nests are also offences under the Wildlife and Countryside Act 1981 (as amended). Penalties for offences against dormice or their nests include fines of up to £5,000 and/or up to six months in prison.

As a result, development works which are likely to involve the loss of nest sites, or which could result in killing of or injury to dormice, need to take place under licence. Works which could disturb dormice may also be licensable, though this is rarely the case unless loss of dormouse habitat is also proposed, and should be assessed on a case by case basis. In practice this

means that works involving any removal of habitat (typically woodland, hedgerows, and scrub) supporting dormice are likely to be licensable.

Licences can be obtained from Natural England or the Welsh Government to permit works that would otherwise be illegal, provided it can be demonstrated that the proposed works are needed to protect public health or safety, or for other reasons of overriding public interest including social and economic reasons. It is also necessary to demonstrate that there is no satisfactory alternative to the proposed works, and that the conservation status of dormice in the area will be maintained. Appropriate mitigation and post-construction monitoring are therefore a requirement of all licences.

AMPHIBIANS

Great Britain supports seven native amphibian species. The four most widespread species; smooth and palmate newts, common frog, and common toad, receive partial protection under the Wildlife and Countryside Act 1981 (as amended) which prohibits sale, barter, exchange, transporting for sale and advertising to sell or to buy. The great crested newt, pool frog and natterjack toad are also fully protected in England and Wales under the Conservation of Habitats and Species Regulations 2017. Penalties for offences against amphibian species include fines of up to £5,000 and/or up to six months in prison.

Four amphibian species (great crested newt, pool frog, common toad, natterjack toad) are listed as priority species under the UK Biodiversity Action Plan, and are therefore considered to be Species of Principal Importance in England and Wales (excluding the pool frog, which does not occur in Wales) under the Natural Environment and Rural Communities (NERC) Act 2006. All public bodies including local and regional authorities have a duty under this legislation to have regard for the conservation of biodiversity.

GREAT CRESTED NEWTS

Great crested newts are protected in England and Wales under the Conservation of Habitats and Species Regulations 2017, known as the 'Habitats Regulations'. This makes it an offence to deliberately kill or injure a great crested newt, or to deliberately disturb a great crested newt such that its ability to hibernate, breed or rear young, or such that the species' distribution, were significantly affected. It is also an offence to damage or destroy any breeding site or resting place for great crested newts. Intentional or reckless disturbance of great crested newts in places of shelter (ponds or terrestrial refuges), and damage to or obstruction of places of shelter are also offences under the Wildlife and Countryside Act 1981 (as amended). Penalties for offences against great crested newts include fines of up to £5,000 and/or up to six months in prison.

As a result, development works which are likely to involve the loss of ponds or terrestrial habitat, or which could result in killing of or injury to great crested newts, need to take place under licence. Works which could disturb great crested newts may also be licensable, though this is rarely the case unless loss of great crested newt habitat is also proposed, and should be assessed on a case by case basis. In practice this means that works involving any removal of or significant modification to ponds or terrestrial habitats (typically rough grassland, scrub, hedgerow bases and woodland) supporting great crested newts are likely to be licensable.

Licences can be obtained from Natural England or the Welsh Government to permit works that would otherwise be illegal, provided it can be demonstrated that the proposed works are needed to protect public health or safety, or for other reasons of overriding public interest including social and economic reasons. It is also necessary to demonstrate that there is no satisfactory alternative to the proposed works, and that the conservation status of great crested newts in the area will be maintained. Appropriate mitigation and post-construction monitoring are therefore a requirement of all licences.

REPTILES

All six native reptile species receive protection under the Wildlife and Countryside Act 1981 (as amended). The four more common species (common lizard *Zootoca vivipara*, slow-worm *Anguis fragilis*, adder *Vipera berus* and grass snake *Natrix helvetica*) receive partial protection which makes it an offence to intentionally kill or injure a reptile. The two other reptile species (smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis*), both of which are rare with very restricted UK ranges receive full protection under the Conservation of Habitats and Species Regulations 2017. Penalties for offences against reptile species include fines of up to £5,000 and/or up to six months in prison.

Works such as site clearance or topsoil stripping which could result in killing or injury of reptiles could be considered result in an offence unless measures are taken to minimise the risk of this occurring. Any inadvertent impacts on common reptile species despite these mitigation measures being in place would be considered an 'incidental result of an otherwise lawful operation' which 'could not reasonably have been avoided' and therefore not an offence. Works which could affect smooth snakes or sand lizards, or their habitats, would need to take place under licence from Natural England or Natural Resources Wales. However sites supporting smooth snakes or sand lizards are very rarely affected by development proposals.

In practice, mitigation for impacts of development on common reptiles generally comprise one or more of the following techniques: displacement, in which reptiles are encouraged to move to suitable retained habitat by changing the management of areas affected by development; exclusion, where reptile-resistant fencing is provided between a development site and suitable retained habitat allowing reptiles to be trapped from the development footprint and released

elsewhere on the site; and translocation, where animals are trapped from a development site and released on another suitable site nearby. Reptile mitigation proposals, particularly those involving translocation of animals, should be agreed in advance with the local planning authority.

BIRDS

All British birds, their nests and eggs (with certain exceptions) are protected under the Wildlife & Countryside Act 1981 (as amended) which makes it an offence to: intentionally kill, injure or take a wild bird; intentionally take, damage or destroy nests which are in use or being built; intentionally take or destroy birds' eggs; or possess live or dead wild birds or eggs. A number of species receive additional protection through inclusion on Schedule 1 of the Wildlife and Countryside Act; for these it is also an offence to intentionally or recklessly disturb birds while nest building, or at a nest containing eggs or young, or to disturb the dependant young of such a bird. Penalties for offences against bird species include fines of up to £5,000 and/or up to six months in prison.

General licences for control of some bird species are issued by Natural England and Natural Resources Wales in order to prevent damage or disease, or to preserve public health or public safety, but it is not possible to obtain a licence for control of birds or removal of eggs/nests for development purposes. Consequently if nesting birds are present on a development site when works are programmed to start it is usually necessary to delay works, at least in the areas supporting nests, until any chicks have fledged and left the nest. It is usually possible, once chicks have hatched, for an experienced ecologist to predict approximately when they are likely to fledge, in order to inform programming of works on site.

The British Trust for Ornithology publishes a list of Birds of Conservation Concern (or the UK Red List for Birds). This list is based on current population trends and historic data and sets out those birds considered "red Listed", "Amber Listed" and "Green Listed" depending on current population levels and present/past trends. Several Birds of Conservation Concern are protected through inclusion on Schedule 1 of the Wildlife and Countryside Act and others are UKBAP species (see below) and so are material considerations in the planning process. Although there is no specific legislation covering the remaining species, the list is nonetheless a useful evaluation tool.

PLANNING POLICY IN RELATION TO BIODIVERSITY - ENGLAND

The revised National Planning Policy Framework (NPPF), issued in July 2018, updates the policies set out under the original NPPF (issued in 2012), which superseded Planning Policy Statement 9: Biodiversity and Geological Conservation (August 2005). Additional guidance can be found online at http://planningguidance.planningportal.gov.uk/blog/guidance/. Further guidance is also available within the Government Circular ODPM 06/2005 on Biodiversity and Geological conservation.. The NPPF simplifies and collates a number of previous planning documents and outlines the government's objective towards biodiversity.

