LC Ecological Services

ECOLOGICAL APPRAISAL AND PHASE 2 SURVEYS

LAND OFF EMPRESS WAY
LUDGERSHALL
WILTSHIRE

JANUARY 2013
UPDATED JULY 2014, NOVEMBER 2015, OCTOBER 2016, JULY 2020 AND MARCH 2022

ON BEHALF OF FOREMAN HOMES

The Old Squash Court,
Rempstone Hall,
Rempstone,
Corfe Castle,
Wareham,
Dorset,
BH20 5JQ

www.ecological-services.co.uk

Telephone: 01929 477115
E-mail: enquiries@ecological-services.co.uk

Authorisation

	Name	Date
Report prepared by:	HS	17/01/13
Report checked and authorised by:	JE	18/01/13
Report updated by:	LJ	17/07/14
Report checked and authorised by:	JS	21/07/14
Report updated by:	NHR	18/11/15
Report checked and authorised by:	JS	24/11/15
Report updated by:	LK	17.10.16
Report checked and authorised by:	JS	18/10/16
Report updated by:	AH	22/07/20
Report checked and authorised by:	JS	23/07/20
Report amended and updated by:	AH	28/07/20
Report checked and authorised by:	JS	29/07/20
Report amended and updated by:	ARH	23/03/2022
Report checked and authorised by:	WD	24/02/2022

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SUMMARY

1. LC Ecological Services Limited were commissioned by Foreman Homes to conduct an ecological appraisal on an area of land off Empress Way, Ludgershall, Wiltshire. This survey is required to support a full planning application for the erection of 190 dwellings, car parking, access including extension to Empress Way, green infrastructure including open space and landscaping, infrastructure, drainage, utilities and engineering works. Off-site highway works at junction of Astor Crescent / Empress Way and Tidworth Road, and land reserved for 2-form entry primary school are also included.

2. An ecological appraisal is essentially a baseline habitat survey which is extended to include an assessment of a sites potential to support any legally protected, notable and/or invasive species. The survey is conducted with the objective of identifying any ecological constraints such as habitats of high nature conservation value, habitats that could potentially support legally protected or notable species, and the presence of invasive species.

3. The site encompasses an area of arable land with some marginal stands of tall ruderal vegetation, two native hedgerows and some scattered scrub. There are also sections of broadleaved plantation woodland shelterbelts situated offsite adjacent to the western boundary.

4. The development site lies 3.5 kilometres to the south-east of the Salisbury Plain SPA/SAC/SSSI designated sites. The potential impacts to these sites resulting from development are discussed in section 5.1.

5. There are two native hedgerows on site which are both considered to be of ecological value and would qualify as UK Biodiversity Action Plan (BAP) habitat. Further recommendations are provided in section 5.2.

6. There are sections of broadleaved plantation woodland which form shelterbelts located offsite adjacent to the western and north-western boundaries. Further recommendations are provided in section 5.3.

7. The mosaic of habitats on site are potentially suitable for badger and the desk study returned nine records of badger within two kilometres of the site. Further recommendations are provided in section 5.4.

8. Two mature standard ash trees at the western end of hedgerow H2 (north-western corner of the site) are considered to hold low potential to support roosting bats, however these trees will be retained and unaffected. All other trees on site were assessed as holding negligible potential to support roosting bats, however this assessment would now require an update. Further recommendations are provided in section 5.5.

9. The site is assessed to be of County Level importance for bats as it forms part of a local network of low to moderate quality foraging and commuting habitat that is utilised by the rare Annex II species barbastelle. Other bat species and bat genus recorded foraging and commuting on site include common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, serotine. *Plecotus sp* and *Myotis sp*. Further recommendations are provided in section 5.5.

10. The site provides suitable terrestrial habitat for great crested newt, although no suitable aquatic habitat was recorded either on site or within 500 metres of the site. The desk study identified a single small waterbody located approximately 555 metres to the south-west, and there are confirmed records of great crested newt (dated 2016) within the Swinton Barracks complex, approximately 1.5 kilometres to the south-west of the site. Further recommendations are provided in section 5.6.

11. The mosaic of habitats on site provide suitable nesting habitat for both arboreal and ground-nesting bird species, including declining farmland bird species of conservation concern. Further recommendations are provided in section 5.7.

12. Good populations of both slow-worm and common lizard were recorded on site and the northern boundary area of the site was identified as being of greatest value for reptiles. Further recommendations are provided in section 5.8.

13. The proposed ecological enhancement measures to be included within the development layout and landscaping are detailed in section 5.9. These include native broadleaved woodland and scrub planting, native hedgerow planting, creation of wildflower grassland habitats, provision of log/brushwood piles, and installation of integrated features for birds, bats, and invertebrates.

14. The biodiversity metric calculation for the development shows that the proposed landscaping and ecological enhancement measures will result in a 67.86% biodiversity net gain (BNG) resulting after development, which is a substantial increase above the site's original ecological baseline value. There will also be a 140.06% increase in hedgerow units.

1.0 INTRODUCTION

LC Ecological Services Limited were commissioned by Foreman Homes to conduct an ecological appraisal on an area of land off Empress Way, Ludgershall, Wiltshire, SP11 9TB (central Grid Ref: SU 2696 5034). A plan indicating the site boundary has been included as appendix I. This survey is required to support a full planning application for the erection of 190 dwellings, car parking, access including extension to Empress Way, green infrastructure including open space and landscaping, infrastructure, drainage, utilities and engineering works. Off-site highway works at junction of Astor Crescent / Empress Way and Tidworth Road, and land reserved for 2-form entry primary school are also included. The current layout plan for the proposed development is included as appendix II.

An ecological appraisal is essentially a baseline habitat survey which is extended to include an assessment of a sites potential to support any legally protected, notable and/or invasive species. The survey is conducted with the objective of identifying any ecological constraints such as habitats of high nature conservation value, habitats that could potentially support legally protected or notable species, and the presence of invasive species.

The following phase 2 ecological surveys were also conducted on the site:

- Bat activity transects with static detector monitoring.
- Targeted reptile survey.

Section 2 of the report provides some background information on legislative requirements and relevant policy. Section 3 details the methodologies adopted for the ecological surveys that were conducted and section 4 provides an account of the survey results. Section 5 provides information on the relevance of the results to the proposed development and makes recommendations for measures to mitigate and compensate for the effects on particular habitats or species.

2.0 LEGISLATION AND POLICY

2.1 Legislation

The following legislation may be of relevance to the proposed works. Full details of statutory obligations with respect to biodiversity and the planning system can be found in DCLG Circular 06/2005.

- **The Conservation of Habitats and Species (Amendment) Regulations 2017:** This transposes the EU Habitats Directive (Council Directive 92/43/EEC) into domestic law. The Regulations provide protection for a number of species including:

  - All species of bat
  - Dormouse (*Muscardinus avellanarius*)
  - Otter (*Lutra lutra*)
  - Great crested newt (*Triturus cristatus*)

  This legislation makes it an offence to deliberately capture, kill or injure individuals of these species listed on Schedule 2 and damage or destroy their breeding site or place of shelter. It is also illegal to deliberately disturb these species in such a way as to be likely to significantly affect: (i) the ability of any significant group of the species to survive, breed or rear or nurture their young; or (ii) the local distribution or abundance of the species[1].

  This legal protection means that where development has the potential to impact on bats, or other species of national interest[2], the results of a protected species survey must be submitted with a planning application.

  Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are also protected under this legislation. These are a network of sites designated for supporting habitats or species of high nature conservation importance in the European context. Any activity that has a detrimental effect on these European sites is made an offence under the Regulations. Where a development is likely to have a significant impact on a European site, the Regulations require a rigorous assessment of the impacts, known as an Appropriate Assessment.

[1] The *Conservation of Habitats and Species (Amendments) Regulations 2017* consolidates the numerous amendments that were made to the Conservation (Natural Habitats, &c.) Regulations 1994. Of particular relevance are amendments made in August 2007and January 2009 which an increased the threshold of illegal levels of disturbance to European Protected Species (EPS). An offence is only committed if the deliberate disturbance would result in significant impacts to the EPS population. However, it should be noted that activities that cause low levels of disturbance to these species continue to constitute an offence under Section 9 of the Wildlife and Countryside Act (see below).

[2] Species of wild fauna and flora as listed in Annex II, IV or V to the Habitats Directive.

- **The Wildlife and Countryside Act 1981 (and amendments):** Protected fauna and flora are listed under Schedules 1, 5 & 8 of the Act. Species likely to be of relevance include:

  - All species of **bat.** It is an offence to intentionally or recklessly disturb any bat whilst it is occupying a roost or to intentionally or recklessly obstruct access to a bat roost.
  - All species of British **reptile** (in particular grass snake (*Natrix helvetica*), common lizard (*Zootoca vivipara*), adder (*Vipera berus*) and slow-worm (*Anguis fragilis*)). It is illegal to kill or injure these species.
  - **Great crested newt.** It is illegal to obstruct access to any structure or place which great crested newts use for shelter or protection or to disturb any great crested newt while it is using such a place.
  - **Water vole.** It is an offence to intentionally kill, injure or take water vole (*Arvicola amphibius*), intentionally or recklessly damage, destroy, obstruct access to water vole burrows or disturb them whilst in a burrow.

  This Act also makes it an offence to intentionally kill, injure or take any wild bird or to take, damage or destroy their eggs and nests (whilst in use or being built). In addition, it is an offence to disturb any nesting bird listed on Schedule 1 or their young.

  Schedule 9 of the Act lists those species for which it is an offence to cause their spread. Schedule 9 species that are most likely to be encountered are Japanese knotweed (*Fallopia japonica*) and New Zealand pigmyweed (*Crassula helmsii)*.

  Sites of Special Scientific Interest (SSSIs) are also protected under the Wildlife and Countryside Act 1981. These are a network of sites identified as being of national nature conservation importance and hence afforded legal protection.

  National Nature Reserves (NNRs) are also protected under the Act (section 35 (1)) and established under the National Parks and Access to the Countryside Act 1949. These are nature reserves which are considered to be of national importance by the relevant statutory bodies i.e. Natural England, Natural resource Wales.

- **Natural Environment and Rural Communities Act (NERC) 2006**: This Act enforces a duty on the planning authority and local council to conserve biodiversity (section 40). Additionally, section 41 encourages the local councils to be aware of the species and habitats of 'principal importance' and to act accordingly to protect and manage these habitats and species.

- **The Countryside and Rights of Way Act 2000:** This Act strengthens nature conservation and wildlife protection. It places a duty on Government Ministers and Departments to conserve biological diversity, provides police with stronger powers relating to wildlife crimes, and improves protection and management of SSSIs.

- **The Protection of Badgers Act 1992:** This Act makes it an offence to wilfully take, injure or kill a badger (*Meles meles*); cruelly mistreat a badger; interfere with badger setts. A licence is required for work which may damage or disturb a sett.

- **Wild Mammals (Protection) Act 1996:** This Act provides protection for all wild animals from intentional acts of cruelty.

- **Hedgerow Regulations 1997:** These Regulations establish a set of criteria for assessing the importance of hedgerows. Where a hedgerow is deemed to be 'important' its removal is prohibited without consent from the local Planning Authority

2.2 Policy

The following policy is of relevance to the proposed works:

- **National Planning Policy Framework (NPPF):** This sets out the Government's vision for biodiversity in England with the broad aim that planning, construction, development and regeneration should maintain and enhance, restore or add to biodiversity and geological conservation interests. NPPF (2021) includes sections on legally protected species and sites (see section 2.1).

- **Local Sites (including Sites of Importance for Nature Conservation (SINCs), Local Nature Reserves (LNR), and Biological Notification Sites (BNSs)/County Wildlife Sites (CWSs)):** These are a network of sites designated for their nature conservation importance in a local context. Although they are not afforded legal protection they contribute towards local and national biodiversity. Where such development is permitted, the local planning authority will use conditions and/or planning obligations to minimise the damage and to provide compensatory and site management measures where appropriate.

- **Natural England Protected Species Standing Advice**: The standing advice is used by local authorities as a fall-back position when in pre-application consultation or during the determination period to define habitat and species survey efforts and mitigation proposals.

- **Biodiversity Action Plans (BAPs):** BAPs set out policy for protecting and restoring priority species and habitats as part of the UK's response as signatories to the Convention on Biological Diversity. BAPs operate at both a national and local level with priority species and habitats identified at a national level and a series of Local BAPs that identify ecological features of particular importance to a particular area of the country. The requirement to consider and contribute towards BAP targets was strengthened through the Countryside and Rights of Way Act 2000. Habitat and Species Action Plans that are likely to be of relevance include:

    - Brown long-eared bat (*Plecotus auritus*) (UK BAP)
    - Soprano pipistrelle (*Pipistrellus pygmaeus*) (UK BAP)

- Barbastelle bat (*Barbastella barbastellus*) (UK BAP)
- Skylark (*Alauda arvensis*) (UK BAP)
- Yellowhammer (*Emberiza citrinella*) (UK BAP)
- House sparrow (*Passer domesticus*) (UKBAP)
- Bullfinch (*Pyrrhula pyrrhula*) (UKBAP)
- Starling (*Sturnus vulgaris*) (UKBAP)
- Dunnock (*Prunella modularis*) (UKBAP)
- Reptiles (UK BAP)

3.0 METHODOLOGY

3.1 Desk study

The Wiltshire and Swindon Biological Records Centre (WSBRC) and Hampshire Biological Records Centre (HBIC) provided records of protected/notable species and details on non-statutory designated sites within two kilometres of the proposed development. The Multi-Agency Geographical Information for the Countryside (MAGIC) website was used to provide any information on statutory designated sites within five kilometres of the proposed development.

3.2 Field study

3.2.1 Vegetation

The standard Phase 1 habitat survey methodology (JNCC, 2016) was adopted whereby habitats are mapped using colour codes (see appendix III). A detailed walkover survey was undertaken on the 15th January 2013 by ecologist Hannah Stebbings directly searching for legally protected and invasive species of plant and categorising any habitats of ecological value that were encountered. A general description of the vegetation was also noted, listing species encountered and scoring their abundance using the DAFOR scale shown below. Update surveys were undertaken on the 24th June 2014 and 31st July 2015 by ecologist Louisa Jones and on the 25th July 2019 by ecologist Andrew Heideman.

D Dominant;
A Abundant;
F Frequent;
O Occasional;
R Rare;
L Local (used as a prefix to any of the above).

3.2.2 Protected species assessment

Badgers

A direct search was undertaken for signs of badger. Signs of badger may include setts, dung pits, latrines, paths or hairs on fences and vegetation. Any setts encountered were classified according to the number of entrances and the extent of their use.

Bats

The potential for the habitats on site to support roosting and foraging/commuting bats was assessed during the walkover surveys in accordance with the Bat Conservation Trust (BCT) Bat Surveys for Professional Ecologists Good Practice Guidelines (Collins et al., 2016).

