

Ecological Impact Assessment

Land off Westbury Road,
New Farm, Warminster



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Ecology | Green Space | Community | GIS

Unit 1, Brassmill Lane Enterprise Centre | Bath | BA1 3JN

01225444114 | info@ethosep.co.uk

www.ethosep.co.uk



Report Produced for



Written by: Joel Sellors-Moore, Ecologist

Checked by: Sarah Forsyth, Principal Ecologist

Approved by: Jim Phillips, Managing Director

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SUMMARY

Purpose of the Report	This Report has been produced by Ethos Environmental Planning on behalf of Barrett Homes. It provides an assessment of the likely ecological effects associated with the proposed residential development of an area of land known as 'Land off Westbury Road', New Farm, Warminster BA12 0AL.
Description of the scheme	The proposals are for an outline planning application to deliver a mix of housing with up to 205 dwellings (including 30% affordable homes), gardens, garages with two accesses from Westbury Road and associated infrastructure, parking, community hub, sustainable drainage systems and large areas of public open spaces.
Methodology	A desk study and UK Habitat Classification survey were undertaken for the site in 2020. Further surveys for bats, dormouse and riparian mammals were undertaken in 2021.
Baseline Ecological Conditions	The site falls within the consultation zones of: i) Salisbury Plain Special Area of Conservation (SAC), ii) River Avon SAC, iii) Bath and Bradford on Avon SAC. Likely significant effects are assessed in support shadow HRAs. The 10.5 ha site was dominated by three arable fields bordered by hedgerows with permanent grassland and a small woodland copse in the northeast of the site. A small woodland copse with pond was located adjacent to the railway corridor in the north west of the site. Fourteen species of bat have been recorded on site, which was dominated by common pipistrelle bats. Bat activity for all species was focused along the northern boundary hedgerow (H2), west boundary bordering the railway corridor and the hedgerow towards the south of the site (H4). H2 is an important commuting and foraging feature for greater horseshoes and the southern hedge (H4) is an important commuting and foraging features for greater and lesser horseshoe bats. Badger is confirmed present on site with outlier setts in the east and west boundary hedgerows and foraging signs on site, notably along the hedgerow to the south (H4). The boundary hedgerows and field margins have potential to be used by breeding birds, hedgehogs (and other section 41 species). Water vole and otter have not been confirmed present on site, however they are highly mobile species and the stream provides suitable habitat.
Key impacts and mitigation	The development layout has been designed to retain, protect and enhance the most valuable ecological features comprising the boundary hedgerows. Mitigation measures are described to ensure compliance with protected species legislation for bats, breeding birds, section 41 mammals, and reptiles. The loss of the arable fields and poor other neutral grassland on site requires no mitigation.
Conclusion	Assuming the implementation of effective mitigation measures, as set out in this report, no significant adverse ecological effects are predicted. Enhancement measures are described which deliver a net gain of over 30% for biodiversity – the results of which are set out within the supporting BNG Report. With the on-site wetland mitigation, the nutrient neutrality calculations have shown that there will be no additional Total Phosphorous being discharged from the proposed development via foul or surface waters. The Total Phosphorous budget indicated a betterment to the wider catchment. Results are reported separately. The supporting shadow HRA assesses that that with mitigation for lighting (construction and operation) and canopy hop-overs in hedgerows for bats, that there are no likely Significant effects of the favourable conservation status of greater horseshoe bats. The proposed development is therefore in accordance with relevant national and local planning policies in relation to nature conservation and relevant wildlife legislation.