The NPPF identifies ways in which the planning system should contribute to and enhance the natural and local environment (Paragraph 170), including:

- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
- recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
- minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

It also emphasises the importance of conserving biodiversity and areas covered by landscape designations (Paragraph 174):

Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads.

When determining planning applications, the NPPF states that local planning authorities should aim to conserve and enhance biodiversity (Paragraph 175) by applying principles including:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. The only exception is where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;
- development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and
- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

ECOLOGICAL ENHANCEMENTS

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

In England, the National Planning Policy Framework (NPPF), issued in July 2018, states that the planning system should contribute to and enhance the natural and local environment by "*minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*". It also states that "*opportunities to incorporate biodiversity in and around developments should be encouraged*".

In Wales, Technical Advice Note 5 on Nature Conservation and Planning (2009) states that the planning system should "look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally", and that when making planning decisions, local authorities should "promote the conservation and enhancement of statutorily designated areas and undeveloped coast" and "adopt a step-wise approach to avoid harm to nature conservation, minimise unavoidable harm by mitigation measures, offset residual harm by compensation measures and look for new opportunities to enhance nature conservation".

APPENDIX B: ECOLOGICAL EVALUATION CRITERIA

It is important to appreciate that the level of protection given to a particular species or habitat through national or international legislation does not necessarily relate to the evaluated level of importance of that receptor to nature conservation. Whilst species may be widespread or common nationally, but of scarce occurrence in a particular county (for example, it might be at the limit of its geographical range), a species may also be considered to be rare nationally or internationally but be abundant within particular areas.

The Ratcliffe Criteria (Ratcliffe, 1977) provide a long established and widely accepted method of determining the nature conservation value of a particular site and have been used to aid the evaluation of the habitats associated with the Scheme. The attributes of the Ratcliffe Criteria are described below.

Ratcliffe Criteria for Nature Conservation Evaluation	
Criteria	**Description**
Size	Large, continuous areas of habitat are considered to be of greater importance than small or fragmented areas.
Diversity	Species and habitat diversity, including variations in topography and wetness, increase the wildlife value.
Naturalness	This reflects man's intervention or management of the habitat. Most habitats of this survey are semi-natural. Naturalness indicates the amount of modification of the land by man. Generally a less modified area results in an increase in the nature conservation value.
Rarity	The scarceness of a habitat, and the presence of rare/uncommon species, relates to its importance and priority for nature conservation. Rarity is related to the frequency of occurrence at national or county level.
Fragility	Fragile habitats are those where changes due to man's intervention, environmental factors or natural succession can directly threaten it. Scrub invasion, agricultural improvement, fire and changes in hydrological regime are the most common threats.
Typicalness	This relates to the quality of the habitat in terms of how good an example it is of a recognised type.
Position in an ecological/geographical unit	The relationship of a site to adjacent areas of nature conservation value. It is important to recognise the important and characteristic formations, communities and species of a district.
Recorded history	The extent to which a site has been used for scientific study and research is a factor of some importance.
Potential wildlife value	The likely quality of the habitat for birds, mammals, reptiles, amphibians and invertebrates if it is managed for wildlife. If appropriate habitat management is undertaken, it is possible for an increase in the diversity and nature conservation value of an area.
Intrinsic appeal	The knowledge of the distribution and numbers of popular groups of species such as birds, is greater than for obscure groups. Similarly, colourful wild flowers and rare orchids arouse more enthusiasm than liverworts. It is pragmatic to give more weight to some groups than to others.
Criteria are based on Ratcliffe, D.A. (1977). A Nature Conservation Review, Cambridge University Press	

Following the CIEEM Guidelines for Ecological Impact Assessment in the UK, when determining the biodiversity importance of natural features found on or in proximity to the site the following characteristics will be considered:

- Naturalness;
- animal or plant species, sub-species or varieties that are rare or uncommon, either internationally, nationally or more locally, including those that may be seasonally transient;
- ecosystems and their component parts, which provide the habitats required by important species, populations and/or assemblages;
- endemic species or locally distinct sub-populations of a species;
- habitat diversity;
- habitat connectivity and/or synergistic associations;
- habitats and species in decline;
- rich assemblages of plants and animals;
- large populations of species or concentrations of species considered uncommon or threatened in a wider context;
- plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types, including examples of naturally species-poor communities; and
- species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change. The criteria described by Ratcliffe and CIEEM will then be used to ascribe importance to each feature according to its value in a geographic context. This is described in the table overleaf.

Level of Importance	Ecological Features
International	A habitat or species cited as a reason for the designation or proposed designation of a World Heritage Site, Biosphere Reserve, Biogenetic Reserve, Ramsar Site, Special Protection Area (SPA) or Special Area of Conservation (SAC). A large extent of habitat that is listed as a Priority Habitat Type in Annex 1 of the EC Habitats Directive in good condition with typical species diversity. A large and viable population of a regularly occurring species that is rare within an international context.
National	A habitat or species cited as a reason for the designation or proposed designation of a National Nature Reserve (NNR), Marine Nature Reserve (MNR), National Park, Site of Special Scientific Interest (SSSI) or Area of Special Scientific Interest (ASSI). Any area of habitat listed as a Priority Habitat Type in Annex 1 of the EC Habitats Directive that has potential to support typical species diversity. A large extent of habitat listed as a Priority Habitat in the UK BAP in good condition that supports an abundance of typical species. A large and viable population of a regularly occurring species that is scarce within an international context. A very large and viable population of a regularly occurring species that is listed as a Priority Species in the UK BAP. A large and viable population of a regularly occurring rare species that occurs in 15 or fewer 10km squares of the National Grid (e.g. a species that is listed in UK Red Data Books). A bird species with a British breeding population of <1,000 pairs.
Regional	A large extent of habitat listed as a Priority Habitat in the UK BAP that supports typical species diversity and is in good condition. A large and viable population of a regularly occurring species that is listed as a Priority Species in the UK BAP. A large and viable population of a regularly occurring plant species that is known to occur in 16 to 100 10km squares of National Grid (Stewart, Preston and Pearman 1994). A large and viable population of a regularly occurring insect species (Nationally Notable categories Na and Nb) that is known to occur in 16 to 100 10km squares of the National Grid [Ball, 1986]. A bird species with a British breeding population of 1,000 to 10,000 pairs.
County	A habitat or species cited as a reason for the designation or proposed designation of a Local Site (known locally as a County Wildlife Site (CWS), Site of Importance for Nature Conservation (SINC), Ecology Database Site (EDS) etc.), a Local Nature Reserve (LNR), a Nature Reserve (owned or managed by: The Wildlife Trusts, The Woodland Trust or equivalent body etc) or an Ancient Woodland. A habitat listed as a Priority Habitat in the UK BAP which is large in extent and supports typical species diversity. A medium and viable population of a regularly occurring species that is listed as a Priority Species in the UK BAP. A viable population of a regularly occurring species listed in a County Red Data Book, County Flora or found in less than 10% of 1km squares of the National Grid within the count. A small population of a plant species that is known to occur in 16 to 100 10km squares of National Grid. A small population of an insect species (Nationally Notable categories Na and Nb) that is known to occur in 16 to 100 10km squares of the National Grid. A bird species with a British breeding population of 10,000 to 100,000 pair
District	A habitat or species cited as a reason for the designation or proposed designation of a Local Site (known locally as a Local Wildlife Site (LWS), Site of Importance for Nature Conservation (SINC), Ecology Database Site (EDS) etc.), a Local Nature Reserve (LNR), a Nature Reserve (owned or managed by: The Wildlife Trusts, The Woodland Trust or equivalent body etc) or an Ancient Woodland. A habitat listed as a Priority Habitat in the UK BAP which is small in extent, supports typical species diversity or is in an unfavourable condition. A small and viable population of a species that is listed in the UK BAP or LBAP. A bird species with a British breeding population of 100,000 to 500,000 pairs.
Local	A habitat or species cited as a reason for the designation or proposed designation of a site which is officially listed e.g. on a Parish Register. A semi-natural habitat that is listed in the UK BAP or LBAP, which is either small in extent and/or is in an unfavourable condition. A species which occurs occasionally that is listed in the UK BAP or LBAP. A bird species with a British breeding population of >500,000 pairs.
Site	An artificial habitat or habitat that has readily established e.g. amenity grassland. A species which is common and not listed on the UK BAP or LBAP e.g. Badger.
Negligible	A habitat or species common within the Application Site, offering little benefit to British wildlife and biodiversity.