Trees

Bats often roost in trees. Features such as old woodpecker holes, splits, cavities and rot holes, loose or flaking bark, hollows and ivy creepers can all be exploited by bats for roosting. Any trees present on site were therefore assessed for their potential to support roosting bats by searching for such features. The presence of roosting bats can be spotted through signs such as accumulations of moth or butterfly wings, urine staining, bat droppings, or bats themselves. The absence of this evidence cannot, however, be treated as conclusive proof that bats are not present, therefore in such cases an assessment was made of the potential of any trees to support bats based on the scale presented in table 1 below:

Table 1: Criteria for assessing bat roosting potential of trees

Confirmed Roost	Evidence of bat occupation found.
High Roosting Potential	With significant roosting potential, either because they contain a large number of suitable features or those features present appear optimal.
Medium Roosting Potential	Features with moderate roosting potential, with roosting features appearing less suitable.
Low or Negligible Roosting Potential	Trees with few, if any, features suitable for roosting.

Bat activity transect surveys

Bat activity transect surveys were undertaken on site in 2015, 2016, 2019 and 2020.

The bat transect surveys involved walking a pre-defined route around the site which incorporated key areas that are likely to be important for foraging and/or commuting bats. In this case, the transect routes largely followed the site boundaries which included native hedgerow habitat. The transect routes were walked by two surveyors, working in tandem, on each occasion. The routes were walked at a steady pace up to three times during any one survey and incorporated a number of listening station stops at key points interspersed along the route.

Bat activity was recorded by the surveyors using a combination of Echometer 3, Echometer touch and a heterodyne (Magenta MKII) bat detector. Visual observations of flight lines and feeding behaviour were recorded onto a plan of the site. Notes on times, species and behaviour were also recorded to aid identification to species level. The bat detector recordings, which were analysed using Analook and Kaleidoscope Pro software, were used to confirm where possible the bat species recorded during the survey.

2015 - 2016

The transect route for these surveys is illustrated on the plan included as appendix V.

A dawn bat activity survey was undertaken on the 18th September 2015 by ecologists Alex Coggins and Lisa Embery and an additional dusk bat activity survey was undertaken by ecologists Pete Duffy and Katie Ford on the 22nd September 2015. An update dusk bat activity survey was undertaken on the 23rd August 2016 by ecologists Louisa Jones and Carl Noyce. The dusk surveys began 15 minutes before sunset and continued for approximately two hours afterwards in order to detect bats commuting from roost sites to foraging sites. The dawn survey commenced two hours before sunrise and continued until or shortly after sunrise.

No static detector monitoring was undertaken during this survey period.

2019 - 2020

The transect route for these surveys is illustrated on the plan included as appendix VII.

Seasonal transect surveys for low value habitat (Collins, 2016) commenced on site in August 2019, then due to the presence of rare bat species the survey effort was increased to monthly transect surveys between September 2019 and May 2020, with an additional transect also completed in July 2020.

Dusk transect surveys were undertaken on the 19th August, 17th September and 15th October 2019 and on the 21st April and 14th July 2020. A pre-dawn transect survey was undertaken on 20th May 2020. The ecologists who undertook this fieldwork included Alex Sinclair, Miguel Sanabria, Stuart Woodley, George Hunt, Aimee Cokayne, Sarah Barker, Pete Duffy, Andrew Heideman and Lissie Hastie.

The dusk transects surveys began at or just before sunset and continued for approximately two hours afterwards in order to record any bats commuting from roost sites to foraging grounds as well as general foraging activity. The pre-dawn transect survey began two hours before sunrise and continued up to sunrise in order to record any foraging activity and bats returning to roosting sites.

Static monitoring

In August 2019 a single static monitoring device was deployed on site to record any bat activity for periods of five nights (in line with survey guidelines for low value habitat (Collins, 2016)), then due to the presence of rare bat species the survey effort was increased to two static monitoring devices deployed on site in September and October 2019 and in April, May and July 2020. The recording devices used included Song Meter 2, Song Meter 4 and Anabat express. The static monitoring devices were deployed at the same strategically selected locations on each occasion. All analysis of the static detector recordings was undertaken using Kaleidoscope Pro software. The static detector locations are illustrated on the plan included as appendix VII and described below:

August 2019

- Static monitor 1 (SU 26876 50424): positioned within the wooded shelterbelt on the central western boundary of the site.

September 2019 – May 2020

- Static monitor 1 (SU 26595 50248): positioned within the hedgerow on the south west boundary of the site.

- Static monitor 2 (SU 27042 50595): positioned at the base of the hedgerow on the northern boundary of the site.

Limitations and constraints

Static monitor 1 malfunctioned and failed to record any data when it was deployed on site in both August and September 2019. Static monitor 2 also malfunctioned and failed to record when it was deployed on site in October 2019. Despite these issues, it is considered that a sufficient level of static detector monitoring to evaluate bat activity on site was achieved, and combined with the transect surveys provided details on bat activity within those months.

Assessment of foraging and commuting habitat importance

A methodology for ecological impact assessments on bats has been developed by Wray et al (2010). This uses a number of factors, such as the species and number of bats involved, presence of nearby roosts and characteristics for foraging and commuting habitat, to produce a score indicating level of importance. This scoring system has been applied to the foraging areas and commuting routes on the site to assess their level of importance. The scoring system can also be used to determine the value of the habitat for each bat species recorded during the surveys, with the highest scores normally obtained for the rarest species. The scores and corresponding levels of habitat importance are shown below:

- 0 – 10 = not valuable
- 11 – 20 = locally important
- 21 – 30 = important at county level
- 31 – 40 = important at regional level
- 41 – 50 = nationally important

>50 = internationally important

Reptiles

Reptiles are widespread in habitats, such as scrub, rough grassland and hedgerows, which provide cover, foraging opportunities and basking sites. They also have an affinity with scattered debris, including building materials and log/brushwood piles, which can provide

suitable refugia and hibernacula. The site was assessed for its potential to support native species of reptile.

Targeted reptile survey

A total of 75 artificial refugia (0.5 metre^2 sections of bitumen felt) were set out in suitable areas of the site identified as having potential to support reptiles. The refugia were distributed on site on the 8th September 2015 and left to 'settle' for a period of at least one week before the survey visits commenced. The refugia were checked for presence of reptiles between the hours of 09:00 and 11:00 or 16:00 and 19:00 during suitable weather conditions, cloudy and/or with sunny breaks, with temperatures between 9 and 18 degrees centigrade when the refuges provide warmer conditions than the open ground (Froglife, 1999). A total of seven checks were conducted between the 13th and 30th September 2015 to determine presence or likely absence of reptiles. This survey work was conducted by ecologists Alex Hannam, Alex Coggins, Pete Duffy and Liz Kimber.

4.0 RESULTS

4.1 Desk study

Statutory and non-statutory sites

Table 2 below lists statutory designated sites for nature conservation located within five kilometres and non-statutory designated sites within two kilometres of the proposed development site.

Table 2: Statutory designated sites within five kilometres and non-statutory designated sites within two kilometres of the land off Empress Way, Ludgershall

Site name	Conservation status	Distance from site	Size (Ha)	Habitat description
Salisbury Plain	SAC[3], SPA[4], SSSI[5]	3.5 km north-west	21,460	Largest expanse of unimproved chalk downland in north west Europe. The site supports 13 species of nationally rare and scarce plants, 67 species of rare and scarce invertebrates and it is a site of international importance for birds.
Heaven Corner/Heron's Copse	LWS[6]	1.5km north	62.33	Ancient woodland site, part of the larger Collingbourne Forest. Largely plantation beech, fir and spruce, with occasional pine.
Cockshord, Great Whickheath, Sawpit and Oxdown Copses	LWS	1.6km north	63.22	Beech (*Fagus sylvatica*) and hornbeam (*Carpinus betulus*) plantation on an ancient woodland site.
Great Perham Copse	LWS	1.7km south	9.36	A small ancient woodland site within a larger area of mixed plantation woodland.
Stert Copse	LWS	1.8km north	16.22	Neglected coppice with standards, featuring large amounts of outgrown hornbeam coppice together with field maple (*Acer campestre*) and hazel (*Corylus avellana*).
The Belt	SINC[7]	1.9km south-east	0.68	Deciduous woodland site.

[3] SAC: Special Area of Conservation
[4] SPA: Special Protected Area
[5] SSSI: Site of Special Scientific Interest
[6] LWS: Local Wildlife Sites
[7] SINC: Sites of Importance for Nature Conservation

Site name	Conservation status	Distance from site	Size (Ha)	Habitat description
Pickpit Hill	LWS	2km west	17.15	Small chalk hill with fine, moderately rich calcareous & mesotrophic grassland and scattered scrub.
Lower Newdown Copse	SINC	2.4km south	0.96	Deciduous woodland site.
Freeth Copse Relic	SINC	2.5km east	0.66	Deciduous woodland site.
Grove Copse, Appleshaw	SINC	2.5km east	3.09	Deciduous woodland site.
Littleton Copse, Kimpton	SINC	2.9km south-east	9.59	Deciduous woodland site.
Hillfield Copse	SINC	3.4km east	6.90	Deciduous woodland site which supports the notable plant meadow saffron (*Colchicum autumnale*).

The proposed development is located within 4 kilometres of Salisbury Plain SPA/SAC/SSSI, the Salisbury Plain designated sites are discussed further in section 5.1. All other non-statutory designated sites are situated at a significant distance from the proposed development site and therefore no impacts are expected, no further action is required.

Protected, notable and invasive species records

Table 3 below presents the results of the data search for protected, notable and invasive species returned by WSBRC and HBIC within 2 kilometres of the site.

Table 3: Protected, notable and invasive species within a 2 kilometre radius of the land off Empress Way, Ludgershall

Common Name	Scientific Name	Status	Location
Reptiles and Amphibians			
Slow worm	*Anguis fragilis*	Schedule 5 WCA[8], UK BAP[9]	6 records dated between 1978 and 2017.
Common toad	*Bufo bufo*	UK BAP	5 records dated between 1976 and 2017.
Grass snake	*Natrix natrix*	Schedule 5 WCA, UK BAP	4 records dated between 1972 and 2016.
Great crested newt	*Triturus cristatus*	Annex II[10], Schedule 2 Habs Regs, Schedule 5 WCA, UK BAP	6 records dated between 1972 and 2016.

[8] WCA: Wildlife and Countryside Act (1981) (as amended)
[9] UK BAP: UK Biodiversity Action Plan
[10] Annex II: Annex II of the EC Habitats Directive

Common Name	Scientific Name	Status	Location
Common lizard	*Zootoca vivipara*	Schedule 5 WCA, UK BAP	3 records dated 1976 and 2016.
Mammals – Terrestrial (bats)			
Western barbastelle	*Barbastella barbastellus*	Annex II, Schedule 2 Habs Regs, Schedule 5 WCA, UK BAP	1 record dated 2015.
Lesser noctule	*Nyctalus leisleri*	Schedule 2 Habs Regs, Schedule 5 WCA	1 record dated 2016.
Noctule	*Nyctalus noctula*	Schedule 2 Habs Regs, Schedule 5 WCA, UK BAP	1 record dated 2016.
Pipistrelle sp.	*Pipistrellus sp*	Schedule 2 Habs Regs, Schedule 5 WCA	2 records dated 1991 and 2017.
Common pipistrelle	*Pipistrellus pipistrellus*	Schedule 2 Habs Regs, Schedule 5 WCA	7 records dated between 1979 and 2018.
Soprano pipistrelle	*Pipistrellus pygmaeus*	Schedule 2 Habs Regs, Schedule 5 WCA, UK BAP	3 records dated between 2013 and 2016.
Long-eared bat sp.	*Plecotus sp*	Schedule 2 Habs Regs, Schedule 5 WCA	2 records dated 1994 and 2013.
Brown long-eared Bat	*Plecotus auritus*	Schedule 2 Habs Regs, Schedule 5 WCA, UK BAP	3 records dated between 1994 and 2018.
Serotine	*Eptesicus serotinus*	Schedule 2 Habs Regs, Schedule 5 WCA	2 records dated 1958 and 2015.
Mammals – Terrestrial (non-bats)			
West European hedgehog	*Erinaceus europaeus*	UK BAP	1 record dated 2014.
Brown hare	*Lepus europaeus*	UK BAP	20 records dated between 1968 and 2007.
Eurasian badger	*Meles meles*	PBA[11]	9 records dated between 1982 and 2016.
Hazel dormouse	*Muscardinus avellanarius*	Schedule 2 Habs Regs, Schedule 5 WCA, UK BAP	12 records dated between 2015 and 2017.
Polecat	*Mustela putorius*	Schedule 5 Habs Regs, UK BAP	1 record dated 2004.

[11] PBA: Protection of Badgers Act

Common Name	Scientific Name	Status	Location
Birds			
Skylark	*Alauda arvensis*	BoCC[12] Red list, UK BAP	13 records dated between 2005 and 2017.
Cuckoo	*Cuculus canorus*	BoCC Red list, UK BAP	5 records dated between 2013 and 2017.
Lesser-spotted woodpecker	*Dendrocopos minor*	BoCC Red list	1 record dated 2015.
Corn bunting	*Emberiza calandra*	BoCC Red list	1 record dated 2013.
Yellowhammer	*Emberiza citrinella*	BoCC Red list, UK BAP	14 records dated between 2005 and 2017.
Brambling	*Fringilla montifringilla*	Schedule 1 WCA	64 records dated 2008 and 2015.
Linnet	*Linaria cannabina*	BoCC Red list, UK BAP	7 records dated between 2005 and 2016.
Red kite	*Milvus milvus*	Schedule 1 WCA	24 records dated between 2006 and 2017.
Grey wagtail	*Motacilla cinerea*	BoCC Red list	5 records dated 2008 and 2015.
Spotted flycatcher	*Muscicapa*	BoCC Red list, UK BAP	1 record dated 2011.
House sparrow	*Passer domesticus*	BoCC Red list, UK BAP	61 records dated between 2005 and 2013.
Grey partridge	*Perdix perdix*	BoCC Red list, UK BAP	4 records dated between 2005 and 2017.
Marsh tit	*Poecile palustris*	BoCC Red list, UK BAP	31 records dated between 2000 and 2015.
Bullfinch	*Pyrrhula pyrrhula*	HBAP, UK BAP	5 records dated between 2015 and 2017.
Starling	*Sturnus vulgaris*	BoCC Red list	67 records dated between 2005 and 2017.
Redwing	*Turdus iliacus*	Schedule 1 WCA, BoCC Red list	7 records dated between 2006 and 2017.
Song thrush	*Turdus philomelos*	BoCC Red list, UK BAP	27 records dated between 2006 and 2016.
Fieldfare	*Turdus pilaris*	Schedule 1 WCA, BoCC Red list	9 records dated between 2005 and 2017.
Mistle thrush	*Turdus pilaris*	BoCC Red list, UK BAP	6 records dated between 2007 and 2016.
Barn owl	*Tyto alba*	Schedule 1 WCA	4 records dated between 2004 and 2014.
Lapwing	*Vanellus vanellus*	BoCC Red list, UK BAP	2 records dated 2006 and 2008.
Invertebrates - Lepidoptera			

[12] BoCC: Birds of Conservation Concern

Common Name	Scientific Name	Status	Location
Small heath	*Coenonympha pamphilus*	UK BAP	82 records dated between 1996 and 2018.
Dingy skipper	*Erynnis tages*	UK BAP	31 records dated between 1996 and 2018.
Grizzled skipper	*Pyrgus malvae*	UK BAP	26 records dated between 1986 and 2018.
White ermine	*Spilosoma lubricipeda*	UK BAP	1 record dated 2017.
Brown hairstreak	*Thecla betulae*	Schedule 5 WCA, UK BAP	75 records dated between 1987 and 2017.
White-letter hairstreak	*Satyrium w-album*	Schedule 5 WCA, UK BAP	1 record dated 1981.
Cinnabar	*Tyria jacobaeae*	UK BAP	4 records dated between 2004 and 2015.
Invasive Non-native Species			
Grey squirrel	*Sciurus carolinensis*	WCA Schedule 9	2 records 2009 and 2010.
Invasive Non-native Plants			
Montbretia	*Crocosmia x crocosmifolia*	WCA Schedule 9	1 record dated 2013.
Himalayan balsam	*Impatiens glandulifera*	WCA Schedule 9	1 record dated 1996.