- 1.4 The proposals are for an outline planning application to deliver a mix of housing with up to 205 dwellings (including 30% affordable homes), gardens, garages with two accesses from Westbury Road and associated infrastructure, parking, sustainable drainage systems and large areas of open spaces.
- 1.5 The proposals include the creation of floating treatment wetland basins, an attenuation pond, areas of open space with LEAP (Local Equipped Area for Play), a sports pitch and habitat set aside to be managed for wildlife.
- 1.6 This assessment is based on surveys undertaken in 2020 comprising a UK Habitat Classification (UKHab) survey, bats and riparian mammal surveys. A UKHab survey update, and further surveys for bats and dormouse were undertaken in 2021.
- 1.7 A Biodiversity Net Gain (BNG) assessment and report has been produced by Ethos. The BNG report is based on the enhancement measures set out within Section 8 of this report.
- 1.8 The aims of this EcIA report are to:
 - provide an assessment of the likely effects of the proposed development on ecological features on site;
 - provide an assessment of the likely effects of the proposed development on statutory sites;
 - identify the measures required to mitigate impacts on ecological receptors;
 - identify opportunities to deliver ecological enhancement and biodiversity net gain on site;
 - allow the Local Planning Authority to write planning conditions or obligations to secure mitigation compensation and enhancement measures should planning permission be granted.
- 1.9 This report has been produced following the approach set out in CIEEM's 'Guidelines for Ecological Report Writing' (CIEEM, 2017).

2 POLICY AND LEGISLATION

2.1 National Policy

- 2.1.1 The **National Planning Policy Framework (NPPF)** sets out national planning policy, including policies of relevance to conserving and enhancing the natural environment. Policies of relevance to the proposed development (parts of paragraphs 180 and 185) have been summarised below:

Para 180: When determining planning applications, local planning authorities should apply the following principles:

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

d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

Para 185: c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

2.2 Local Policy

- 2.2.1 Wiltshire Council have provided guidance in relation to planning and biodiversity in the Wiltshire Core Strategy, adopted 2015. In particular, Core Policies 50 and 52 are relevant:

Core Policy 50 - Biodiversity and geodiversity

Development proposals must demonstrate how they protect features of nature conservation and geological value as part of the design rationale. There is an expectation that such features shall be retained, buffered, and managed favourably in order to maintain their ecological value, connectivity and functionality in the long-term. Where it has been demonstrated that such features cannot be retained, removal or damage shall only be acceptable in circumstances where the anticipated ecological impacts have been mitigated as far as possible and appropriate compensatory measures can be secured to ensure no net loss of the local biodiversity resource, and secure the integrity of local ecological networks and provision of ecosystem services. All development proposals shall incorporate appropriate measures to avoid and reduce disturbance of sensitive wildlife species and habitats throughout the lifetime of the development. Any development potentially affecting a Natura 2000 site must provide avoidance measures in accordance

with the strategic plans or guidance set out in paragraphs 6.75-6.77 above where possible, otherwise bespoke measures must be provided to demonstrate that the proposals would have no adverse effect upon the Natura 2000 network. Any development that would have an adverse effect on the integrity of a European nature conservation site will not be in accordance with the Core Strategy.

Biodiversity enhancement

All development should seek opportunities to enhance biodiversity. Major development in particular must include measures to deliver biodiversity gains through opportunities to restore, enhance and create valuable habitats, ecological networks and ecosystem services. Such enhancement measures will contribute to the objectives and targets of the Biodiversity Action Plan (BAP) or River Basin/ Catchment Management Plan, particularly through landscape scale projects, and be relevant to the local landscape character. Local sites Sustainable development will avoid direct and indirect impacts upon local sites through sensitive site location and layout, and by maintaining sufficient buffers and ecological connectivity with the wider environment. Damage or disturbance to local sites will generally be unacceptable, other than in exceptional circumstances where it has been demonstrated that such impacts:

- i) Cannot reasonably be avoided*
- ii) Are reduced as far as possible*
- iii) Are outweighed by other planning considerations in the public interest,*
- iv) Where appropriate compensation measures can be secured through planning obligations or agreements.*

Development proposals affecting local sites must make a reasonable contribution to their favourable management in the long-term.