APPENDIX C: PHOTOGRAPHS OF SITE FEATURES

Photograph 6: Stables Building

Photograph 7: Cottage Building

Photograph 8: Main House Building

Photograph 9: Main House Building

Photograph 10: Back of Main House Building

Photograph 11: Barn Building

APPENDIX D: EDNA RESULTS

Report: 19085-CLW-JR-1 Order number: CLW-19004-JR

Great Crested Newt eDNA Results

Company:	Clarkson & Woods Ltd Ecological Consultants
Contact:	Jo Robinson
Project code|Task code:	Jerrings hall Farm - 6294 | eDNA kit only - 1
Date of Report:	30 April 2019
Number of samples:	1

Thank you for sending your sample for analysis by NatureMetrics. Your sample has been processed in accordance with the protocol set out in Appendix 5 of Biggs et al. (2014).

DNA was precipitated via centrifugation at 14,000 x g and then extracted using Qiagen Blood and Tissue extraction kits.

qPCR amplification was carried out in 12 replicates per sample, using the primers and probe described by Biggs et al. (2014), in the presence of both positive and negative controls.

Results indicate GCN absence in 'Pond 1'. All controls performed as expected and so the results are conclusive.

Results are based on the samples as supplied by the client to the laboratory. Incorrect sampling methodology may affect the results. Note that a negative result does not preclude the presence of Great Crested Newts at a level below the limits of detection.

Sample	Pond ID	Arrived	Inhibition	Degradation	Score	GCN status
611	'Pond 1'	27-Apr	No	No	0	Negative

End of report

Report issued by: Dr. Cuong Tang

Contact: ct@naturemetrics.co.uk | 01491 829042

APPENDIX E: LIGHTING SPECIFICATION FROM BOX TWENTY

The Island

Luminaire Schedule

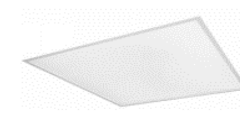
P2161-B20-ZZ-XX-SH-E-0000

BOX TWENTY

Electrical Schedules

Reference: 2161-B20-XX-XX-SH-E-0000 - Luminaire Schedule
Project Title: The Island
Project No: P2161
Checked: DM

Issue: Tender Issue
Revision: T02
Date: 14/09/2020
Sheet: 1 of 1

Ref	Description	Location	Manufacturer	Model	Light Source	Fitting Colour	IP/K Rating	Image
A	*Recessed IP54 LED downlighter with cast aluminium 200ø body, white aluminium bezel and integral LED light engine. Driver included as standard.*	*Various throughout*	*Whitecroft Lighting*	*COMPACT R6 CPH114K*	*LED 4000K 12w 1100 lumens*	*White*	*IP54*	
A1	*Recessed IP54 LED downlighter with cast aluminium 200ø body, white aluminium bezel and integral LED light engine. Driver included as standard.*	*Various throughout*	*Whitecroft Lighting*	*COMPACT R6 CPH204K*	*LED 4000K 21w 2073 lumens*	*White*	*IP54*	
B	*Wall mounted IP44 LED with 367 x 117mm body. Integral driver as standard.*	*Various throughout*	*Whitecroft Lighting*	*Horizon 360 HZH24K*	*LED 4000K 15.4w 1775 lumens*	*White / Silver*	*IP44*	
C	*Slim-line suspended linear LED luminaire. 750mm wide with micropolymer diffuser. Direct/indirect light distribution*	*Stairwells, Lobby*	*Whitecroft Lighting*	*Oculus OMMY54KW*	*LED 4000K 41W 6025 lumens*	*Silver*	*IP20*	
C1	*Slim-line suspended linear LED luminaire. 500mm wide with micropolymer diffuser. Direct/indirect light distribution*	*Stairwells, Lobby*	*Whitecroft Lighting*	*Oculus OMMY14KW*	*LED 4000K 18W 2492 lumens*	*Silver*	*IP20*	
D	*600 x 600mm slim surface LED tile diffused, Surface mounted to acoustic tiles in directors office.*	*Office spaces*	*Whitecroft Lighting*	*Tegan Slim Surface TMELPH34KXT*	*LED 4000K 36w 4088 lumens*	*White*	*IP20*	
E	*Suspended LED linear luminaire with direct / indirect lighting ratio of 65/35 and a quadraprism optic.*	*Break out meeting space Open Office*	*Whitecroft Lighting*	*Selene surface SNSH121W*	*LED 4000K 24w 2646 lumens*	*Silver*	*IP20*	

Electrical Schedules

F	*Surface mounted, 1200mm pressed steel bodied, IP54 linear luminaire with a clear polycarbonate diffuser for glare control.*	*Teaching spaces*	*Whitecroft Lighting*	*Stylus Comfort SUSH2*	*LED 4000K 37w 3476 lumens*	*White*	*IP54*	
F1	*Surface mounted, 600mm pressed steel bodied, IP54 linear luminaire with a clear polycarbonate diffuser for glare control.*	*Teaching spaces*	*Whitecroft Lighting*	*Stylus Comfort SUSH1*	*LED 4000K 19w 1668 lumens*	*White*	*IP54*	
G	*Wall mounted IP44 LED with 560 x 117mm body. Integral driver as standard.*	*OT suite*	*Whitecroft Lighting*	*Convor LED CVLPH14K*	*LED 4000K 40w 4651 lumens*	*White / Silver*	*IP44*	
J	*Wall mounted IP44 with polycarbonate body. Integral driver as standard and PIR detector*	*External*	*JCC Lighting*	*Centurion L65 CENLH14KEM*	*LED 4000K 12w 890 lumens*	*Black*	*IP44*	
H	*LED Ground Mounted Bollard. Root mounted to ground.*	*External*	*Whitecroft Lighting*	*Kolo BLY224KARB*	*LED 3000K 9w 703 lumens*	*Black*	*IP65*	
I	*Pole top amenity luminaire with aluminium cast body and spigot adaptor. Specifically made for bat conservation areas. UV stabilised polycarbonate cover rated IP66 and IK10. Integral high quality LED driver. Asymmetrical optic.*	*Car Park*	*Innolumis*	*Nicole Bat Lamp*	*LED 2700K 50w 2700 lumens*	*Silver / Clear*	*IP67*	
I1	*Pole top amenity luminaire with aluminium cast body and spigot adaptor. UV stabilised polycarbonate cover rated IP66 and IK10. Integral high quality LED driver. Symetrical version.*	*Car Park*	*Thorlux Lighting*	*Juno B JUN19200*	*LED 4000K 44w 5155 lumens*	*Silver / Clear*	*IP66*	
K	*Recessed wall mounted LED bricklight*	*Path to willow unit*	*Whitecroft Lighting*	*Broadwalk Quad BQS14K*	*LED 4000K 3.3w 171 lumens*	*Grey*	*IP54*	