These records of protected, notable and invasive species in the vicinity of the site increase the likelihood of them being present where suitable habitat is identified during the field survey.

4.2 Field study

4.2.1 Vegetation

The accompanying phase 1 habitat map provided as appendix III depicts the habitats encountered and highlights areas of particular interest with target notes. Photographs of the habitats and features on site are included as appendix IV.

The site encompasses an area of arable land with some marginal stands of tall ruderal vegetation, two native hedgerows and some scattered scrub. There are also sections of broadleaved plantation woodland shelterbelts situated offsite adjacent to the western boundary.

Descriptions of the habitats encountered during the survey are provided below:

Arable (Target notes 1 & 2)

The vast majority of the survey area comprises arable land which includes both land that has been left fallow for a period and land that is currently in production. The central and south-western areas of the site, are occupied by arable land which has been left fallow for a period of approximately one year or more (T1), since being taken out of production this

land has become colonised by a variety of common ruderals and arable weeds which are summarised in table 4 below. On the eastern side of the site there is a section of arable land, separated by a fence line, which is currently being used for intensive rapeseed (*Brassica napus*) production.

Table 4: Species recorded within the fallow arable land

Common name	Latin name	Abundance	Status
Grasses, sedges, rushes and ferns			
Black-grass	*Alopecurus myosuroides*	O	Common & widespread
Wild oat	*Avena fatua*	O-R	Common & widespread
Herbaceous species			
Scarlet pimpernel	*Anagalis arvensis*	O	Common & widespread
Creeping thistle	*Cirsium arvense*	O-R	Common & widespread
Spear thistle	*Cirsium vulgare*	R	Common & widespread
Fat hen	*Chenopodium album*	O	Common & widespread
Willowherb	*Epilobium sp*	R	Common & widespread
Petty spurge	*Euphorbia peplus*	O-R	Common & widespread
Common fumitory	*Fumaria officinalis*	R	Common & widespread
Common poppy	*Papaver rhoeas*	O	Common & widespread
Common knotgrass	*Polygonum aviculare*	O-R	Common & widespread
Dandelion	*Taraxacum agg.*	O-R	Common & widespread
Common ragwort	*Senecio jacobaea*	R	Common & widespread
Groundsel	*Senecio vulgaris*	D	Common & widespread
Hedge mustard	*Sisymbrium officinale*	R	Common & widespread
Prickly sow-thistle	*Sonchus asper*	O	Common & widespread
Smooth sow-thistle	*Sonchus oleraceus*	R	Common & widespread
Speedwell	*Veronica sp*	R	Common & widespread

Species present within the arable land are common/widespread and this habitat is considered to be of limited ecological value, nevertheless it could potentially support badgers, ground nesting birds, foraging/commuting bats and great crested newt. These species are discussed further in section 4.2.2.

Tall ruderal vegetation (Target note 3)

Along some of the arable field boundaries there are strips/margins of tall ruderal vegetation which comprise the following species: false oat-grass (*Arrhenatherum elatius*), field bindweed (*Convolvulous arvensis*), great willowherb (*Epilobium hirsutum*), common nettle (*Urtica dioica*), prickly lettuce (*Lactuca serriola*), prickly sow-thistle (*Sonchus asper*), wild oat (*Avena fatua*), hogweed (*Heracleum sphondylium*), mugwort (*Artemisia vulgaris*), hedge bindweed (*Calystegia sepium*), broad-leaved dock (*Rumex obtusifolius*), spear thistle (*Cirsium vulgare*), cleavers (*Galium aparine*), common couch (*Elymus repens*) and cock's-foot (*Dactylis glomerata*).

Species present within the tall ruderal vegetation are common/widespread and this habitat is considered to be of limited ecological value but could potentially support badgers, ground nesting birds, foraging/commuting bats, great crested newt and reptiles. These species are discussed further in section 4.2.2.

Native hedgerows (Target note 4, H1 & H2)

There are two native hedgerows on site. Hedgerow H1 comprises an established native hedgerow, approximately 123 metres in length, five metres in average height and 4 – 4.5 metres in average width. A good variety of woody species were recorded within the hedge, including a low number of standard ash trees (*Fraxinus excelsior*), but the field layer was densely shaded and species poor with ivy (*Hedera helix*) being the dominant constituent. There is a large gap in the central area of the hedgerow. Hedgerow H2 comprises an established native hedgerow which is considered to be defunct due to the presence of multiple large gaps. The hedgerow is approximately 325 metres in length, 4 – 4.5 metres in average height and 3 – 3.5 metres in average width, a good variety of woody species were recorded within the hedge, including a low number of standard ash trees at its western end, but the field layer is densely shaded and mostly species poor with ivy being the dominant constituent. Both of the existing native hedgerows will be retained within the development layout. The native hedgerows on site are summarised in table 5 below.

Table 5: Native hedgerows recorded on site

Key (see Phase 1 map)	Woody species	Ground flora	BAP status (80% native woody species)	General description
H1	Field maple (*Acer campestre*) Ash (*Fraxinus excelsior*) Dogwood (*Cornus sanguinea*) Hazel (*Corylus avellana*) Hawthorn (*Crataegus monogyna*) Blackthorn (*Prunus spinosa*) Elder (*Sambucus nigra*) English elm (*Ulmus procera*)	False oat-grass (*Arrhenatherum elatius*) Traveller's-joy (*Clematis vitabla*) Cleavers (*Galium aparine*) Ivy (*Hedera helix*) Hogweed (*Heracleum sphondylium*) Bramble (*Rubus fruticosus* agg.) Wood dock (*Rumex sanguineus*) Common nettle (*Urtica dioica*)	Yes	Intact, native hedgerow, approximately 123 metres in length, five metres in average height and 4 – 4.5 metres in average width. Includes a low number of standard ash trees. A large gap is present in the central area of the hedge.
H2	Sycamore (*Acer pseudoplatanus*) Ash Dogwood Hawthorn Blackthorn	False oat-grass Rosebay willowherb (*Chamerion angustifolium*) Traveller's-joy Cleavers	Yes	Defunct, native hedgerow, approximately 325 metres in length, 4 – 4.5 metres in average height and 3 – 3.5 metres in average width. Includes a low number of

Key (see Phase 1 map)	Woody species	Ground flora	BAP status (80% native woody species)	General description
	Buckthorn (*Rhamnus cathartica*) Dogrose (*Rosa canina*) Goat willow (*Salix caprea*) Elder	Ground-ivy (*Glechoma hederacea*) Ivy Bramble Bittersweet (*Solanum dulcamara*) Common nettle		standard ash trees at far western end.

The native hedgerows on site comprise 80% or more cover of at least one woody UK native species which qualifies them as UK BAP Hedgerow habitat, further recommendations are provided in section 5.2. The native hedgerows on site could potentially support badgers, nesting birds, foraging/commuting bats, dormice, great crested newt, and reptiles, these species are discussed further in section 4.2.2.

Scrub (Target note 5)

There are small stands of scattered scrub along some of the field boundaries on site, scrub species recorded include wild cherry (*Prunus avium*), bramble (*Rubus fruticosus* agg.), ash saplings (*Fraxinus excelsior*), hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*), elder (*Sambucus nigra*), hazel (*Corylus avellana*), blackthorn (*Prunus spinosa*), butterfly-bush (*Buddleja davidii*) and English elm (*Ulmus procera*).

The scrub on site is very limited in extent and comprises common/widespread species. No further action is required.

Plantation woodland shelterbelts (Target note 6)

There are sections of broadleaved plantation woodland which form shelterbelts located offsite adjacent to the western boundary. These woodland stands comprise a canopy of semi-mature to mature specimens of ash, whitebeam (*Sorbus aria* agg.), pedunculate oak (*Quercus robur*) and wild cherry (*Prunus avium*), and a well-established understorey of hazel, wayfaring tree (*Viburnum lantana*), field maple, blackthorn, elder, crab apple (*Malus sylvestris*), guelder rose (*Viburnum opulus*) and dog rose (*Rosa canina* agg.). The field layer is densely shaded and species-poor, it is mostly dominated by ivy, with cleavers (*Galium aparine*), bramble, traveller's joy (*Clematis vitalba*) and hedge bindweed (*Calystegia sepium*) also recorded.

The offsite woodland shelterbelts comprise a native species plantation community of limited botanical interest, nevertheless this habitat is well established with mature trees and shrubs and is therefore considered to be of moderate ecological value, further recommendations to ensure that this habitat is safeguarded from damage during construction are provided in section 5.3. The woodland shelterbelts could potentially

support badgers, nesting birds, foraging/commuting/roosting bats, dormice, great crested newt, and reptiles, these species are discussed further in section 4.2.2.

4.2.2 Protected species

Badgers

No badger setts or evidence of badger activity was identified on site during the update walkover survey in 2019. The desk study returned nine records of badger within two kilometres of the site. The mosaic of habitats on site, including arable fields, tall ruderal vegetation, native hedgerows and scrub, as well as the offsite woodland shelterbelts, provide sub-optimal foraging and sett building habitat for badger. Though no setts were recorded on site in 2019 this species is wide ranging and potentially able to colonise the site at any time. Due to the low foraging potential of the site it is currently anticipated that any site activity will be limited to commuting individuals within the wider area.

Precautionary measures to safeguard badgers from harm during the construction phase of the development are detailed in section 5.4.

Bats

Trees

Two mature standard ash trees at the western end of hedgerow H2 (north-western corner of the site) are considered to hold low potential to support roosting bats due to the presence of a reasonable amount of ivy cladding on each main trunk, however these trees will be retained alongside the development and unaffected. All other trees on site were assessed as holding negligible potential to support roosting bats, however this assessment would now require an update.

Further recommendations are provided in section 5.5.

Foraging and commuting habitat

The habitats on site, including arable land, tall ruderal vegetation, native hedgerows and scattered scrub, as well as the offsite broadleaved woodland shelterbelts, have collectively been assessed as 'Low' in terms of their suitability to support foraging and commuting bats (Collins, 2016). This is mainly due to the dominance of arable land across the site which is considered to be of low value for foraging and commuting bats. The mosaic of vegetation communities on site will likely support a range of invertebrate prey that could potentially support local populations of a number of different bat species. The habitats on site are also reasonably well connected with further suitable foraging and commuting habitat within the local surrounding area, including mixed-use lowland farmland with native hedgerow networks, stands of broadleaved and mixed woodland, scrub, railway embankments/cuttings, and residential gardens.

Activity transect surveys

2015 - 2016

Low numbers of common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle were recorded foraging and commuting on site during this period and this activity was largely concentrated around the south-western boundaries of the site. A summary of each activity transect surveys is provided below, whilst the full survey results are included as appendix VI.

Dawn survey – 18th September 2015

No bats were recorded.

Dusk survey – 22nd September 2015

Individual common pipistrelle and soprano pipistrelle bats were both recorded foraging within the site between 20.01 and 20.37. This activity was mostly recorded over hedgerow H1 and the wooded shelterbelt along the south-western boundaries of the site.

Dusk survey – 23rd August 2016

Individual common and soprano pipistrelle bats were both recorded foraging within the site between 20:41 and 22:16. This activity was predominantly concentrated over hedgerow H1 and the wooded shelterbelt along the south-western boundaries of the site.

2019 – 2020

Low to moderate numbers of common pipistrelle and low numbers of soprano pipistrelle, noctule (*Nyctalus noctula*), serotine (*Eptesicus serotinus*) and a long-eared bat species (*Plecotus sp.*) were recorded foraging and commuting on site during this period. This activity was largely concentrated over hedgerow H2 along the northern site boundary, over the woodland shelterbelts adjacent to the western boundary, and over hedgerow H1 along the south-western boundary.

Low numbers of the rare, Annex II species barbastelle (*Barbastella barbastellus*) were recorded foraging and commuting on site during the August and September 2019 transects. This activity was mostly concentrated over hedgerow H2 along the northern site boundary, with a minor amount of activity also recorded over the woodland shelterbelts along the western boundary.

A summary of each activity transect surveys is provided below, whilst the full survey results are included as appendix VIII.

Dusk survey – 19th August 2019

Individuals of common pipistrelles and the rare, Annex II species barbastelle were recorded foraging and commuting within the site between 20:59 and 22:18. Common pipistrelles were recorded on eleven occasions and this activity was mostly concentrated over hedgerow H2 along the northern site boundary, hedgerow H1 along the south-western boundary and the woodland shelterbelts along the western boundary. Barbastelle were recorded on three occasions, twice over hedgerow H2 along the northern site boundary and once over the woodland shelterbelts along the western boundary.

Dusk survey – 17th September 2019

Common pipistrelles were recorded on eleven occasions between 19:40 and 20:58 with a maximum of two individuals recorded. This included foraging and commuting activity that was mostly concentrated over hedgerow H2 along the northern site boundary, hedgerow H1 along the south-western boundary and the woodland shelterbelts along the western boundary. An individual soprano pipistrelle was recorded on one occasion foraging/commuting over the woodland shelterbelts along the western site boundary at 21:12. An individual noctule bat was recorded on one occasion foraging/commuting over the woodland shelterbelts along the western site boundary at 19:39. An individual long-eared bat species was also recorded on one occasion foraging/commuting over the woodland shelterbelts along the western site boundary at 21:13. Barbastelle were recorded foraging/commuting over hedgerow H2 along the northern site boundary on four occasions between 20:24 and 20:50.