Core Policy 52 - Green infrastructure

Development shall make provision for the retention and enhancement of Wiltshire's green infrastructure network and shall ensure that suitable links to the network are provided and maintained. Where development is permitted developers will be required to:

- i) retain and enhance existing on site green infrastructure*
- ii) make provision for accessible open spaces in accordance with the requirements of the adopted Wiltshire Open Space Standards*
- iii) put measures in place to ensure appropriate long-term management of any green infrastructure directly related to the development*
- iv) provide appropriate contributions towards the delivery of the Wiltshire Green Infrastructure Strategy*
- v) identify and provide opportunities to enhance and improve linkages between the natural and historic landscapes of Wiltshire.*

Bat Special Area of Conservation (SAC) planning guidance for Wiltshire

- 2.2.2 The internationally designated site of the Bath and Bradford-on-Avon Bats Special Area of Conservation (SAC) supports populations of greater horseshoe, lesser horseshoe and Bechstein's bats. These bat populations are afforded very high levels of legal protection, placing significant duties on decision-makers to prevent damage to bat roosts, feeding areas and the routes used by bats to travel between these locations.

2.3 Relevant Legislation

- 2.3.1 The following pieces of legislation have been considered within this assessment with an explanation of their relevance provided in table 1.

Table 1 Relevant legislation

Legislation	Relevance
The Conservation of Species and Habitat Regulations 2017 (as amended) transposes the EU Habitats Directive and Wild Bird directive into domestic law (the regulations still apply and function since the UK left the EU).	Potential of likely significant effects on: River Avon SAC, Salisbury Plain SAC/SPA, Bath and Bradford-Upon-Avon Bats SAC. • River Avon SAC: discharge of Total Phosphorous. • Salisbury Plain SAC: potential recreational pressure. • Bat SAC: Presence of commuting/ foraging bats on site, utilising hedgerows.
Wildlife and Countryside Act 1981 (as amended, including by the Countryside and Rights of Way Act 2000), which provides legislative protection for certain species. The Act also prohibits the spread of invasive plant species, as well as providing the mechanism for the designation and protection of Sites of Special Scientific Interest;	Potential for reptiles and nesting birds in hedgerows
Badgers and their setts are protected under the Protection of Badgers Act 1992 as amended by the Hunting Act 2004.	Presence of badger setts on site.
The Natural Environment and Rural Communities Act 2006 (the NERC act) places a duty on all public authorities, including local planning authorities, to consider biodiversity in their work. Local planning authorities are to ensure that there is no net loss of biodiversity on a site, no net loss in habitat connectivity and aims to enhance biodiversity.	Potential presence, and presence of Section 41 species – enhancement of habitat for these species (hedgehog, bats, reptiles and amphibians, harvest mouse, polecat, brown hare, and various birds including swifts, house sparrow, and farmland birds including grey partridge, snipe and turtle dove). Enhancement of Wiltshire's Local Biodiversity Action Plan Habitats – woodland pond, hedgerows and road verges. Enhancements for biodiversity
The Environment Act 2021 includes provision for biodiversity net gain to be applied to every planning permission. Schedule 14 of the draft Environment Bill sets out amendments to the Town and Country Planning Act 1990 for the inclusion of biodiversity net gain as a planning requirement.	Delivery of ecological enhancements and measurable biodiversity net gain.

Legislation	Relevance
The Hedgerows Regulations 1997 protect 'important hedgerows' from being removed (uprooted or destroyed). Hedgerows are protected if they are at least 30 years old and meet at least one of the criteria listed in part II of schedule 1.	Presence of hedgerows on site.

3 METHODOLOGY

3.1 EciA Process

3.1.1 This assessment has been undertaken following the approach set out in the 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (CIEEM, 2018). The impact assessment process involves:

- identifying and characterising impacts and their effects;
- incorporating measures to avoid and mitigate negative impacts and effects;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects; and
- identifying opportunities for ecological enhancement.

3.1.2 The key elements of the process comprise: scoping; establishing the baseline; identifying important ecological features that may be affected; assessing whether important features will be subject to impacts (during construction and operation) and an assessment of the significance of residual effects (after mitigation), including cumulative effects. The process also identifies measures to avoid, reduce and compensate negative ecological impacts and their effect, as well as provision of ecological enhancements and setting out procedure to monitor impacts and the success of the proposed mitigation, compensation and enhancement measures.