Electrical Schedules

-	*Desk Lamp made of milled anodised aluminium with adjustable arm. LED intergral driver with touch dimming to 1%*	*Desk task lamp*	*atelje-lyktan*	*Birdie table 204305*	*LED 3000K 7w 511 lumens*	*White or Black*	*IP20*	
Exit	*Surface or suspended LED exit luminaire with 15 long life LEDs, Non maintained with 3 Hour intergral battery pack.*	*Exit signs*	*Whitecroft Lighting*	*CONCERT EX1S*	*4.5w*	*Silver*	*IP20*	

Notes
1. This schedule shall be read in-conjunction with the specifications and drawings.
2. The code letter and/or number or each luminaire type is as indicated on the drawings.
3. The letter "E" generally represents a 3 hr emergency conversion version of the regular fitting, shown in purple.
4. The contractor shall contact the specialist lighting manufacturer to confirm the required order code and appropriate mounting accesories.
5. Recessed fittings shall be mounted at ceiling height as defined by the Architectural RCP drawings, where fitting's are suspended the elevations have been shown on layouts.

Box Twenty

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Creating bespoke low carbon environmental solutions for our clients

APPENDIX F: BIODIVERSITY IMPACT ASSESSMENT CALCULATOR V19.0, SUMMARY SHEET

Site name: to be copied from the BIA sheet

Planning reference number: to be copied from the BIA sheet

Existing	Habitat Area (ha)	Hedgerow impact (km)	Connectivity Features (km)	Habitat Biodiversity Value	Hedgerow Biodiversity Value	Connectivity Biodiversity Value
Onsite Biodiversity Impact	0.33	0.05	0.00	6.03	1.08	0.00
Indirect Biodiversity Impact	0.00	0.00	0.00	0.00	0.00	0.00
Total habitat / linear features impacted	**0.33**	**0.05**	**0.00**	**6.03**	**1.08**	**0.00**
Retained / Created / Enhanced						
Onsite biodiversity retained	0.94	0.02	0.00	3.55	0.77	0.00
Onsite Creation	0.33	0.63	0.00	0.48	4.41	0.00
Biodiversity retained and enhanced	0.26	0.19	0.00	1.84	0.69	0.00
Total biodiversity retained/enhanced	**1.53**	**0.84**	**0.00**	**5.87**	**5.87**	**0.00**
Trading Down	n/a	n/a	n/a	0.00	-0.77	0.00
Biodiversity Impact	**n/a**	**n/a**	**n/a**	**-0.16**	**4.13**	**0.00**

Habitat Impacts	Loss	Gain	Impact	%age losses	Compensatory Unit loss	Indicative Offset (ha)	WCC Offset units	WCC Indicative Offset Contribution
Woodland Habitat	0.96	0.48	**-0.48**	94.12	-0.15	0.35	-0.15	£16,684
Grassland Habitat	0.72	0.84	**0.12**					
Wetland Habitat	0.00	0.23	**0.23**				-0.01	£10,129
Other Habitat (incl. Built Env)	0.03	0.00	**-0.03**	5.88	-0.01	Transferred to Wetland		
Total	1.71	1.55	**-0.16**	100.00	-0.16	0.35	-0.16	**£26,813**
		Trading down	**0.00**					
			-0.16					

Warwickshire County Council is currently transferring 'Other' habitat loss to Wetland Creation

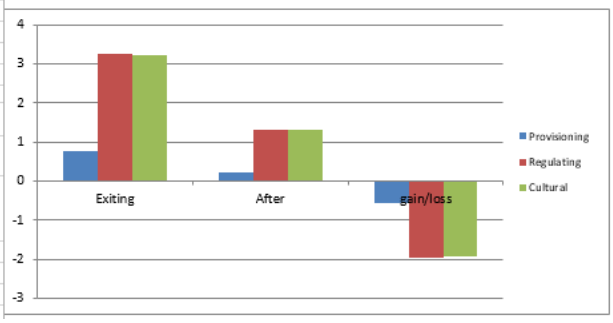
Hedgerow Impacts	Loss	Gain	Trading down	Impact	Unit loss	Indicative Offset (km)	WCC Offset units	WCC Offset Contribution
Hedgerow	0.20	5.10	-0.77	**4.13**				

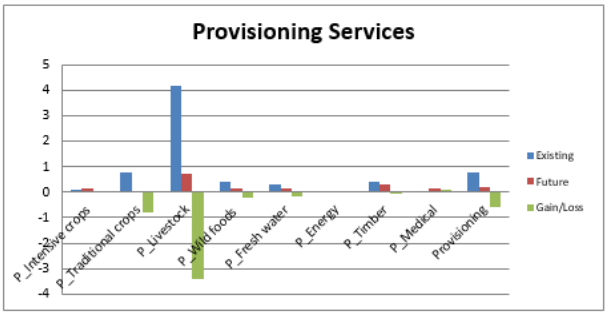
SUMMARY

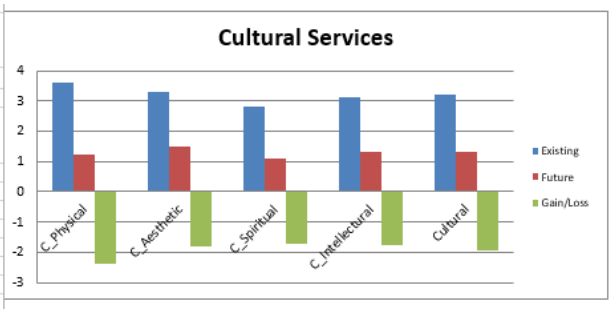
This development will result in -0.16 Habitat Biodiversity Units loss; 4.13 Hedgerow Units gain and 0 Connectivity Biodivesity Units loss

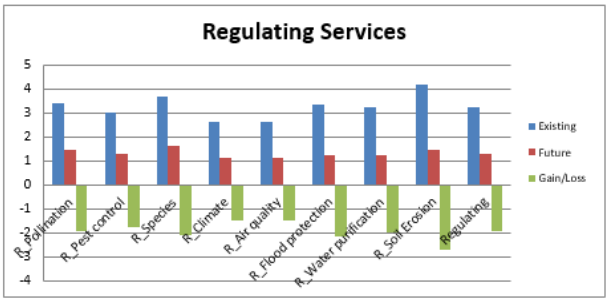
This loss will need to be compensated for, either through a condition or an obligation, via a 'Biodiversity Offsetting Scheme' that compensates for the each habitat and their resepective units. The Biodiversity Offsetting Scheme can be one arranged by you or by a financial contribution to Warwickshire County Council indicatively of

ECOSYSTEM SERVICES ANALYSIS









For any questions with regard to biodiversity impact and this development please contact Warwickshire County Council Ecological Services:
email: planningecology@warwickshire.gov.uk or telephone 01926 418060

Warwickshire, Coventry & Solihull - Habitat Impact Assessment Calculator

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Automatic Condition setting
	Result

Local Planning Authority:	
Site name:	
Planning application reference number:	
Assessor:	
Date:	