Dusk survey – 15th October 2019

Common pipistrelles were recorded on 14 occasions between 18:34 and 20:17 with a maximum of two individuals recorded, this included foraging and commuting activity that was mostly concentrated over hedgerow H2 along the northern site boundary and the woodland shelterbelts along the western boundary.

Dusk survey – 21st April 2020

Common pipistrelles were recorded on 14 occasions between 20:52 and 21:40 with a maximum of two individuals recorded, this included foraging and commuting activity that was mostly concentrated over the woodland shelterbelts along the western boundary and hedgerow H2 along the northern site boundary. A possible serotine bat was recorded on one occasion at 21:01 commuting from west to east over hedgerow H2 along the northern site boundary.

Dawn survey – 20th May 2020

Individual common pipistrelle bats were recorded on seven occasions between 03:20 and 04:15, this included foraging and commuting activity that was mostly concentrated over

hedgerow H2 along the northern site boundary and over the woodland shelterbelts along the western boundary. A single pass was recorded over hedgerow H1 along the south-western boundary.

Dusk survey – 14th July 2020

A single noctule bat was recorded on two occasions between 21:35 and 21:44 foraging over the former arable field at the south of the site. Individual common pipistrelle bats were recorded on three occasions between 22:20 and 23:20, this included foraging and commuting activity that was concentrated over the woodland shelterbelt and scattered scrub along the north-western boundaries of the site.

Static detector monitoring

The results of the static monitoring are presented in table 6 below which summarises the species recorded and the total number of bat passes per species at each static detector during each month of recording. A total of six bat species and one bat genus were recorded during the static monitoring, including common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), serotine, noctule, barbastelle, and *Myotis* bat species. The static detector locations are depicted on the plan included as appendix VII.

Table 6: Summary of total bat passes recorded during static monitoring

Static detector 1 (South-west boundary hedgerow)						
	September 2019	**October 2019**	**April 2020**	**May 2020**	**July 2020**	**Total passes**
Common pipistrelle	0	1	36	111	46	**194**
Soprano pipistrelle	0	1	2	5	0	**8**
Nathusius' pipistrelle	-	-	-	-	-	**-**
Noctule	0	5	0	1	6	**12**
Serotine	0	2	4	3	0	**9**
Myotis sp.	0	4	0	10	0	**14**
Barbastelle	0	0	0	3	0	**3**
Static detector 2 (Northern boundary hedgerow)						
	September 2019	**October 2019**	**April 2020**	**May 2020**	**July 2020**	**Total passes**
Common pipistrelle	47	0	32	31	36	**146**
Soprano pipistrelle	5	0	5	0	1	**11**
Nathusius' pipistrelle	0	0	4	0	0	**4**
Noctule	3	0	8	0	6	**17**
Serotine	0	0	7	0	9	**16**
Myotis sp.	6	0	5	10	0	**21**
Barbastelle	32	0	47	0	0	**79**
Total passes across all months and all static detectors						
Common pipistrelle	**340**					

Soprano pipistrelle	**19**
Nathusius' pipistrelle	**4**
Noctule	**29**
Serotine	**25**
Myotis sp.	**35**
Barbastelle	**82**

Common pipistrelle was the most frequently recorded bat species during the static monitoring with a significantly higher total number of passes recorded compared with the other species/genus, the highest number of passes by common pipistrelle was recorded on static monitor 1. Barbastelle was the second most frequently recorded bat species with the highest number of passes recorded on static monitor 2, the majority of these passes were recorded during two peaks in activity during September 2019 and April 2020, only three barbastelle passes were recorded on static monitor 1 in May 2020. The other species and genus, including Nathusius' pipistrelle, noctule, serotine and *Myotis* bats, were all recorded in low numbers during the static monitoring, with slightly higher numbers of passes recorded on static monitor 2 in all cases and Nathusius' pipistrelle only being recorded on static monitor 2.

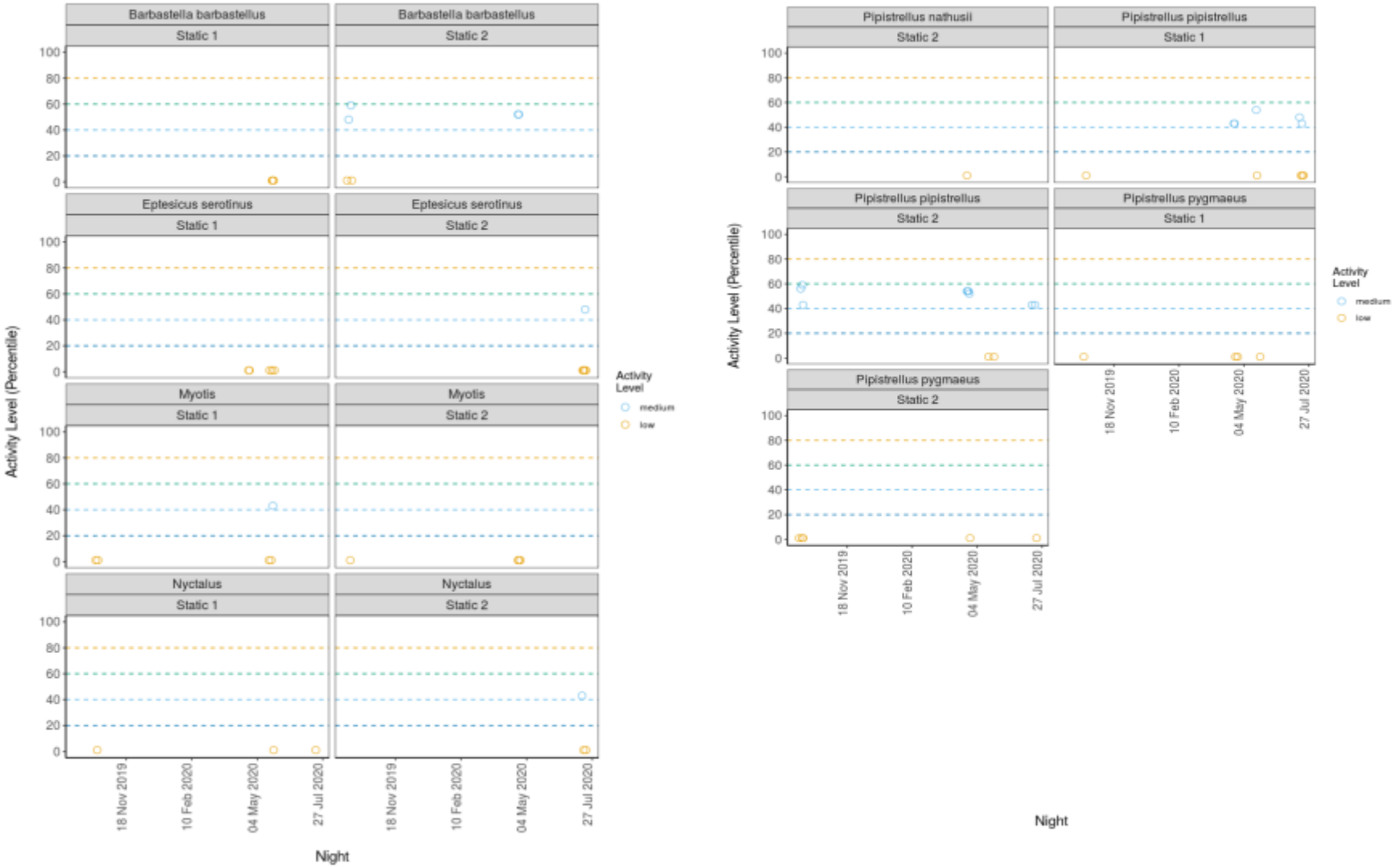
Table 7 below provides a summary of the nights where recorded bat activity for each species/genus falls into each activity band. Figure 1 below provides a visual representation of the levels of recorded bat activity for each species on each static monitor during each month.

Table 7: Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Static monitor	Activity band				
	Nights of High Activity	Nights of Moderate / High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Common pipistrelle					
1	0	8	5	4	5
2	0	5	9	5	2
Totals	**0**	**13**	**14**	**9**	**7**
Soprano pipistrelle					
1	0	0	0	2	4
2	0	0	0	3	5
Totals	**0**	**0**	**0**	**5**	**9**
Nathusius' pipistrelle					
1	-	-	-	-	-
2	0	0	0	1	1
Totals	**0**	**0**	**0**	**1**	**1**
Noctule					
1	0	0	0	4	3

Static monitor	Activity band				
	Nights of High Activity	Nights of Moderate / High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
2	0	0	1	4	2
Totals	**0**	**0**	**1**	**8**	**5**
Serotine					
1	0	0	0	2	5
2	0	0	1	3	4
Totals	**0**	**0**	**1**	**5**	**9**
Myotis sp.					
1	0	0	1	3	4
2	0	1	0	3	4
Totals	**0**	**1**	**1**	**6**	**8**
Barbastelle					
1	0	0	0	0	3
2	0	3	4	1	2
Totals	**0**	**3**	**4**	**1**	**5**

Figure 1: The activity level (percentile) of bats recorded across each night of the bat survey, split by static monitor and species.



The results presented in table 7 and figure 1 above show:

- Common pipistrelle activity was at moderate levels for the most part, with notable peaks in activity recorded on both static monitors 1 and 2 in May and July 2020, and on static monitor 2 in September 2019.
- Barbastelle activity was at moderate to low levels, with notable peaks in activity recorded on static monitor 2 in September 2019 and April 2020.
- Soprano pipistrelle activity was at low levels, with no notable peaks in activity recorded.
- Nathusius' pipistrelle activity was only recorded at a low level on static monitor 2 in April 2020.
- Noctule activity was at low levels for the most part with no significant peaks in activity recorded for this species.
- Serotine activity was at low levels for the most part with no significant peaks in activity recorded for this species.
- Myotis bat species activity was recorded at low levels for the most part with no significant peaks in activity recorded for this genus.

Key areas of the site for bats

The key areas of habitat on site where the most significant levels of foraging/commuting activity were recorded during the transect surveys and static detector monitoring include hedgerow H2 along the northern site boundary, hedgerow H1 along the south-western boundary and the woodland shelterbelts along the western boundary. Hedgerow H2 and the woodland shelterbelts were also identified as key habitat areas on the site being used by the rare Annex II species barbastelle. Very limited levels of bat activity were recorded over the open arable land indicating that this habitat is of little value to foraging and commuting bats. There was also a limited level of bat activity recorded at the far north-west of the survey area, which indicates that the habitat here, consisting of sparse scattered scrub and some tall ruderal, is relatively poor for foraging and commuting bats.

Value of the habitat for foraging/commuting bats

The value of the habitat on site for foraging and commuting bats was assessed and the scores are presented in tables 8 and 9 below. Scores have been calculated on the basis that low numbers of rarer bat species, in particular barbastelle, were recorded during the transect survey and static monitoring, a moderate number of bat roosts are present within the locality, and foraging habitat/commuting routes are deemed to be of low to moderate quality and used on a regular basis by low numbers of bats.

Table 8: Scores for foraging habitat on the site off Empress Way (bold indicates the relevant criteria)

Species	Number of bats	Roosts/potential roosts nearby	Foraging habitat characteristics
Common (2)	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
Uncommon (3)	-	**Small number (3)**	Suburban areas or intensive arable land (2)
Rarer (5)	**Small number of bats (10)**	Moderate number/Not known (4)	**Isolated woodland patches, less intensive arable and/or small towns and villages (3)**
-	-	Large number of roosts, or close to a SSSI for the species (5)	Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands and wetland areas (5)
5	10	3	3
Total score			**21**

Table 9: Scores for commuting routes on the site off Empress Way (bold indicates the relevant criteria)

Species	Number of bats	Roosts/potential roosts nearby	Commuting habitat characteristics
Common (2)	Individual bats (5)	None (1)	Absence of (other) linear features (1)
Uncommon (3)	-	**Small number (3)**	Unvegetated fences and large field sizes (2)
Rarer (5)	**Small number of bats (10)**	Moderate number/Not known (4)	**Walls, gappy or flailed hedgerows, isolated well-grown hedgerows, and moderate field sizes (3)**
-	-	Large number of roosts, or close to a SSSI for the species (5)	Well-grown and well-connected hedgerows, small field sizes (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Complex network of mature well-established hedgerows, small

Species	Number of bats	Roosts/potential roosts nearby	Commuting habitat characteristics
			fields and river/streams (5)
5	10	3	3
Total score			**21**

Using the scoring system above, the foraging habitat and commuting routes across the site are considered to be of County Level importance for bats.

Further mitigation measures relating to foraging and commuting bats are provided in section 5.5.

Hazel dormouse

The native hedgerows, scrub and offsite broadleaved plantation woodland shelterbelts all provide sub-optimal habitat for dormouse, including a variety of food plants and flowering shrubs, such as bramble, hazel, elder and hawthorn, and some dense shrub cover potentially suitable as nesting sites. The two hedgerows on site also have connectivity with further suitable dormouse habitat within the surrounding area, including scrub, hedgerow networks and broadleaved woodlands. The on-site habitat connectivity for dormice across the entire northern and western site boundaries is considered to be relatively poor/fragmented with considerable gaps present. The desk study returned 12 records of dormice, all of which are from Collingbourne Wood located within two kilometres to the north of the site. No evidence of dormice, such as opened hazel nuts or nests, was recorded on site during the update walkover survey.

The existing habitats of suitability for dormice, both on and off-site, will be retained and unaffected by development. The new woodland and hedgerow planting detailed in section 5.9 will also ensure a significant positive increase in suitable habitat for dormice on site, maintaining and improving connectivity with the surrounding landscape. Taking these factors into account, it is considered highly unlikely that there will be any significant adverse impacts on dormice. No further action is required.

Great crested newt

<u>Aquatic habitat</u>

No potentially suitable aquatic habitat (breeding habitat) for great crested newt was identified on site. No other potentially suitable aquatic habitat was identified within a 500 metre radius of the site (median dispersal distance for great crested newt), however there is a single small waterbody located approximately 555 metres to the south-west.

There are a further two waterbodies located approximately 1.3 and 1.6 kilometres to the south-west within the Swinton Barracks complex.

Terrestrial habitat

The mosaic of habitats on site, including arable fields, tall ruderal vegetation, native hedgerows and scrub, as well as the offsite woodland shelterbelts, all provide suitable terrestrial habitat for great crested newt with opportunities for foraging and potential hibernacula features.

Desk study records

The desk study returned two records of great crested newt (dated 2016) within the Swinton Barracks complex, approximately 1.5 kilometres to the south-west of the site, indicating the presence of a medium-sized adult population. One EPSM licence and four Natural England survey licence returns for great crested newt were also identified in this location using the MAGIC website. It is considered that these records and licence details are most likely associated with the two waterbodies identified in this locality.

The desk study also returned a total of four great crested newt records (dated 1972 and 1976) between approximately 0.9 and 1 kilometres to the north and north-west of the site.