3.2 Scope of Assessment

3.2.1 This assessment has considered 'Important Ecological Features' that are present within the 'Zone of Influence' of the project. Important Ecological Features for this project comprise¹:

- Statutory designated nature conservation sites;
- Habitats and Species of Principal Importance for the Conservation of Biodiversity in Wiltshire;
- Legally protected species; and
- Red Listed or rare species (based on Red Data Book lists, Birds of Conservation Concern and species considered to be nationally rare / scarce).

3.2.2 The Zone of Influence (Zoi) is the area over which the project could have an influence on ecological features. The Zoi is likely to vary for different features. However, in general terms the Zoi for this development proposal is considered to comprise the land within the red line boundary as well as immediate adjacent habitat features. It also includes designated nature conservation sites in the surrounding area, to the extent that these may be impacted by increases in visitor numbers.

¹ Box 14 in CIEEM's ECiA Guidelines (2018)

3.2.3 The scope of the assessment was informed by an 'ecological walkover' undertaken in January 2021. The purpose of this was to identify the habitats on site, their potential for protected species and to establish the scope of surveys that would be required to inform a future planning application at the site.

3.2.4 The overall assessment has been informed by guidelines provided in CIEEM (2017) Guidelines for Ecological Report Writing.

3.3 Evaluation of ecological features

3.3.1 In line with CIEEMs guidelines on EclA, this assessment has focused on relevant Important Ecological Features. The scale of importance of these features has been determined based on available contextual information, which for this project are considered only to include:

- **National** – of importance in England and protected through national or international legislation;
- **County** – of importance to the county (Wiltshire) but not sufficiently important to warrant 'National' scale of importance;
- **Local** – of importance to Warminster Area and/or West Wiltshire district area but not sufficiently important to warrant County scale of importance;
- **Site** – a feature of importance in the context of those present within the site, but not sufficiently important to warrant 'Local' scale of importance.

3.3.2 Potential impacts on Important Ecological Features are identified and assessed; likely significant effects are those likely to result in a change to the conservation status of a habitat or species population or undermine/support nature conservation policy.

3.3.3 Effects identified at site level were not considered 'Significant' and scoped out. However, where legislative impacts still apply, mitigation and/or precautionary working methods are discussed.

3.3.4 Mitigation measures have been devised following the mitigation hierarchy; appropriate mechanisms for securing mitigation measures have been identified.

3.4 Desk Study

3.4.1 A background data search was received from Wiltshire and Swindon Biological Records Centre in January 2020, which covered a 2km search for species and records and a 4km search for bat records.

3.4.2 A search for designated sites and granted European Protected Species (EPS) licences within 1km of the site boundary was undertaken using publicly available information (DEFRA Magic map).

3.5 UK Habitat Classification Survey

- 3.5.1 The habitat survey has drawn on guidance provided in the *Handbook for Phase 1 Habitat Survey – a technique for environmental audit* (JNCC 2010). The classification and mapping of habitats has used the UK Habitat Classification (UKHab) as this links directly to the biodiversity net gain calculator and assessment. Every habitat feature is given a Primary Habitat code and, where necessary, more detail has been added with the use of Secondary Codes. UKHab has its own symbology which has been used when creating maps for the existing and proposed habitats.
- 3.5.2 A UKHab survey was initially undertaken on 28th January 2020 and subsequently updated on 29th June 2021. The survey incorporated detailed assessment of the land within the development boundary, including a description and mapping of all key features and habitat types. The survey was carried out to identify the range of habitats within the site and the predominant and notable species of flora.
- 3.5.3 The hedgerows have been surveyed to determine their status and condition in line with UKHab criteria which has been used to inform the BNG assessment.
- 3.5.4 The habitats on site included in the baseline BNG Assessment have been subject to a condition assessment in line with the *Defra Biodiversity Metric 3.0 – habitat condition assessment sheets with instructions*. Details of this are provided in the supporting BNG Assessment (Ethos, 2022).

3.6 Protected Species

NERC Mammal Surveys

- 3.6.1 The survey included an assessment of the habitats on site for their potential to support NERC Section 41 species such as hedgehog (*Erinaceus europaeus*), polecat (*Mustela putorius*), harvest mouse (*Micromys minutus*) and brown hare (*Lepus europaeus*). This included a search for nests, runs, latrines, paw prints, and live specimens.