Please fill in both tables

Please do not edit the formulae or structure

To condense the form for display hide vacant rows do not delete them

If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services 01926 418060

								Habitat Biodiversity Value						
	Existing habitats on site Please enter all habitats within the site boundary			**Habitat distinctiveness**		**Habitat condition**		**Habitats to be retained with no change within development**		**Habitats to be retained and enhanced within development**		**Habitats to be lost within development**		
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	**Comment**
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H	
B	B6	Grassland: Poor semi-improved grassland	0.07	Medium-Low	3	Poor	1			0.07	0.20			to be enhanced to wet grass
	B6	Grassland: Poor semi-improved grassland	0.17	Medium-Low	3	Poor	1			0.17	0.52			to be enhanced to wildflower
	B6	Grassland: Poor semi-improved grassland	0.49	Medium-Low	3	Poor	1	0.49	1.47					to be retained
	B6	Grassland: Poor semi-improved grassland	0.24	Medium-Low	3	Poor	1					0.24	**0.72**	to be lost (car park & other)
	J12	Grassland: Amenity grassland	0.03	Low	2	Poor	1			0.03	0.05			to be enhanced to wildflower
	J12	Grassland: Amenity grassland	0.12	Low	2	Poor	1	0.12	0.24					to be retained
	C31	Other: Tall ruderal	0.01	Medium-Low	3	Poor	1					0.01	**0.03**	to be lost
	n/a	Built Environment: Buildings/hardstanding	0.19	none	0	Poor	1	0.19	0.00					to be retained
	A3	Woodland: Scattered trees	0.08	Medium	4	Good	3					0.08	**0.96**	to be lost
	A3	Woodland: Scattered trees	0.08	Medium	4	Good	3	0.08	1.01					to be retained
	G1	Wetland: Standing water	0.05	High	6	Good	3	0.05	0.83					to be retained
		Total	1.53				Total	0.94	3.55	0.26	0.77	0.33	1.71	J
													ΣD + ΣF + ΣH	
												Site habitat biodiversity value	6.03	

Before/after impact	**Indirect Negative Impacts** Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii	
Before									
After									
Before									
After									
Before									
After									
Before									
After									
Before									
After									
	Total	0.00						0.00	M

	HIS = J + M
Habitat Impact Score (HIS)	**1.71**

	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		Habitat biodiversity value	
T. Note	code	Phase 1 habitat description	Area (ha)	Distinctiveness	Score	Condition	Score		Time (years)	Score	Difficulty	Score		Comment
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R	
	A3	Woodland: Scattered trees	0.08	Medium	4	Good	3		32+ years	3	Low	1	**0.32**	
	n/a	Built Environment: Buildings/hardstanding	0.22	none	0	Poor	1		3 Years	1.1	Low	1	**0.00**	
	A5	Woodland: Orchard	0.03	High	6	Good	3		32+ years	3	Low	1	**0.16**	
		Total	**0.33**											
		Habitat Enhancement						Existing value S (= F)					((NxOxP)-S)/Q/R	
B	F1	Wetland: Swamp	0.07	High	6	Moderate	2	**0.20**	15 years	1.7	Medium	1.5	**0.23**	
	B12	Grassland: Semi-improved acidic grassland	0.17	Medium-High	5	Moderate	2	**0.52**	15 years	1.7	Low	1	**0.72**	
	B12	Grassland: Semi-improved acidic grassland	0.03	Medium-High	5	Moderate	2	**0.05**	15 years	1.7	Low	1	**0.12**	
		Total	**0.26**											

Trading down correction value	0.00	
Habitat Mitigation Score (HMS)	**1.55**	
	HBIS = HMS - HIS	
Habitat Biodiversity Impact Score	**-0.16**	Loss
Percentage of biodiversity impact loss	9.36	

	Loss	Gain	Impact
Woodland Habitat	0.96	0.48	**-0.48**
Grassland Habitat	0.72	0.84	**0.12**
Wetland Habitat	0.00	0.23	**0.23**
Other Habitat (including Built Environment)	0.03	0.00	**-0.03**
Total	1.71	1.55	**-0.16**
		Trading down	**0.00**
			-0.16

Warwickshire, Coventry & Solihull - Hedge Impact Assessment Calculator

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

This sheet calculates the impact to hedges and lines of trees in and around the site.

These units are not transferrable as compensation for either the Habitat or Connectivity Impact Assessments carried.

Please fill in both tables

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

T. Note	code	Hedgerow habitat description	Feature length (km)	Distinctiveness	Score	B1	B2	E1	E2	C1	C2	D1	D2	Condition Score	Hedgerow Biodiversity Value: Hedgerows features to be retained with no change within development — Length (km)	Existing value	Hedgerows features to be retained and enhanced within development — Length (km)	Existing value	Hedgerows features to be lost within development — Length (km)	Existing value	Comment
		Direct Impacts and retained features			A										C	A x B x C - D	E	A x B x E - F	G	A x B x G - H	
H33	n/a	Hedgerow: non_species rich hedge	0.04	Low	2	Pass	Fail	Fail	Fail	Pass	Pass	Pass	Pass	2					**0.04**	**0.16**	to be lost
H33	n/a	Hedgerow: non_species rich hedge	0.06	Low	2	Pass	Fail	Fail	Fail	Pass	Pass	Pass	Pass	2			0.06	**0.25**			to be enhanced
H51	n/a	Hedgerow: non_species rich hedge	0.01	Low	2	Pass	Fail	Fail	Fail	Pass	Pass	Pass	Pass	2					**0.01**	**0.04**	to be lost
H51	n/a	Hedgerow: non_species rich hedge	0.07	Low	2	Pass	Fail	Fail	Fail	pass	Pass	Pass	Pass	2			0.07	**0.28**			to be enhanced
H17 H23	n/a	Hedgerow: non_species rich hedge	0.06	Low	2	Pass	Fail	Fail	Fail	Pass	Pass	Pass	Pass	2			0.06	**0.24**			to be enhanced
H57	n/a	Hedgerow: non_species rich hedge	0.02	Low	2	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	3	0.02	**0.11**					to be retained
		Total	0.26											Total	0.02	0.11	0.19	0.77	0.05	0.20	J
																				ΣD+ΣF+ΣH	
																			Site Hedge Biodiversity Value		1.08

Before/after impact	Indirect Negative Impacts		Value of loss from indirect impacts K x A x B - Li, Lii	Li - Lii
		K		
Before				
After				
Before				
After				
Before				
After				
Before				
After				
Before				
After				
	Total	0.00		0.00 M

HIS - J + M

Hedge Impact Score (HIS) **0.28**

T. Note	code	Phase 1 habitat description	Length (km)	Distinctiveness	Score	B1	B2	E1	E2	C1	C2	D1	D2	Condition Score	Time till target condition: Time (years)	Score	Difficulty of creation / restoration: Difficulty	Score	Linear biodiversity value	Comment
		Hedgerow Creation			0											Q		R	(N x O x P) / Q / R	
	n/a	Hedgerow: species rich hedge	0.40	Medium	4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	3	10 years	1.4	Low	1	**3.44**	
	n/a	Hedgerow: non_species rich hedge	0.23	Low	2	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Fail	3	10 years	1.4	Low	1	**0.97**	
		Total	0.63																	
		Hedgerow Enhancement													Existing value S (-F)				((N x O x P) - S) / Q / R	