The possible implications of the development proposals in relation to great crested newt are discussed in section 5.6.

Nesting birds

The mosaic of habitats on site, including arable fields, tall ruderal vegetation, native hedgerows and scrub, as well as the offsite woodland shelterbelts, provide suitable nesting habitat for both arboreal and ground-nesting bird species. The arable fields and tall ruderal margins could provide suitable nesting habitat for notable/declining ground nesting bird species such as yellowhammer (*Emberiza citrinella*), lapwing (*Vanellus vanellus*) and skylark (*Alauda arvensis*). Skylark have been observed on the site during previous surveys. The MAGIC website identifies that site lies within a priority area for countryside stewardship measures addressing lapwing habitat issues.

Further recommendations relating to nesting birds are provided in section 5.7.

Reptiles

The hedgerows, scrub and tall ruderal margins on site, as well as the offsite woodland shelterbelts, all provide sub-optimal habitat for common reptile species such as slow-worm, grass snake and common lizard. The desk study returned six records of slow-worm, four records of grass snake and three records of common lizard within two kilometres of the site.

The results of the targeted reptile survey conducted on site in 2015 are presented in table 10 below and depicted on the plan included as appendix XI. To summarise, good populations of both slow-worm and common lizard were recorded on site with maximum

counts of seven adult common lizard and five adult slow-worm recorded during any one survey visit (Froglife, 1999). All reptiles encountered during the survey were recorded along the northern boundary area of the site, which adjoins a railway line and encompasses native hedgerow H2, scattered scrub and margins of tall ruderal. This area of the site is therefore considered to be of greatest value for reptiles.

Table 10: Reptile survey results

Date	Time	Weather (Cloud cover)	Temp (°C)	Reptiles		Other
				Common lizard	Slow worm	
13/09/15	14.00	Sunny 2/8	16	10 including 3 juvenile	2 male, 2 female, 2 juvenile	-
18/09/15	08.00	Cloudy 8/8	12.5	0	0	-
21/09/15	18.15	Sunny 2/8	15.0	0	0	-
22/09/15	17.15	Overcast 7/8	12.5	1 juvenile	0	-
24/09/15	10.30	Overcast 7/8	15	1 male	2 female, 1 male	-
28/09/15	14.30	Sunny 0/8	18	0	0	-
30/09/15	10.30	Sunny 3/8	17	0	2 male, 3 female, 1 juvenile	-

Further mitigation measures for reptiles are outlined in section 5.8.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The site encompasses an area of arable land as well as some marginal stands of tall ruderal vegetation, two native hedgerows and some scattered scrub. There are also broadleaved plantation woodland shelterbelts situated offsite adjacent to the western boundary. The majority of the site which encompasses arable land with some minor areas of tall ruderal and scrub is considered to be of low ecological value. The two existing native hedgerows are considered to be the most ecologically valuable features on site. The following potential impacts to habitats, species and designated sites are likely to occur in the absence of mitigation:

- Development of the surveyed site could result in indirect impacts to statutory designated sites.
- Development of the site could result in damage and/or degradation of native hedgerows.
- Development of the site could result in damage and/or degradation of offsite plantation woodland shelterbelts.
- Development of the site could result in the loss of suitable habitat for badgers and potential injury/deaths of individual badgers during construction.
- Development of the site could result in disturbance or harm to bats roosting in trees.
- Development of the site could result in the loss of suitable foraging and commuting habitat for bats and disturbance to bats caused by lighting systems.
- Development of the site could result in damage and destruction of bird nesting habitat and individual birds' nests.
- Development of the site could result in the loss of suitable reptile habitat and injury and/or killing of individual reptiles.

5.1 Designated sites

The development site lies 3.5 kilometres to the south-east of the Salisbury Plain SPA/SAC/SSSI designated sites. The SAC is designated for the presence of the Annex I habitats 5130 *Juniperus communis* formations on heaths or calcareous grassland and 6210 semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*), and for populations of the Annex II species marsh fritillary (*Euphydryas aurinia*). The site is designated as an SPA for its breeding population of stone curlew (*Burhinus oedicnemus*) and over-wintering hen harrier (*Circus cyaneus*).

Taking into account the considerable intervening distance between the Salisbury Plain designated sites and the proposed development site, no impacts on the SAC/SPA/SSSI citation features are anticipated. However, stone curlew breeding success is vulnerable to human disturbance, particularly from dog walkers. Salisbury Plain is a popular location for recreation and it is known to attract visitors from approximately a 15 kilometre radius. Additional housing within the visitor catchment of Salisbury Plain is likely to increase the level of recreational pressure on the designated sites and disturbance impacts on stone curlew.

The development proposal is for a "major development" of more than 10 houses and the site lies within the 15 kilometre visitor catchment of the Salisbury Plain SPA, therefore the charges set out in the Salisbury Plain SPA HRA and Mitigation Strategy document will apply (Wiltshire Council,

2018). Wiltshire Council requires financial contributions towards mitigation for the Salisbury Plain SPA to be secured for residential development within the visitor catchment through S106 agreements. As the proposed development site lies within 4 kilometres of the Salisbury Plain SPA, the higher charge of £109.82 per dwelling will apply and this will be secured through a S106 agreement if planning permission is granted. Payments will increase annually in line with the associated index.

5.2 Native hedgerows

5.2.1 Summary of findings

There are two native hedgerows on site. Hedgerow H1 comprises an established native hedgerow with a good variety of woody species, including a low number of standard ash trees, but the field layer is densely shaded and species poor. There is a large gap in the central area of the hedgerow. Hedgerow H2 comprises an established native hedgerow, although it is considered to be defunct due to the presence of lots of large gaps. This hedgerow comprises a good variety of woody species including a low number of standard ash trees, however the field layer is densely shaded and mostly species poor.

The two native hedgerows on site are considered to be of ecological value and will be retained within the development layout.

5.2.2 Mitigation

The existing/retained hedgerows and any new hedgerow planting on site should be protected during the construction phase in accordance with the British Standards Institute guidance (British Standards Institute, 2012) by installing Heras fencing along the root protection zones before works.

The existing/retained hedgerows on site will be enhanced by planting up any gaps with native shrubs, as well as planting native standard trees at suitable locations with a minimum spacing of 20 metres to allow for full crown development. Recommended species to use for this planting are listed in table 12 below (under section 5.9).

New native hedgerow planting on site is recommended as an enhancement measure in section 5.9.

5.3 Plantation woodland shelterbelts

5.3.1 Summary of findings

There are sections of broadleaved plantation woodland which form shelterbelts located offsite adjacent to the western and north-western boundaries. These woodland stands comprise a canopy of semi-mature to mature specimens of native tree species, and a well-established understorey of native shrubs and young trees. The field layer is densely shaded and species-poor. This habitat lacks botanical interest but is nevertheless considered to be of moderate ecological value.

5.3.2 Mitigation

The woodland shelterbelt habitat should be protected during the construction phase in accordance with the British Standards Institute guidance (British Standards Institute, 2012) by installing Heras fencing along the root protection zones.

5.4 Badgers

5.4.1 Summary of findings

The mosaic of habitats on site, including arable fields, tall ruderal vegetation, native hedgerows and scrub, as well as the offsite woodland shelterbelts, provide sub-optimal foraging and sett building habitat for badger. The desk study returned nine records of badger within two kilometres of the site, however no evidence of badger activity was identified during the update walkover survey in 2019.

Precautionary measures to safeguard badgers during the construction phase of the development have been detailed below.

5.4.2 Mitigation

If at any point badgers and/or setts are identified on site, an ecologist will be contacted for further advice. Advice may include ceasing all works within 20 metres of the sett/s and other precautionary measures, or where necessary, a licence from Natural England could be required.

Measures to prevent potential impacts to commuting and foraging badgers during the construction phase will be included in a Construction Management Plan (CMP) for the development. These measures will include the following, in accordance with Natural England guidelines:

- Enclose all works areas with Heras fencing to dissuade badgers from entering the construction site.
- Locate any spoil/earth heaps well away from identified badger activity and check on a daily basis for any signs of digging by badger.
- Minimise night-working to avoid disturbance to any badgers present within the locality.
- If any excavations are left open at night, leave an earth/wooden ramp to allow any animals that fall in to escape and check work areas daily to ensure that no animals are trapped.
- Cap any pipes left over-night on site to avoid animals becoming trapped.

The recommended ecological enhancement measures for the site, including extensive broadleaved woodland planting, new hedgerow planting and creation of wildflower grassland habitat, will all provide good quality foraging habitat on site for badger in the long-term and maintain connectivity with the surrounding landscape.

5.5 Bats

5.5.1 Summary of findings

Two mature standard ash trees at the western end of hedgerow H2 (north-western corner of the site) are considered to hold low potential to support roosting bats, however these trees will be retained and unaffected. All other trees on site were assessed as holding negligible potential to support roosting bats, however this assessment would now require an update.

The site is considered to be of County Level importance for bats with a total of six species and two genus recorded and low to moderate quality foraging/commuting habitat available on site and within the surrounding locality. Common pipistrelle, soprano pipistrelle, Nathusius pipistrelle, serotine, noctule, the rare Annex II species barbastelle, long-eared bat species and Myotis bat species were all recorded on site, mostly in low numbers, with common pipistrelle being the most frequently recorded species. Hedgerow H2 along the northern site boundary, hedgerow H1 along the south-western boundary, and the woodland shelterbelts along the western boundary have all been identified as the most important areas of the site for foraging/commuting bats. Hedgerow H2 has also been identified as key habitat feature on the site being used by the rare Annex II species barbastelle. This species has also shown some use, to a lesser extent, of the habitat features along the western site boundary, including the woodland shelterbelt and hedgerow H1. The arable land on site has been identified to provide limited value for foraging and commuting bats. Further suitable foraging and commuting habitat within the surrounding locality includes lowland farmland, native hedgerow networks, stands of woodland, scrub, railway embankments/cuttings, and residential gardens.

The proposed development will be almost entirely confined to the low value arable land on site and the habitat features identified as key areas for foraging and commuting bats will be retained. The development may result in disturbance impacts on bats as a result of lighting systems, both during the construction and operational phases.

5.5.2 Mitigation

Roosting habitat (trees)

It is advised that an update bat roost assessment of any existing trees on site requiring felling or management should be undertaken prior to any such works.

Foraging/commuting habitat

The proposed development layout will retain, protect and enhance the existing habitat features of greatest value to foraging and commuting bats (see sections 5.2 and 5.3), there will also be a substantial amount of good quality foraging and commuting habitat created on site, including broadleaved woodland planting, species-rich native hedgerow planting with standard trees and areas of native wildflower grassland (refer to section 5.9 and appendix XII). These measures will provide a considerable net increase in high value foraging and commuting habitat on site which will support local bat populations and enhance habitat connectivity around the site perimeter and

with the surrounding landscape. It is considered that these measures will also benefit the rare species barbastelle in particular by providing new foraging habitat and commuting corridors along the eastern and southern boundaries of the site, as well as enhancing local habitat connectivity.

Lighting

The impact of additional lighting as a result of the proposed development will be minimised to that necessary and detailed as part of the submission of a Lighting Strategy by discharge of planning condition. The Lighting Strategy will give consideration to the following measures:

- Directing external lighting within the development layout only to the areas where it is needed, including to meet Wiltshire Council standards for the adoption of roads by the local highway authority. The allocated habitat areas on site forming the primary ecological mitigation and enhancement for the development, including the retained and planted hedgerows, woodland planting along the eastern and southern boundaries, and the areas of wildflower grassland creation, will all be maintained as dark/unlit zones as far as possible.

- Considered selection and design of the lighting systems across the development layout with the aim of minimising light pollution and light-spill.

- Use of alternative lighting systems such as low height bollard lamps or other downward directional luminaires, and by using accessories such as cowls or hoods to minimise light spill.

- Use of low intensity LED luminaires which lack UV elements, are of a warm white spectrum (ideally <2700Kelvin), and with peak wavelengths higher than 550nm.

- Limiting the height of any lighting columns wherever feasible.

- Preferentially using security lighting that is set on a timer and only triggered at waist height.

Construction phase

A number of measures to avoid/limit the disturbance impacts on foraging/commuting bats will be incorporated into a Construction Management Plan (CMP) for the development works. Such measures will likely include restrictions on working hours during the bat activity season and limitations on the use of external lighting systems.

5.6 Great crested newt

5.6.1 Summary of findings

The identified pond located approximately 555 metres to the south-west of the site is just outside of the typical 500 metre dispersal distance used to assess impacts from development on great crested newt. However, the identified presence of a great crested newt population within the Swinton Barracks complex further to the south-west increases the likelihood that that this pond may also support great crested newt, it is also know that great crested newt are capable of

dispersing over greater distances than 500 metres across land (English Nature, 2001). Taking these factors into account it is therefore considered there is a minor possibility that great crested newt could be utilising suitable terrestrial habitat in the south-west of the site and therefore be at risk of harm during site preparation for the construction phase.

The desk study also returned a total of four great crested newt records between approximately 0.9 and 1 kilometres to the north and north-west of the site. Taking into account the considerable intervening distances between the development site and these records, as well as the developed urban areas of Ludgershall which surround the site to the north and north-west, including the A342 highway, which would all present a significant barrier to newt movements, it is therefore considered highly unlikely that any great crested newt populations in those areas to the north and north-west would disperse to the development site. No further actions regarding these great crested newt records are recommended.

5.6.2 Mitigation

Taking into account the considerable intervening distance between the development site and the nearest suitable waterbody to the south-west, it is therefore considered that the risk of harm to great crested newt during site preparation (pre-construction ground works) is minimal and that further targeted surveys for the species is unnecessary. Instead, as a precaution, a supervised destructive search of a 50 metre width zone alongside the southern and south-western boundaries of the site, as depicted on the plan included as appendix IX, will be conducted following a non-licenced method statement. The method statement will detail a specific precautionary working methodology as outlined below.

Precautionary working methodology for the destructive search.

- A licenced great crested newt ecologist must be present on site to supervise all of the destructive search across the zone of land indicated on the plan included as appendix IX.

- In the first instance, the great crested newt ecologist will work alongside contractors to clear any ruderal vegetation within the destructive search area. This will involve the great crested newt ecologist undertaking a thorough hand search of any ruderal vegetation immediately prior to contractors cutting it to ground level using mechanised hand tools, such as strimmers and/or brush-cutters. This process will continue until all vegetation across the destructive search area has cut to ground level. Once this is completed, then all of the arisings will be collected and removed from the site to avoid these being colonised temporarily by other fauna such as reptiles and small mammals.

- Once the vegetation clearance work has been completed, then a supervised destructive search of the area, comprising a topsoil strip with the use of an excavator, will be undertaken and this will render the area unsuitable for great crested newt. The licenced ecologist will work alongside the excavator and supervise during the topsoil strip, they will also repeatedly check the excavated (scraped) earth for presence of great crested newt or any other fauna.