Badger Surveys

- 3.6.2 The survey for badger (*Meles meles*) included a search of the development site for any evidence of badgers, including setts, foraging signs (snuffle holes), runs and latrines.

Hazel Dormouse Surveys

- 3.6.3 The survey included an assessment of the potential of the site for hazel dormouse (*Muscardinus avellanarius*), focusing on the connectivity and suitability of the habitat on site.

- 3.6.4 Fifty dormouse tubes were deployed in suitable habitat across the site with several already on site, on 8th April 2021 at roughly 20 metre intervals. The tubes were checked once a month between May - November 2021. Table 2 below (taken from Table 5 of the Dormouse Conservation Handbook) shows the index of probability of finding evidence of dormouse in nest tubes. The score is based on 50 tubes deployed (doubled for 100 tubes and halved for 25 tubes) and a minimum score of 20 must be reached to determine presence/likely absence. A score of 24 was achieved, the months and scores highlighted in italics in table 1 show the dates when the dormouse tubes were deployed and checked.

Table 2 Dormouse Surveys Index of Probability Score

Month	Score
April	1
<i>May</i>	<i>4</i>
<i>June</i>	<i>2</i>
<i>July</i>	<i>2</i>
<i>August</i>	<i>5</i>
<i>September</i>	<i>7</i>
<i>October</i>	<i>2</i>
<i>November</i>	<i>2</i>
Total	24

Bat Surveys

- 3.6.5 The methodology for the bat survey has been informed by the Bat Conservation Trust Bat Surveys Good Practice Guidelines 2016. The habitats on site were assessed for their suitability for foraging and commuting bats and the potential for roosting bats.

Activity surveys

- 3.6.6 Monthly bat activity surveys were undertaken at the site, over two activity seasons, July to October in 2020 and April to June in 2021. Each transect involved two surveyors walking a suitable transect route (see Figure 2) to observe and record bat activity. The surveyors used Echometer Pro bat detectors. The surveys commenced 15 minutes before sunset and continued for two hours after sunset. The surveys were undertaken on the following dates:
- 28th July 2020;
 - 20th August 2020;
 - 8th September 2020;
 - 15th October 2020;
 - 21st April 2021;
 - 11th May 2021; and
 - 8th June 2021.

Static Surveys

3.6.7 Passive bat detector surveys were used to identify levels of bat activity on site, as recommended in BCT Survey Guidelines. Passive bat detectors can provide a greater understanding of the bat species using the site and identify patterns in bat activity over long periods of time. Five Wildlife Acoustics Song Meter 4 (SM4) bat detectors were deployed in five locations on site during April, May, June, early August, late August, September and October 2021 (Figure 2).

3.6.8 The detectors were deployed at each location 1 to 5 (see Figure 2), for the following connective nights:

- 08th - 21st April 2021 (14 nights);
- 11th - 25th May 2021 (15 nights);
- 8th – 15th June 2021 (7 nights);
- 4th – 11th August 2021 (7 nights),
- 25th – 14th September 2021 (20 nights) and
- 7th -26th October (20 nights).



Figure 2 Bat activity transect and static detector locations

3.6.9 Static detector surveys provided an assessment of bat activity across the site and highlighted areas of activity. All calls recorded were analysed using Kaleidoscope and BTO Ecobat Software.

3.6.10 The static data was input into the Ecobat database. Ecobat is a web-based tool which provides a standardised method of interpreting bat activity data. The information includes activity percentiles which includes a numerical indicator of the relative importance of a nights' worth of bat activity by comparing it with data within 100km from the site against national database.

Bird Surveys

3.6.11 The bird survey included an assessment of the habitats on site for their potential to support protected and notable species of bird as well as their potential to support breeding birds.

Amphibian Surveys

3.6.12 The habitats on site were assessed for their potential to support amphibian species, including great crested newt (*Triturus cristatus*) (GCN). Surveys for GCN were informed by the Great Crested Newt Conservation Handbook, Froglife 2001. The site was examined for suitable waterbodies and for breeding terrestrial habitat. Terrestrial habitats providing sufficiently structured vegetation in which amphibians may forage or hibernate over winter were also surveyed for.