T. Note	Prepared hedge features on site (Onsite mitigation)			Target hedge distinctiveness		Hedgerow condition assessment									Existing value S (-F)	Time till target condition		Difficulty of creation / restoration		Linear biodiversity value	Comment
	code	Phase 1 habitat description	Length (km)	Distinctiveness	Score	A1	A2	B1	B2	C1	C2	D1	D2	Condition Score		Time (years)	Score	Difficulty	Score	(N x O x P) / Q / R	
	Hedgerow Creation		N		O												Q		R		
	n/a	Hedgerow: species rich hedge	0.40	Medium	4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	3		10 years	1.4	Low	1	**3.44**	
	n/a	Hedgerow: non_species rich hedge	0.23	Low	2	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Fail	3		10 years	1.4	Low	1	**0.97**	
		Total	**0.63**																		
	Hedgerow Enhancement																			(N x O x P) - S) / Q / R	
	n/a	Hedgerow: species rich hedge	0.06	Medium	4	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	2	**0.25**	3 years	1.1	Low	1	**0.23**	
	n/a	Hedgerow: species rich hedge	0.07	Medium	4	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	2	**0.28**	3 years	1.1	Low	1	**0.25**	
	n/a	Hedgerow: species rich hedge	0.06	Medium	4	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	2	**0.24**	3 years	1.1	Low	1	**0.21**	
		Total	**0.19**															Trading down correction value		-0.77	
																		Hedge Mitigation Score (HMS)		**4.33**	

	HBIS - HMS - HBIS	
Hedge Biodiversity Impact Score	**4.13**	Gain
Percentage of linear impact lost		

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Gain
	Overall Loss

APPENDIX G: MORRIS BAT SLATE

The 'MORRIS' BATSLATE

The Morris batslate is a specially designed 'slate' that will allow bats access to a roof void.

All bats and their roosts are protected by law under the 1981 WILDLIFE AND COUNTRYSIDE ACT (as amended). A roost can be defined as… 'any place a bat uses for shelter, protection or rest'. A roost is still defined as a roost even if the bat(s) is temporarily absent. NATURAL ENGLAND or your own Statutory Nature Conservation Organisation (SNCO) must be consulted for advice *before* any work is carried out on a place known to be used by bats.

Due to the relatively low cost of materials and labour involved in the construction of a Batslate (against the cost of making one and sending it through the post), it is easier to follow these instructions.

Some species of bat, such as Pipistrelles, are quite happy living between the roofing felt and the tiles/slates - never actually entering the roof void. Other species, such as the long-eared bat prefer the openness of the attic or loft. The species of bat identified (by an expert) dictates a very important factor in fitting a Batslate. All modern and 'refurbished' properties will have roofing felt. For species of bats that use the inside of the attic, a hole will need to be established in the felt to allow bats free access into and out of the loft. The hole need not be large - 75mm x 30mm is more than ample, but it is very important to establish it immediately adjacent to a rafter or wall to allow bats to climb back out. A hole in the middle of the felt will be difficult to find, difficult to land near and unlikely to be used. Some species of bat use the cavity wall, and access to here from the loft will be required.

Fitting the slate

Please get a reputable roofer or builder to fit the slate should you be at all unsure about climbing on the roof. They can telephone our staff member, Colin Morris (an experienced roof tiler) for advice on 01258 454341. The lead used should be at the *very least* Code 6. A lower code lead will sag after a very short time, blocking the bats' access. A 300mm square of lead will be enough to construct all types of Batslate. It can be reduced as tile size/type dictates. On a refurbished building there may very well be some stripped lead lying around that can be used - from a valley, wide chimney flashing or a hip. The Batslate should take no more than a couple of minutes to make and can be fitted during the normal re-roofing process with minimal disruption to the roofer - Figs. 1 and 2.

- On a plain tile roof, the Batslate can be fitted anywhere. The 'wings' of the Batslate should go under the adjacent tiles - a welt on each wing will further reduce the likelihood of water ingression - Figs. 3 and 4.
- On a profiled tile roof, the Batslate can only be fitted under the ridge tiles. Figs. 5 and 6.
- On a slate roof the Batslate can be fitted under the ridge tiles - Fig. 7. The ridge tiles can be adapted or cut away allowing for a lower ridge tile line. For example, when secret or back-bedded mortar is specified - Fig. 8. The Batslate can also be adapted to be fitted in the middle of a slate roof but more lead is required and a great deal more labour. Also, on a steep roof, rough material may have to be applied to the surface of the slates to enable the bats to grip - Figs 9 to 12.

For more technical advice call VWT Field officer Colin Morris on 01258 454341

Lead "Bat Slate" for a Plain Tile Roof

℄. Morris.

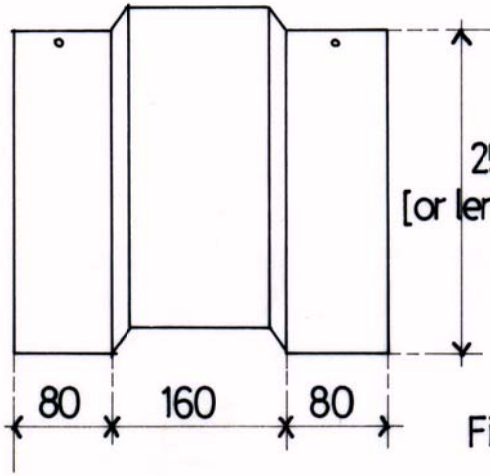


Fig. 1.

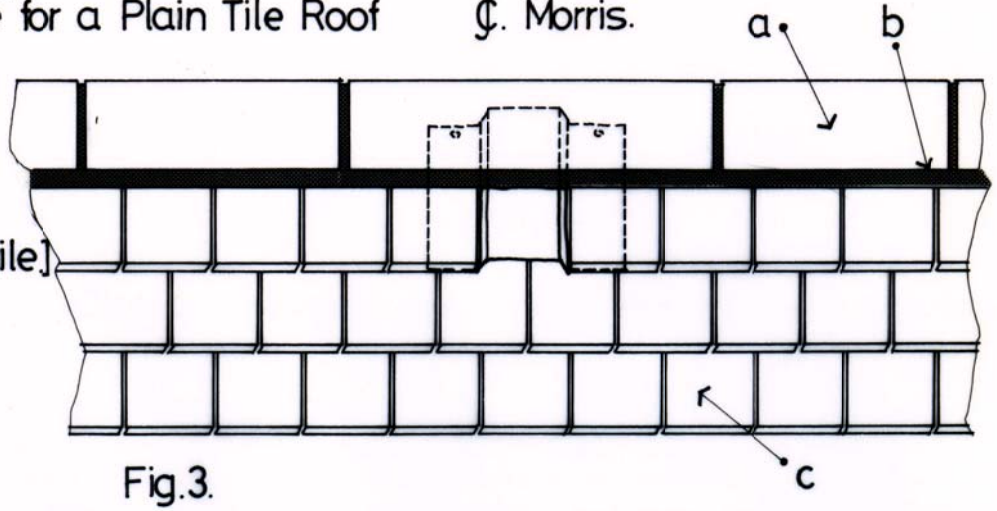


Fig. 3.

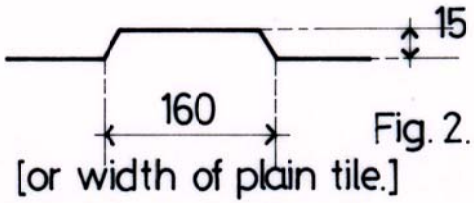


Fig. 2.

Original size of lead:
250x350mm. approx.