- To avoid any impacts on hibernating great crested newt the above works must be undertaken outside of the winter months between March and November inclusive, where temperatures are above 10°C.

- No site preparation works (pre-construction ground works) or any other construction-related activities will take place in the southern and south-western areas of the site until the destructive search has been completed.

- If a great crested newt is discovered on site during the proposed works, then all works must cease and Natural England will be consulted.

5.6.3 Enhancement

The development layout will include a substantial amount of good quality terrestrial habitat of suitability for great crested newt, providing potential foraging, refuge and hibernation opportunities and strong connectivity with the surrounding landscape. This will include hedgerow retention and enhancement, new hedgerow planting, broadleaved woodland planting, creation of wildflower grassland habitats, installation of drainage swales which will be seeded with a native damp grassland mix, provision of artificial hibernaclum, and provision of numerous log and brushwood heaps (refer to sections 5.2, 5.8 and 5.9 and appendix XII).

5.7 Nesting birds

5.7.1 Summary of findings

The mosaic of habitats on site, including arable fields, tall ruderal vegetation, native hedgerows and scrub, as well as the offsite woodland shelterbelts, all provide suitable nesting habitat for both arboreal and ground-nesting bird species, including notable/declining ground nesting species such as yellowhammer, lapwing and skylark.

5.7.2 Mitigation

<u>All nesting bird species</u>

The following precautions should negate the risk of disturbing, harming or contributing to the demise of nesting birds:

- All vegetation clearance should ideally be undertaken outside of the bird nesting season which is considered to run from March to August inclusive. Where any vegetation must be cleared within the nesting bird season, it must first be checked by an ecologist for the presence of nesting birds (including both arboreal and ground nesters) immediately prior to clearance. Should any active nests be encountered, the clearance in those particular areas must be postponed and a suitable protection zone established until either the nestlings have fledged or the nest is abandoned.

- The recommended ecological enhancement measures for the site, including extensive broadleaved woodland planting, native hedgerow planting, creation of wildflower grassland habitat, and provision of numerous integrated nesting features on the new residential housing (refer to section 5.9) will all provide good quality nesting and foraging habitat on site for a broad range of different bird species in the long-term and maintain connectivity with the surrounding landscape.

Lapwing and skylark

A specific off-site area of land, located approximately 540 metres to the south of the proposed development and approximately 13.8ha in size, will be used to create suitable breeding habitat for both lapwing and skylark and thereby provide compensation for loss of habitat resulting from the land-take of the development. The location is considered to be ideal for this purpose as it is set within a quite rural area comprising mixed farmland, with only small country roads a limited number of existing properties.

This compensation area will comprise a central section of land, approximately 9.2ha in size that will be farmed as arable land and used for growing spring sown cereals. Within this section of arable land a total of three hectare-sized bare plots will be created, at an even spacing and set back at least 100 metres from any hedgerows or tree cover, to provide suitable nesting sites for both lawing and skylark. The bare plots will be created by either spraying off the crop or leaving the area undrilled. The surrounding margins of the lapwing and skylark breeding area (land managed as arable) will be used to create areas of wildflower grassland using an appropriate native seed mixture suitable for calcareous soils, such as Emorsgate EM6 (Emorsgate Seeds, 2022). This grassland will then function as areas of cover, refuge and foraging for recently hatched lapwing and skylark chicks when the adult birds move the hatched chicks away from the open nesting sites and into taller vegetation.

In addition to the above measures, new species-rich native hedgerows will be planted along the north-western and south-western boundaries of the lapwing and skylark mitigation area in order to provide natural screening against the adjacent roads and farm buildings.

The proposed compensation area for breeding lapwing and skylark and the habitat creation measures are depicted on the plan included as appendix X.

5.8 Reptiles

5.8.1 Summary of findings

Good populations of both slow-worm and common lizard were recorded on site and the northern boundary area of the site was identified as being of greatest value for reptiles.

A mitigation strategy has been devised to ensure that the favourable conservation status of slow-worm and common lizard is maintained and the site is enhanced for reptiles. Precautionary measures will also be implemented to prevent injuring or killing of reptiles during site preparation works.

5.8.2 Mitigation

Taking into account that the development footprint will mostly be confined to the existing arable land which is of poor suitability for reptiles, the habitat features of greatest value for reptiles, i.e. hedgerow H2 along the northern site boundary, will be retained/enhanced, and the high level of suitable reptile habitat creation being proposed on site, it is therefore considered that a full trapping and translocation exercise would be unnecessary and disproportionate. Instead, habitat manipulation works will be undertaken to temporarily disperse reptiles out of the development area and into suitable adjacent habitat to the north and east. These works will be undertaken in line with the following methodology:

- Vegetation clearance will be supervised by a suitably qualified ecologist at all times.
- Vegetation clearance works will only be conducted during suitable, dry weather conditions, with temperatures above 10°C, between March and October (inclusive).
- Ruderal and scrub vegetation will be cut by hand using handheld strimmers and/or brush cutters.
- The vegetation will be cut to a minimum length of 10 centimetres on the initial cut. This will encourage reptiles to disperse into adjacent suitable habitat on site to the north of the clearance area.
- Subsequent cutting to ground level can be undertaken no sooner than one hour after the initial cut.
- All arisings will be cleared from the area and removed from site to ensure that reptiles do not colonise the cut vegetation.
- The vegetation clearance will be undertaken in a directional manner to encourage reptiles to move towards adjacent suitable habitat to the north and east of the site.
- The removal of any stumps/roots will be supervised by a suitably qualified ecologist, and will be conducted during suitable, dry weather conditions, with temperatures above 10°C, between March and October, to ensure that any hibernating reptiles are not harmed.

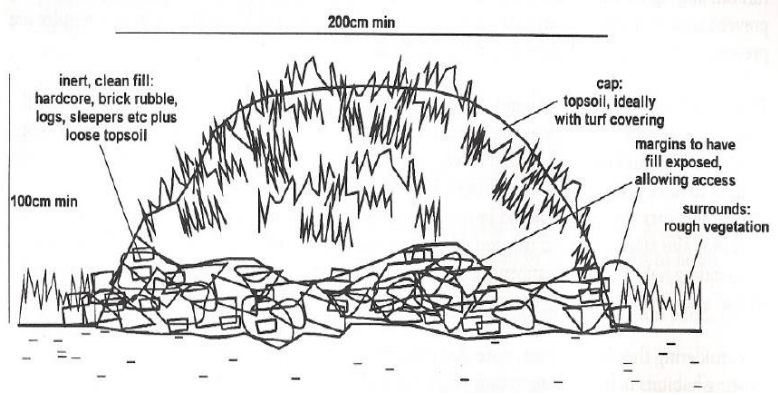
Site enhancement

A substantial amount of good quality supporting habitat for common reptile species with connectivity to the surrounding landscape will be provided within the layout of the development, this will include retention and enhancement of the existing native hedgerows, planting of new species-rich native hedgerows, extensive planting of broadleaved woodland habitat, creation of wildflower grassland habitats, and installation of drainage swales which will be seeded with a native damp grassland mix (refer to sections 5.2 and 5.9 and appendix XII). These measures will provide a significant net increase in suitable foraging and breeding habitat for reptiles, as well as opportunities for refuge and hibernation, and enhanced connectivity with the surrounding landscape.

Two artificial hibernacula will also be included within the development layout to provide an additional refuge/hibernation resource on site for reptiles. The hibernacula will be constructed alongside the belt of new broadleaved woodland planting, with one to be located adjacent to the eastern site boundary and another located adjacent to the southern boundary (see appendix IX). The hibernacula will consist of a shallow excavation, approximately 2 metres in length, 1 metre in

width and 0.5 metres in depth, which will be filled with logs and clean rubble with the excavated earth laid on top as depicted in diagram 1 below.

Diagram 1. Reptile hibernacula design



Additional ecological enhancement measures that could potentially benefit reptiles on site, include the provision of log/brushwood piles, as outlined in section 5.9.

5.9 Ecological enhancement

The proposed ecological enhancements to be incorporated within the development layout and landscaping design are outlined below. The locations of these enhancement measures are depicted on the plan included as appendix XII.

- The development layout will incorporate a substantial amount of new species-rich broadleaved woodland planting forming a continuous belt along almost the entire lengths of the eastern and southern boundaries of the site. In the long term, this woodland habitat creation will provide a valuable ecological resource and corridor for a variety of fauna including badgers, bats, birds, invertebrates, small mammals, reptiles and amphibians. The woodland planting mix will entirely comprise native tree and shrub species as detailed in table 11 below:

Table 11: Species to be included in woodland planting

Native tree species forming 80% of the woodland planting mix	Native shrub species forming 20% of the woodland planting mix
Field maple (*Acer campestre*) Silver birch (*Betula pendula*) Beech (*Fagus sylvatica*) Bird cherry (*Prunus padus*) Wild cherry (*Prunus avium*) Rowan (*Sorbus aucuparia*) Yew (*Taxus baccata*)	Dogwood (*Cornus sanguinea*) Hazel (*Corylus avellana*) Holly (*Ilex aquifolium*) Wild privet (*Ligustrum vulgare*) Dog rose (*Rosa canina*) Guelder rose (*Viburnum opulus*)

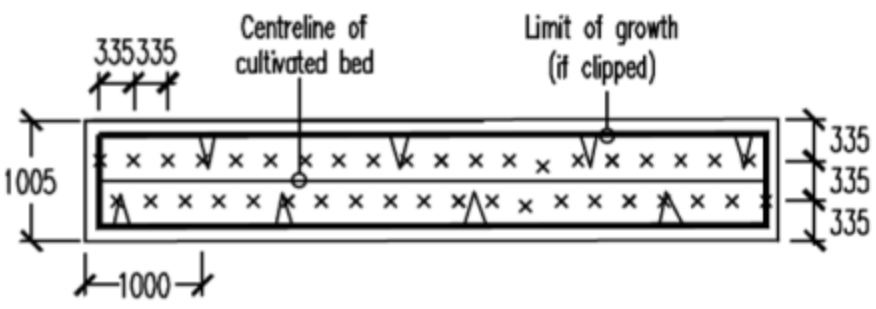
- There will also be a number of additional smaller native woodland and scrub stands created throughout the development layout (within both green spaces and residential areas) using varying mixtures of the species listed in table 11 above for this planting.

- The development layout will incorporate a small section of new species-rich native hedgerow planting along part of the south-western boundary, providing a link and enhancing connectivity between the retained native hedgerow and the offsite woodland shelterbelt (refer to the proposed landscaping and site enhancement plan included as appendix XII). There will also be additional sections of new native hedgerow planting around the edges of the central open space in the south of the site, and there will be numerous smaller sections of native hedgerow planted alongside the residential plots. All new native hedgerow planting on site will incorporate the species listed in table 12 below, adhering to the recommended planting proportions and following the planting pattern illustrated in Diagram 2 below. New hedgerow planting will also incorporate native standard trees which must be planted at a minimum spacing of 20 metres in order to allow for full crown development. Recommended species to use for standard tree planting are also listed in table 12 below.

Table 12: Species to be included in hedgerow planting

Species	Proportion within hedgerow
Spindle (*Euonymous europaea*)	10%
Hawthorn (*Crataegus monogyna*)	15%
Blackthorn (*Prunus spinosa*)	15%
Field maple (*Acer campestre*)	15%
Dog rose (*Rosa canina*)	5%
Hazel (*Corylus avellana*)	20%
Elder (*Sambucus nigra*)	10%
Crab apple (*Malus sylvestris*)	5%
Guelder-rose (*Viburnum opulus*)	5%
Pedunculate oak (*Quercus robur*), beech (*Fagus sylvatica*), large-leaved lime (*Tilia platyphyllos*), small-leaved lime (*Tilia cordata*) and/or wild service (*Sorbus torminalis*) will be used for standard tree planting within the hedgerow.	

Diagram 2: Planting Pattern



- The landscaping plans for the development will also include a substantial amount of additional scattered tree planting and 'street trees'. This tree planting will mostly comprise native species, including beech (*Fagus sylavtica*), small-leaved lime (*Tilia cordata*), field maple (*Acer campestre*), whitebeam (*Sorbus aria* agg.), pedunculate oak (*Quercus robur*), wild cherry (*Prunus avium*) and bird cherry (*Prunus padus*), as well as various cultivated, ornamental tree

species (refer to the proposed landscaping and site enhancement plan included as appendix XII). It is considered that the tree planting on site will provide a valuable habitat resource for various fauna, including invertebrates, foraging and commuting bats, and foraging birds, when they become established over time and their canopies spread out.

- An area of wildflower grassland (meadow habitat) will be created within an allocated plot in the centre of the site (refer to the proposed landscaping and site enhancement plan included as appendix XII). There will also be buffer margins of wildflower grassland habitat created around the margins of the open greenspace area in the south of the site, alongside the swales in the south of the site, alongside the woodland planting adjacent to the eastern boundary, and amongst a landscaped section with tree and shrub planting in the north-east of the site (refer to appendix XII). All wildflower grassland areas will be sown with a suitable wildflower seed mix for loamy soils, such as Emorsgate EM5 (Emorsgate Seeds, 2022), and then subsequently managed via an annual cut in late summer (late August/early September) with removal/raking off of all arisings. These wildflower grassland areas will provide a valuable new ecological resource on site which will likely benefit a range of fauna, including invertebrates, badgers, reptiles, amphibians, birds and foraging/commuting bats, whilst also contributing aesthetic value to the development.

- The proposed drainage swales and basins in the south of the site will be seeded with a suitable damp grassland or pond edge seed mixture, such as Emorsgate EP1 or similar a mixture (Emorsgate, 2022). This will provide a series of damp grassland areas in the south of the site which will add the overall habitat heterogeneity on site and provide additional resources for various fauna, including invertebrates, badgers, reptiles, amphibians, birds and foraging/commuting bats, whilst also contributing aesthetic value to the development.

- Flowering grassland seed mixtures that are tolerant of regular mowing, such as Emorsgate EL1 or similar mixture (Emorsgate, 2022), will be used to seed any new lawns or other areas of amenity grass within the layout of the development. Such grassland has greater plant diversity, provides more nectar sources for invertebrates and hence is of greater value for foraging birds, reptiles, amphibians and other fauna.

- The landscaping plans for the development will include a substantial amount of ornamental planting within the residential areas consisting of a varied mix of cultivated, ornamental shrubs and perennial herbaceous species (refer to the proposed landscaping and site enhancement plan included as appendix XII). It is considered that the ornamental planting on site will also provide a valuable long-term habitat resource for various fauna including invertebrates (especially pollinating insect species), foraging and commuting bats, and foraging birds.

- Numerous log and brushwood piles will be provided within the proposed belt of woodland planting along the eastern and southern boundaries. This will provide refugia and hibernacula features that will benefit various fauna, including invertebrates, reptiles, amphibians, and small mammals such as hedgehog.