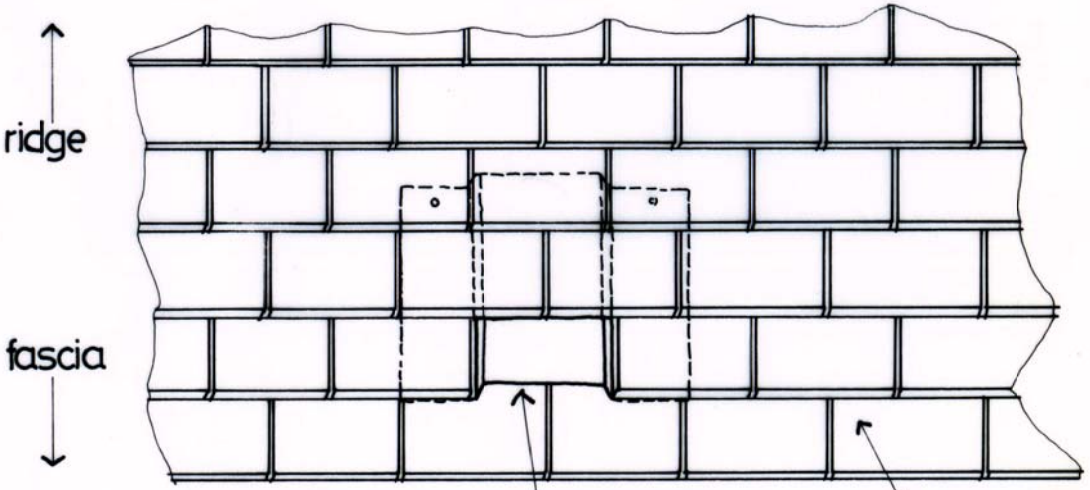


Fig. 4.

"Bat Slate" for a Profiled Tile Roof

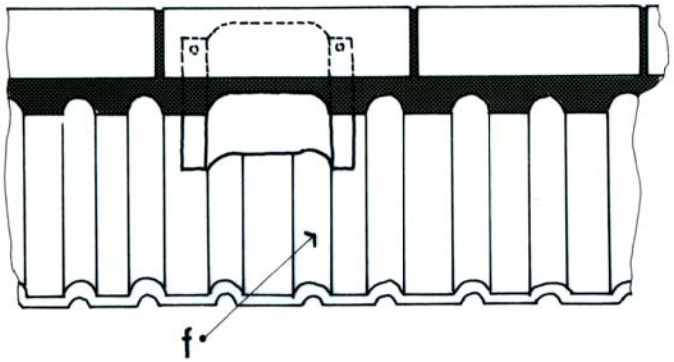


Fig. 5

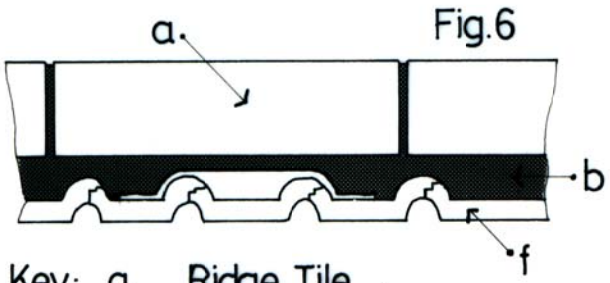


Fig. 6

Key: a Ridge Tile
b Mortar
c Plain Tile
d Slate
e Modified Ridge
f Profiled Tile

"Bat Slate" for a Slate Roof

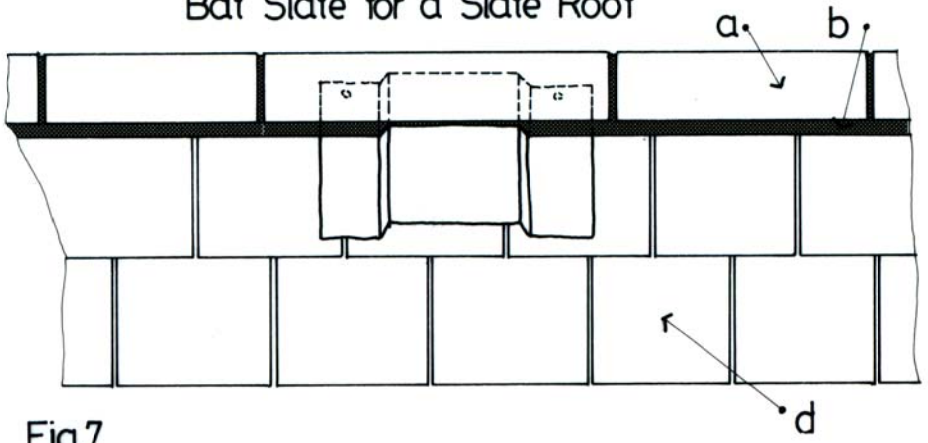
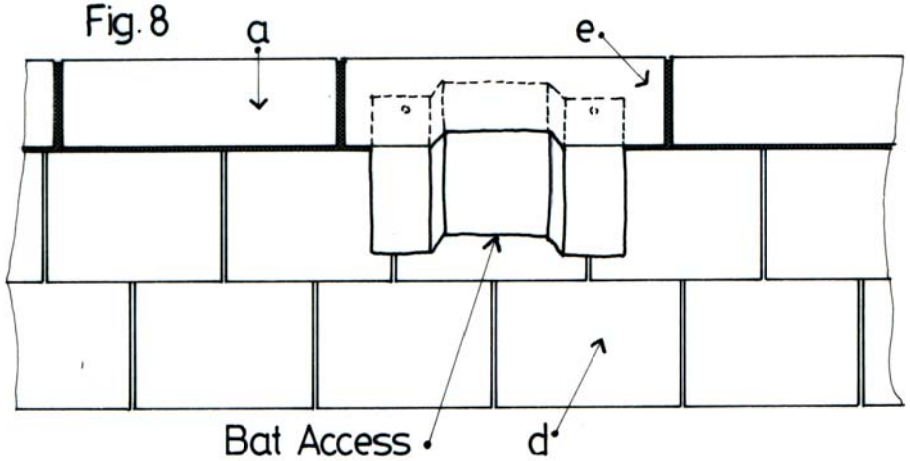


Fig. 7

Fig. 8



C. Morris.

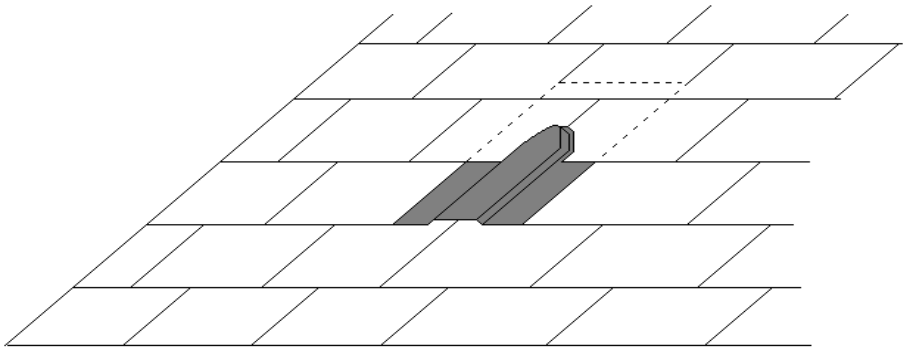


Fig 9. Batslates can be fitted in the middle of a slate roof but more lead and considerably more labour is involved.