- Up to 20% of the new dwellings on site will incorporate integrated features for roosting bats and nesting bird species such as swift (*Apus apus*), swallow (*Hirundo rustica*), house martin

(*Delichon urbica*) and house sparrow. These integrated features should be preferentially installed on the elevations of housing which face out towards adjacent retained or newly created habitat and with clear, unobstructed flight paths available.

- 20% of the new dwellings will also incorporate a minimum of two bee bricks (a nesting, refugia and/or hibernacula feature for insects, especially solitary bee species). These features should ideally be installed on southern elevations of the new housing and facing out towards adjacent retained or newly created habitat.

- All garden fencing will incorporate hedgehog-friendly gravel boards with holes of 10cm x 10cm to enable hedgehog movements around the site.

5.10 Biodiversity Net Gain

The results of the biodiversity metric calculation are provided in table 13 below. To summarise, if all the ecological enhancement measures detailed in section 5.9 and shown on the landscaping plan (appendix XII) are implemented on site, this will result in a 67.86% biodiversity net gain (BNG) resulting after development, which is a substantial increase above the site's original ecological baseline value. There will also be a 140.06% increase in hedgerow units.

N.B. This BNG calculation only relates to the development site and does not include the separate off-site area of land to be used for lapwing and skylark mitigation.

Table 13: Results of the Biodiversity Metric 3.0 calculation for the development

	Habitat Units	Hedgerow Units
On-site Baseline (existing ecological baseline prior to development)	27.67	2688.00
On-site post-development (including habitat retention, creation, enhancement & succession)	46.44	6452.72
Total net unit change (including all habitat retention/creation)	18.77	3764.72
Total net % change (including all habitat retention/creation)	**67.86%**	**140.06%**

6.0 REFERENCES

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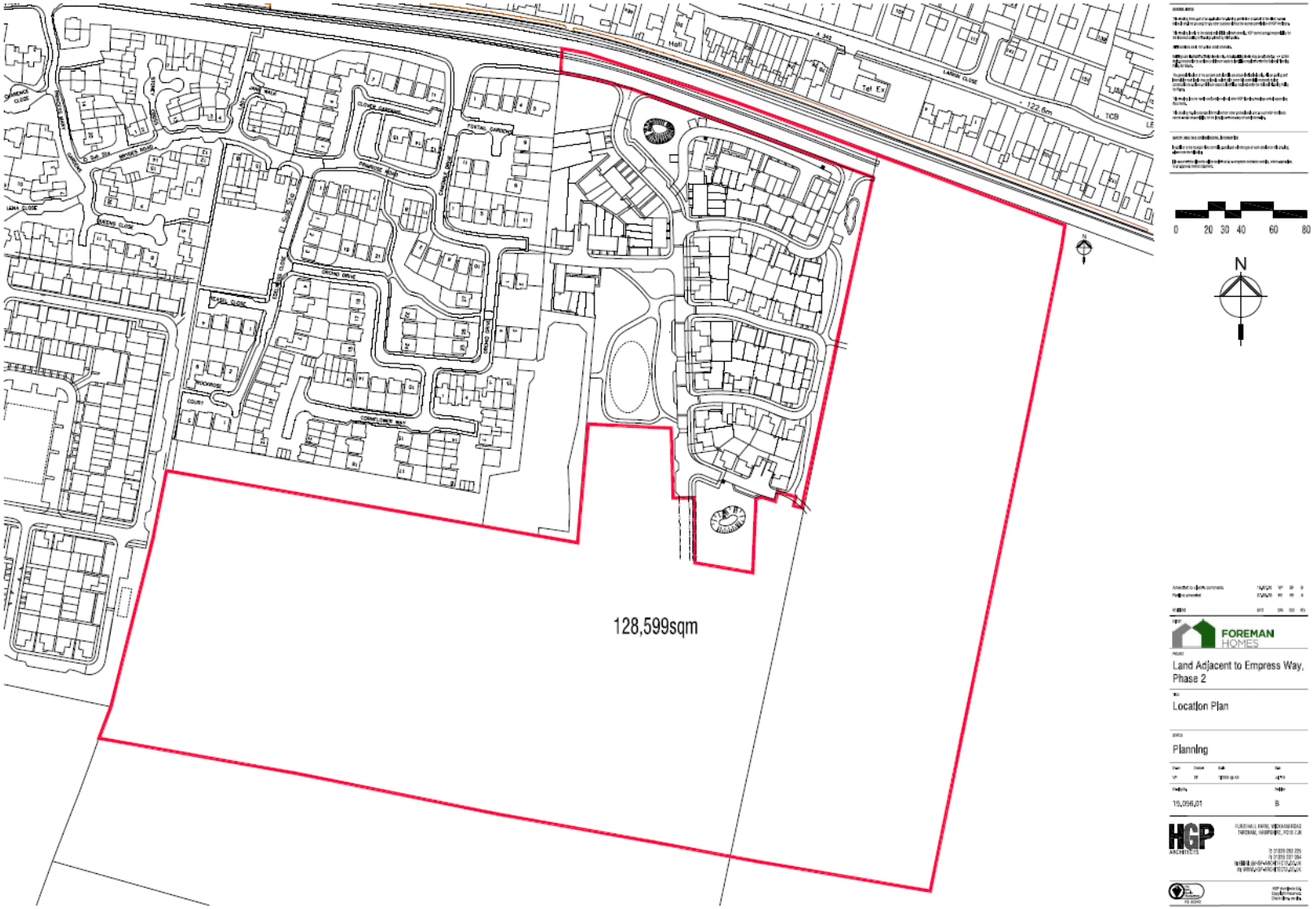
APPENDIX I: Site location and survey boundary



APPENDIX II: Proposed development plans



APPENDIX III: Phase 1 habitat map



Target notes to accompany Phase 1 habitat map

Target Note	Description
T1	Arable land which has been left fallow and has become colonised by a variety of common ruderals and arable weeds, including black-grass (*Alopecurus myosuroides*), wild oat (*Avena fatua*), scarlet pimpernel (*Anagalis arvensis*), creeping thistle (*Cirsium arvense*), spear thistle (*Cirsium vulgare*), fat hen (*Chenopodium album*), willowherb (*Epilobium sp*), petty spurge (*Euphorbia peplus*), common fumitory (*Fumaria officinalis*), common poppy (*Papaver rhoeas*), common knotgrass (*Polygonum aviculare*), dandelion (*Taraxacum* agg.), common ragwort (*Senecio jacobaea*), groundsel (*Senecio vulgaris*), hedge mustard (*Sisymbrium officinale*), prickly sow-thistle (*Sonchus asper*), smooth sow-thistle (*Sonchus oleraceus*) and speedwell (*Veronica sp*).
T2	Arable land which is currently being used for intensive rapeseed (*Brassica napus*) production.
T3	Stands of tall ruderal vegetation, species recorded include false oat-grass (*Arrhenatherum elatius*), field bindweed (*Convolvulous arvensis*), great willowherb (*Epilobium hirsutum*), common nettle (*Urtica dioica*), prickly lettuce (*Lactuca serriola*), prickly sow-thistle (*Sonchus asper*), wild oat, hogweed (*Heracleum sphondylium*), mugwort (*Artemisia vulgaris*), hedge bindweed (*Calystegia sepium*), broad-leaved dock (*Rumex obtusifolius*), spear thistle (*Cirsium vulgare*), cleavers (*Galium aparine*), common couch (*Elymus repens*) and cock's-foot (*Dactylis glomerata*).
T4	Native hedgerows. Hedgerow H1 comprises an established native hedgerow with good variety of woody species, including a low number of standard ash trees (*Fraxinus excelsior*), but the field layer was densely shaded and species poor. Hedgerow H2 comprises an established native hedgerow which is considered to be defunct due to the presence of multiple large gaps. This hedgerow comprises a good variety of woody species, including some standard ash trees at its western end, but the field layer is densely shaded and mostly species poor.
T5	Scattered scrub. Species recorded include wild cherry (*Prunus avium*), bramble (*Rubus fruticosus* agg.), ash saplings, hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*), elder (*Sambucus nigra*), hazel (*Corylus avellana*), blackthorn (*Prunus spinosa*), butterfly-bush (*Buddleja davidii*) and English elm (*Ulmus procera*).
T6	Broadleaved plantation woodland which forms shelterbelts. These woodland stands comprise a canopy of semi-mature to mature specimens of ash, whitebeam (*Sorbus aria* agg.), pedunculate oak (*Quercus robur*) and wild cherry (*Prunus avium*), and a well-established understorey of hazel, wayfaring tree (*Viburnum lantana*), field maple, blackthorn, elder, crab apple (*Malus sylvestris*), guelder rose (*Viburnum opulus*) and dog rose (*Rosa canina* agg.). The field layer is densely shaded and species-poor, it is mostly dominated by ivy, with cleavers (*Galium aparine*), bramble, traveller's joy (*Clematis vitalba*) and hedge bindweed (*Calystegia sepium*) also recorded.

APPENDIX IV: Site photographs



Photo 1: *arable land that has been left fallow*



Photo 2: *arable land which is being used for intensive rapeseed production*



Photo 3: *marginal stands of tall ruderal vegetation*



Photo 4: *native hedgerow H1*



Photo 5: *defunct native hedgerow H2*



Photo 6: *stands of mixed scrub*



Photo 7: *plantation woodland shelterbelt*

APPENDIX V: Bat transect route and areas of peak activity (2015 – 2016)



APPENDIX VI: Bat activity transect recording forms (2015 - 2016)

Dawn activity survey 18th September 2015

BAT DETECTOR / EMERGENCE & ACTIVITY SURVEY					
SURVEY LOCATION:	Ludgershall Transect	**SURVEYORS:**	Alex Coggins, Lisa Embury	**DATE:**	18/09/2015
TEMP AT START:	12.0	**SUNRISE:**	06:45	**START TIME:**	04:45
TEMP AT END:	11.0	**CLOUD COVER (oktas):**	6/8	**END TIME:**	21.06
WIND (bft):	1/12	**RAINFALL:**	Nil	**WEATHER:**	Dry, cool
TIME	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.		
No bat activity observed					

Dusk activity survey 22nd September 2015

BAT DETECTOR / EMERGENCE & ACTIVITY SURVEY					
SURVEY LOCATION:	Ludgershall Transect	**SURVEYORS:**	Pete Duffy, Katie Ford	**DATE:**	22/09/2015
TEMP AT START:	13.0	**SUNSET:**	19.06	**START TIME:**	19.06
TEMP AT END:	11.0	**CLOUD COVER (oktas):**	3/8	**END TIME:**	21.06
WIND (bft):	2/12	**RAINFALL:**	0	**WEATHER:**	Damp/mild
TIME	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.		
19.06 Stop A	-	-	-		
19.15 Stop B	-	-	-		
19.22 Stop C	-	-	-		
19.31 Stop D	-	-	-		

19.41 Stop E	-	-	-
19.49 Stop F	-	-	-
19.59 Stop G	-	-	-
20.01 Stop G	Common pipistrelle	1	Commuting heard not seen
20.03-04 G	Common pipistrelle	1	Brief call, heard not seen
20.05	Soprano pipistrelle	1	Brief calls between G and H
20.09 Stop H	-	-	-
20.14 Stop H	Soprano pipistrelle	1	Brief call heard not seen
20.17	Pipistrelle	1	Brief call heard not seen between H and I
20.19 Stop I	Pipistrelle	1	Brief call heard not seen
20.20-23 I	Common pipistrelle	1	Foraging hedgerow, heard not seen
20.26 Stop J	-	-	-
20.33 Stop A	-	-	-
20.37	Common pipistrelle	1	Commuting, heard not seen
20.44 Stop B	-	-	-
20.53 Stop C	-	-	-

Dusk activity survey 23rd August 2016

BAT DETECTOR / EMERGENCE & ACTIVITY SURVEY					
SURVEY LOCATION:	Ludgershall Transect	**SURVEYORS:**	Louisa Jones and Carl Noyce	**DATE:**	23/08/2016
TEMP AT START:	23.0	**SUNSET:**	20:14	**START TIME:**	20:14
TEMP AT END:	19.5	**CLOUD COVER (oktas):**	3/8	**END TIME:**	21:14
WIND (bft):	1/12	**RAINFALL:**	0	**WEATHER:**	Warm
TIME	**SPECIES**	**NUMBER OF BATS**	**ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.**		
20:41	Soprano pipistrelle	1	Brief pass heard not seen between G and H.		
20:43	Common pipistrelle	1	Brief pass heard not seen at point H.		
20:48	Common pipistrelle	1	Commuting from east to west between H and I.		

20:49	Common pipistrelle	1	Foraging along the hedge between H and I.
20:52	Common pipistrelle	1	Foraging at point I.
21:46	Common pipistrelle	1	Brief commute between F and G.
22:09	Common pipistrelle	1	Brief pass between H and I.
22:13	Common pipistrelle	1	Brief pass at point I.
22:16	Common pipistrelle	1	Foraging by the street light.

APPENDIX VII: Bat transect route, static detector locations and areas of peak activity (2019 – 2020)



APPENDIX VIII: Bat activity transect recording forms (2019 - 2020)

Dusk activity survey 19th August 2019

	BAT DETECTOR ACTIVITY SURVEY				
SURVEY LOCATION:	EMPRESS	**SURVEYORS:**	Alex Sinclair and Miguel Sanabria	**DATE:**	19/08/2019
TEMP AT START:	16C	**SUNSET:**	20:21	**START TIME:**	20:21
TEMP AT END:	14C	**CLOUD COVER (oktas):**	3/8	**END TIME:**	22:21
WIND (bft):	1/12	**RAINFALL:**	Nil	**WEATHER:**	Wet ground
Data Analysed Y/N:	Y	**Additional information:**	iPad 1 EMT 4		

TIME	STOPPING POINT/TARGET NOTE	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.
20:24-20:29	A	-	-	-
20:31-20:36	B	-	-	-
20:39-20:44	C	-	-	-
20:49-20:54	D	-	-	-
20:59	D-E	Common pipistrelle	1	Heard not seen, foraging
21:01-21:06	E	-	-	-
21:01	E	Common pipistrelle	1	Heard not seen, foraging
21:03	E	Common pipistrelle	1	Heard not seen, foraging
21:09-21:14	F	-	-	-
21:09	F	Common pipistrelle	1	Heard not seen, foraging

21:17-21:22	G	-	-	-
21:23	G-H	Common pipistrelle	1	Heard not seen commuting
21:24	G-H	Barbastelle	1	Heard not seen commuting
21:23	G-H	Common pipistrelle	1	Heard not seen commuting
21:25	G-H	Common pipistrelle	1	Heard not seen commuting
21:26-21:31	H	-	-	-
21:39	H-A	Barbastelle	1	Heard not seen
21:40-21:45	A	-	-	-
21:44	A	Common pipistrelle	1	Heard not seen commuting
21:27-21:52	B	-	-	-
21:48	B	Common pipistrelle	1	Heard not seen commuting
21:55-22:00	C	-	-	-
22:03-22:08	B	-	-	-
22:06	B	Barbastelle	1	Heard not seen commuting
22:10	B-A	Common pipistrelle	1	Heard not seen commuting
22:11-22:16	A	-	-	-
22:11-22:18	A	Common pipistrelle	1	Heard not seen, foraging

Dusk activity survey 17th September 2019

	BAT DETECTOR ACTIVITY SURVEY				
SURVEY LOCATION:	EMPRESS	**SURVEYORS:**	George Hunt, Stuart Woodley	**DATE:**	17/9/2019
TEMP AT START:	15C	**SUNRISE:**	19:17	**START TIME:**	19:17
TEMP AT END:	13C	**CLOUD COVER (oktas):**	0/8	**END TIME:**	21:17

WIND (bft):	2/12	**RAINFALL:**	Nil	**WEATHER:**	Cool, still, clear
Data Analysed Y/N:	Y	**Additional information:**	iPad 6, EMT 5		
TIME	STOPPING POINT/TARGET NOTE	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.	
19:17	A	-	-	-	
19:27	B	-	-	-	
19:35	C	-	-	-	
19:39	C	Noctule	1	Heard not seen, commuting	
19:40	C-D	Common pipistrelle	1	Heard not seen, commuting	
19:43	D	-	-	-	
19:44	D	Common pipistrelle	2	One flew west then south over field, the other flew west then north over trees	
19:46	D	Common pipistrelle	1	Flew west to south along hedgerow	
19:52	E	-	-	-	
19:58	E	Common pipistrelle	1	Heard not seen, foraging	
20:05	F	-	-	-	
20:13	G	-	-	-	
20:23	H	-	-	-	
20:24	H	Barbastelle	1	Heard not seen	
20:25	H	Common pipistrelle	1	Heard not seen	
20:33	H-I	Barbastelle	1	Heard not seen	
20:37	H-I	Common pipistrelle	1	Heard not seen	
20:37	H-I	Barbastelle	1	Heard not seen	
20:40	I	-	-	-	
20:50	I-A	Barbastelle	1	Heard not seen	
20:50	I-A	Common pipistrelle	1	Heard not seen	
20:52	A	Common pipistrelle	1	Heard not seen	
20:54	A	Common pipistrelle	1	Heard not seen	
20:55	A	Common pipistrelle	1	Heard not seen	

20:58	B	Common pipistrelle	1	Heard not seen
21:05	C	-	-	-
21:12	D	Soprano pipistrelle	1	Heard not seen
21:13	D	Brow long eared	1	Heard not seen

Dusk activity survey 15th October 2019

	BAT DETECTOR ACTIVITY SURVEY				
SURVEY LOCATION:	EMPRESS	**SURVEYORS:**	Aimee Cokayne and Sarah Barker	**DATE:**	15/10/2019
TEMP AT START:	14°C	**SUNSET:**	18:17	**START TIME:**	18:17
TEMP AT END:	13°C	**CLOUD COVER (oktas):**	4/8	**END TIME:**	20:17
WIND (bft):	1/12	**RAINFALL:**	Nil	**WEATHER:**	Cool, ground wet
Data Analysed Y/N:	**Y**	**Additional information:**	iPad 1 EMT 6		

TIME	STOPPING POINT/TARGET NOTE	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.
18:17-18:22	A	-	-	-
18:29-18:34	B	-	-	-
18:34	B	Common pipistrelle	1	Commuting from south to north.
18:37	B - C	Common pipistrelle	1	Commuting from south to north.
18:38	C	Common pipistrelle	1	Heard not seen, foraging
18:41	C	Common pipistrelle	1	Heard not seen, foraging
18:45	C - D	Common pipistrelle	1	Heard not seen, foraging
18:46 – 18:51	D	-	-	-
18:55 – 19:00	E	-	-	-

19:15 – 19:20	F	-	-	-
19:30 – 19:35	G	-	-	-
19:36	G-H	Common pipistrelle	1	Heard not seen
19:40 – 19:45	H	-	-	-
19:42	H	Common pipistrelle	1	Heard not seen
19:44	H	Common pipistrelle	1	Heard not seen
19:59	H - A	Common pipistrelle	1	Heard not seen, foraging
20:00	A	Common pipistrelle	1	Heard not seen, foraging in trees
20:02	A	Common pipistrelle	2	Heard not seen, foraging in trees
20:06-20:09	A - B	Common pipistrelle	1	Heard not seen, continuous foraging in trees
20:10 – 20:15	B	Common pipistrelle	2	Heard not seen, continuous foraging in trees
20:15-20:17	B - A	Common pipistrelle	1	Heard not seen, continuous foraging in trees

Dusk activity survey 21st April 2020

	BAT DETECTOR ACTIVITY SURVEY				
SURVEY LOCATION:	EMPRESS	**SURVEYORS:**	Pete Duffy, Lissie Hastie	**DATE:**	21/04/2020
TEMP AT START:	15.0°	**SUNSET:**	20:13	**START TIME:**	20:13
TEMP AT END:	12.0°	**CLOUD COVER (oktas):**	2/8	**END TIME:**	22:16
WIND (bft):	2/12	**RAINFALL:**	None	**WEATHER:**	Mild/dry
Data Analysed Y/N:	Y	**Additional information:**	Anabat scout		

TIME	STOPPING POINT/TARGET NOTE	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.
20:13-20:18	E	None	-	-

20:24-20:29	F	None	-	-
20:34-20:39	G	None	-	-
20:45-20:50	H	None	-	-
20:52	H-I	Common pipistrelle	1	Foraging from west to east then back again at point 1
20:56-21:01	I	-	-	-
21:01	I	Possible Serotine	1	Seen commuting from west to east over new road (not echo locating)
21:05-21:12	A	-	-	-
21:05	A	Common pipistrelle	1	Heard not seen foraging
21:12	A	Common pipistrelle	1	Heard not seen brief call
21:14-21:19	B	None		Please note point 2 obsolete (noise)
21:23-21:28	C	-	-	-
21:27	C	Common pipistrelle	1	Heard not seen commuting
21:29	C-D	Common pipistrelle	1	Heard not seen brief call at point 3
21:30	C-D	Common pipistrelle	1	Heard not seen brief call
21:32-21:37	D	-	-	-
21:32	D	Common pipistrelle	1	Heard not seen foraging
21:33	D	Common pipistrelle	1	Heard not seen commuting
21:34	D	Common pipistrelle	1	Foraging from west to east along tree line
21:36	D	Common pipistrelle	1	Foraging from east to west along tree line
21:36	D	Common pipistrelle	1	Foraging from east to west along tree line
21:37	D	Common pipistrelle	1	Foraging around stop station
21:38-21:39	D-E	Common pipistrelle	2	Foraging up and down tree line, multiple passes at point 4
21:40	D-E	Common pipistrelle	1	Heard not seen brief call at point 5

21:42-21:47	E	None	-	-
21:53-21:58	F	None	-	-
21:58	F	-	-	-
22:03-22:08	G	None	-	-
22:11-22:16	H	None	-	-

Pre-dawn activity survey 20th May 2020

	BAT DETECTOR ACTIVITY SURVEY				
SURVEY LOCATION:	Empress	**SURVEYORS:**	William Davis, Lissie Hastie	**DATE:**	20.05.2020
TEMP AT START:	15.0°	**SUNRISE:**	05:07	**START TIME:**	03:20
TEMP AT END:	15.0°	**CLOUD COVER (oktas):**	0/8	**END TIME:**	05:25
WIND (bft):	1/12	**RAINFALL:**	Nil	**WEATHER:**	Dry
Data Analysed Y/N:	Y	**Additional information:**	Anabat scout		
TIME	STOPPING POINT/TARGET NOTE	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.	
03:20	A	Common pipistrelle	1	Repeated passes around point A.	
03:31	I	Common pipistrelle	1	Heard not observed.	
03:39	B	Common pipistrelle	1	Heard not observed.	
04:00-04:03	C	Common pipistrelle	1	Repeated foraging passes.	
04:04	C	Common pipistrelle	1	Foraging along hedgerow adjacent to stopping point.	
04:08	C-D	Common pipistrelle	1	Foraging along hedgerow adjacent to transect route between points C and D.	
04:10	E	-	-	No bats recorded at stopping point.	

04:15	E	Common pipistrelle	1	Foraging along hedgerow adjacent to stopping point.
04:23	F	-	-	No bats recorded at stopping point.
04:32	G	-	-	No bats recorded at stopping point.
04:42	H	-	-	No bats recorded at stopping point.
04:50	G	-	-	No bats recorded at stopping point.
05:00	F	-	-	No bats recorded at stopping point.
05:09	E	-	-	No bats recorded at stopping point.
05:18	D	-	-	No bats recorded at stopping point.
05:25	C	-	-	No bats recorded at stopping point.

Dusk activity survey 14th July 2020

	BAT DETECTOR ACTIVITY SURVEY				
SURVEY LOCATION:	EMPRESS	**SURVEYORS:**	Andrew Heideman, Sarah Barker	**DATE:**	14/07/20
TEMP AT START:	15.0°C	**SUNRISE:**	21:02	**START TIME:**	21:17
TEMP AT END:	14.0°C	**CLOUD COVER (oktas):**	5/8	**END TIME:**	23:20
WIND (bft):	2/12	**RAINFALL:**	Nil	**WEATHER:**	Dry and mild
Data Analysed Y/N:	Y	**Additional information:**	Anabat Express LCECO 6, Magenta 6		

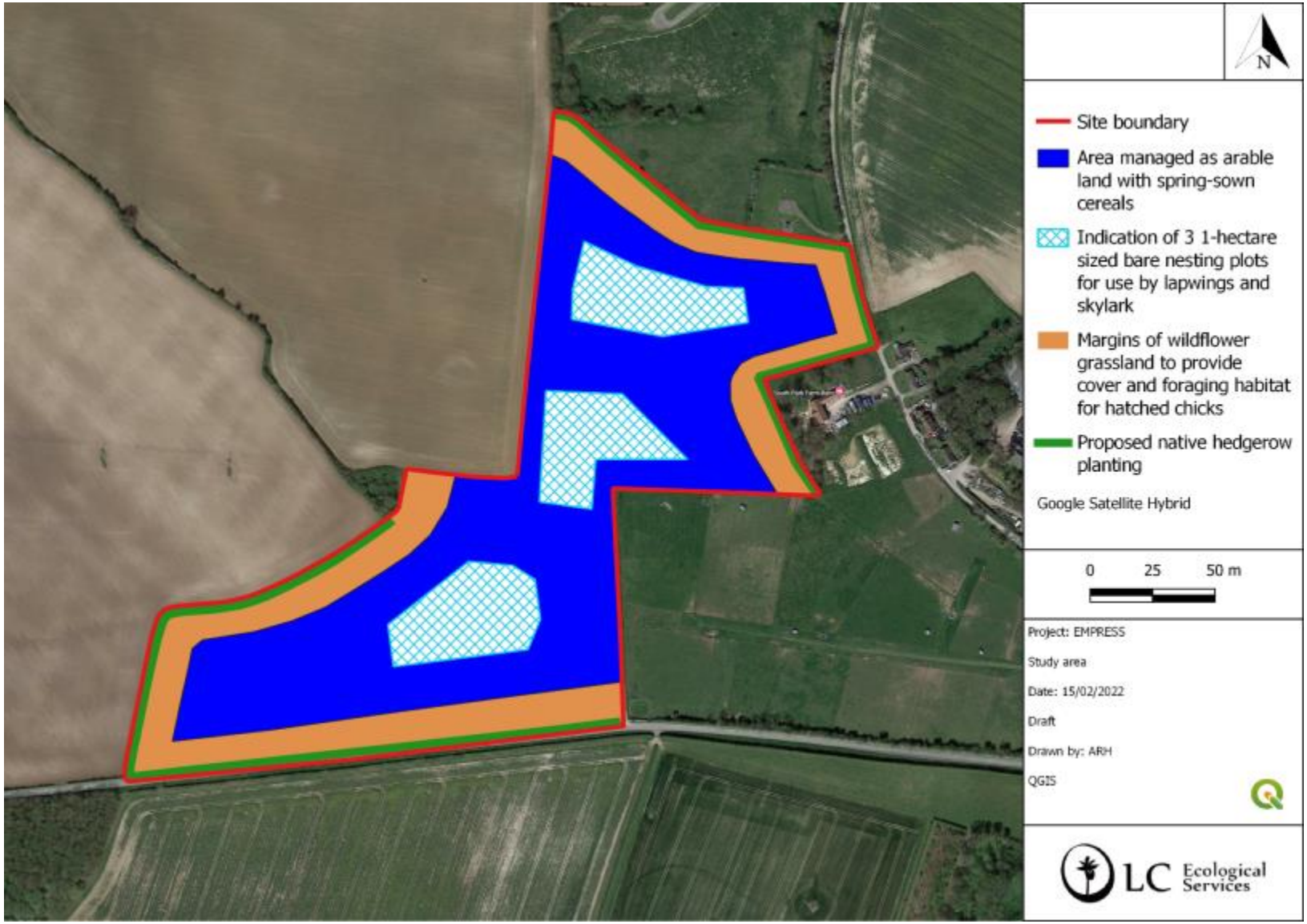
TIME	STOPPING POINT/TARGET NOTE	SPECIES	NUMBER OF BATS	ACTIVITY (behaviour/ commuting/ direction/ foraging/ feeding/ feeding buzzes/ roost/ etc.
21:17 – 21:23	H	-	-	-
21:35	F	Noctule	1	Foraging over former arable field. TN1.

21:35 – 21:40	F	-	-	-
21:44	F-E	Noctule	1	Foraging over former arable field. TN1.
21:50 – 21:57	E	-	-	No bats recorded at stopping point.
22:01 – 22:06	D	-	-	No bats recorded at stopping point.
22:10 – 22:15	C	-	-	No bats recorded at stopping point.
22:20	B	Common pipistrelle	1	Foraging over scrub. TN2.
22:20 – 22:25	B	-	-	-
22:29 – 22:34	A	-	-	No bats recorded at stopping point.
22:40 – 22:45	I	-	-	No bats recorded at stopping point.
22:47 – 22:52	H	-	-	No bats recorded at stopping point.
22:55 – 23:00	G	-	-	No bats recorded at stopping point.
23:03	C	Common pipistrelle	1	Heard but not seen foraging over shelter belt.
23:03 – 23:10	C	-	-	No bats recorded at stopping point.
23:13 – 23:18	B	-	-	No bats recorded at stopping point.
23:20	A	Common pipistrelle	1	Heard but not seen foraging.

APPENDIX IX: Non-licenced destructive search area for great crested newt



APPENDIX X: Lapwing and skylark mitigation area (off-site)



APPENDIX XI: Reptile survey plan (2015)



APPENDIX XII: Proposed landscaping and site enhancement plan