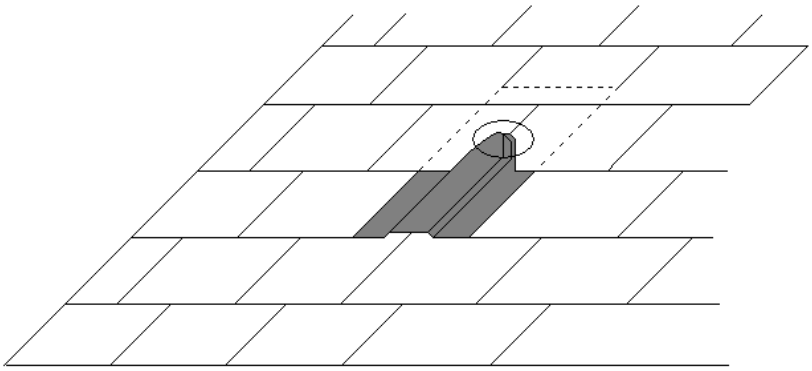


Fig 10. To allow bats into the loft, a hole may be cut in the roofing felt. The hole needs to be cut adjacent a rafter or wall to enable the bats to crawl in and out.

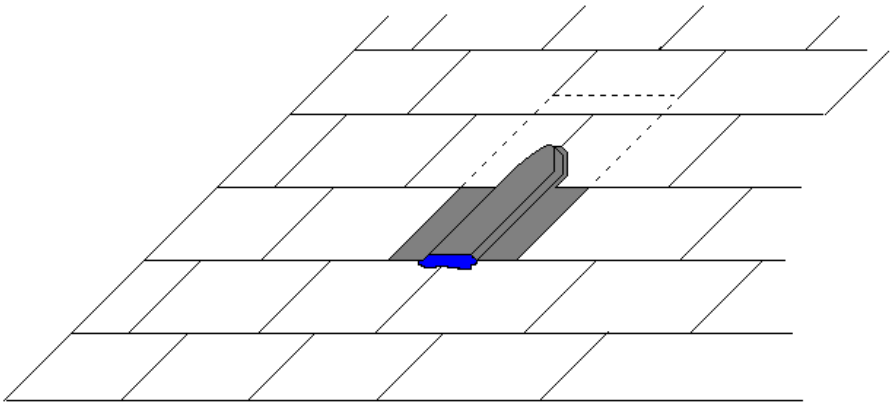


Fig 11. Steep pitched roofs

On a roof with a steep pitch, it is important to give the bats an area of grip – otherwise they would simply slide down the roof. Rough material should be applied just below and under the raised section of the batslate. It is vitally important to continue the rough surface right up to the top edge of the lower slates. An ideal material is readily available from builders merchants - 100 mm wide Scotch™ anti-slip tape or similar. P.V.A. adhesive or a weatherproof Mastic with a 'drying' surface could be used to fix a suitable material; fine gravel, rough/coarse sand are just a couple of options that might be used; it can be dyed to match the colour of the slates to make it less obvious from the ground.

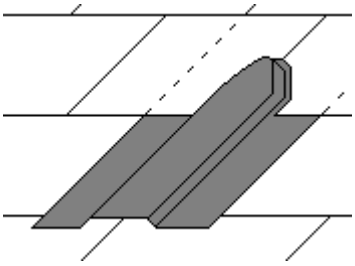


Fig 12. Shallow pitched roofs. On a lower pitched slate roof, the batslate can be extended down the roof to lessen the chance of water ingression.

Roofing felt

Many of the modern roofing felts and membranes have a smooth and slippery surface. These are generally unsuitable for bats, especially those bats that are crevice dwellers and choose to roost between the felt and roof covering. Any bats that did manage to get onto the upper surface of this type of membrane would be unable, or find it very difficult, to get out; they may very well die as a result. The traditional hessian reinforced bitumastic roofing/slater's felt (BS747) with a sand finish on its upper surface is probably the best, and it is still readily available.

Should a builder or roofer insist on one of the 'slippery' membranes, then some kind of material needs to be fitted, both on top of and below it, to enable the bats to have an area on which to get a purchase. Fine nylon 'Screening mesh' with holes of approximately 2.0mm across is available from Garden Centres and is suitable for most bat species. For example, Netlon®, product codes 74040201 (black) 74040220 (green). This micro-mesh needs to be stretched and nailed tightly across the tops of the rafters before the roofing membrane is fitted. After the fitting of the mesh it is important not to let the roll of roofing membrane sit/rest on the mesh as this will cause it to sag. There have been recorded incidents of bats crawling around and becoming trapped behind 'sagging' materials. Once the roofing membrane has been fitted, another roll of mesh will need to be fitted on the upper surface of the membrane, before the normal battening process can continue. If a hole is cut through the mesh/membrane/mesh sandwich, the three layers around the hole can be secured together using a stapler.

Inside the loft, the joins between the rolls of mesh should be covered with a batten, skew-nailed into the rafters/roof joists. This will cover any sags that will inevitably occur in the mesh, no matter how tight it is pulled by the builder/roofer.

The VWT does not advise the use of Netlon or similar products in roosts occupied by lesser horseshoe bats because of the danger of the bats becoming trapped. Please seek advice from the VWT before using any mesh to check on the suitability for the bat species in question.

Fabrication and fitting of a Batslate in a Plain tile roof

Lead used to fabricate the Batslate must be at least Code 6. Code 6 is less likely to sag and block bats access. The Batslate can be made from second hand or previously used lead: such as from a valley, hip, ridge, or wide cover flashings. Second-hand lead has the advantage of already looking 'weathered', and is often free.

Dressing the lead until it is flat.

Cut the lead to the length of one of the plain tiles you are going to use.

Dressing the lead over suitable sized timber. The depth of the finished Batslate should be 17-20mm.

Forming the second 'wing' of the Batslate and the width by using one of the tiles.

The second wing is complete.

The completed Batslate alongside two tiles, showing how it will look once fitted.

A typical place where a Batslate might be fitted; this is an old roof without felt. The Batslate is fitted alongside a rafter, allowing bats to land and crawl out. On a new or re-furbished roof, a hole will need to be established in the felt.

The Batslate shown here is fitted so that a whole tile will fit alongside it. Where this is not possible, tiles will require cutting. The Bat-slate is nailed (x2) to the batten.

Tiles are refitted around the Batslate.

The Batslate with all the surrounding tiles replaced.

Not the best picture in the World, but this is what the Batslate looks like in the middle of a plain tile roof.
From the ground it is almost invisible.

Fitting a Batslate in a Plain tile roof near the ridge tiles

A hole is cut in the roofing felt when the Batslate is fitted near the ridge tiles. This will allow bats access into the loft/attic area.

The Batslate is fitted in the same way as the previous one, being the same length and width as a plain tile and nailed twice into the top batten.

Note: The Batslate is above the hole in the felt and a rafter.

The top 'eave' tiles are fitted in the normal way.

The Batslate can also be fitted by replacing one of the shorter eave tiles. The Batslate's length should be adjusted accordingly.

This picture shows the ridge tiles being bedded on. If the mortar joint in the ridge-line is directly above the Batslate, material such as a broken tile or piece of slate should be placed on top of the Batslate and between the opposite top eave. This will ensure the mortar does not block the bats' access. This ***could*** *be done at every joint, allowing bats access to the underside of every ridge tile.*

This shows the Batslate in place of the top eave tile.

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