3.6.13 In addition to the on-site assessment, Great Crested Newt Mitigation Guidelines (English Nature, 2001) recommend that a desktop analysis of ponds within 500m of the site be undertaken, to identify any potential breeding ponds which may require further survey. Ponds within 500m of the site were mapped on GIS with an OS OpenData base map at 1:10,000 resolution.

3.6.14 Targeted GCN survey were carried out in accordance with the guidelines set out in the Herpetofauna Worker's Manual (Gent & Gibson, 2003) and Great Crested Newt Mitigation Guidelines (English Nature, 2001). All surveys were carried out by an appropriately licensed surveyor.

3.6.15 Habitat suitability indices (HSI) were calculated for every pond within the 500m buffer. The HSI was developed by Oldham et al. (2000) as a means of evaluating habitat quality and quantity. Ten suitability indices are assessed visually for each pond resulting in a numerical index between 0 (unsuitable) and 1 (highly suitable). As stated in ARG UK Advice Note 5, "In general, ponds with high HSI scores are more likely to support great crested newts than those with low scores. However, the system is not sufficiently precise to conclude that any pond with a high score will support newts, or that any pond with a low score will not do so."

eDNA surveys

3.6.16 The onsite pond was subject to eDNA surveys on 7th May 2021. The surveys comprised the collection of 40ml samples from 20 locations around the edge of the pond. Samples are mixed together in a bag and six 15ml samples are extracted and stored within preserving fluid. These samples were then sent to ADAS, who analyse the samples for GCN DNA. This technique has been tested by DEFRA and found to have a reliability of 99.3%. Sampling methodology followed best practice guidance within Analytical and Methodological Development for Improved Surveillance of the Great Crested Newt (Freshwater Habitats Trust, 2014).

3.7 Personnel

3.7.1 The surveyors on site are included within Table 2. The survey team have worked together on numerous similar projects and have a complimentary range of skills and experience which are considered to have provided a robust ecological appraisal of the site.

Table 3 Site surveyors

Ecologist	Position	Qualification/Licence	Experience	Role in Assessment
Sarah Forsyth	Principal Ecologist	MSc BSc (Hons), ACIEEM Class 1 GCN Licence Tree Climbing and Rescue, City and Guilds NPTC Level 2 Award (206 and 306)	Sarah has over 15 years' experience in ecological management and assessment, both in consultancy and the public sector. Sarah is responsible for leading on ecological assessments and overseeing projects through various stages of planning and implementation.	Report writing and dormouse surveys.
Steph Green	Principal Ecologist	MSc BSc (Hons), MCIEEM Class 1 GCN Licence Class 1 Hazel Dormouse Licence	Steph has over eight years' experience in ecological field survey and consultancy. Steph is responsible for leading and undertaking comprehensive habitat assessments, protected species surveys and is a licenced GCN and dormouse worker, as well as a Full Member of CIEEM.	Bat activity surveys.
Martin Smith	Senior Ecologist	BSc (Hons), Grad CIEEM Class 2 Bat Licence (NE) Class 1 dormouse licence (NE) Class 1 GCN Licence	Martin is a qualified tree climber, bat worker, and also holds licences for dormouse and GCN. Martin leads on designing the bird surveys for the Ethos team. Martin manages several projects for ethos and is experienced at providing suitable mitigation for various projects	Wintering birds and bat surveys.
Matt Attrill	Senior Ecologist	Tree Climbing and Rescue, City and Guilds NPTC Level 2 Award (206 and 306)	Matt is a highly experienced field surveyor with over 7 years ecological experience. Matt is competent in surveying for a wide variety of wildlife gained	Bat activity and static surveys.

Ecologist	Position	Qualification/Licence	Experience	Role in Assessment
		BSc (Hons) Class 2 Bat Licence Class 1 GCN Licence	experience from both the commercial and voluntary sectors.	
Kane Burchill	Senior Ecologist	Level 2 Certificate and Diploma in Work-based Environmental Conservation Tree Climbing and Rescue, City and Guilds NPTC Level 2 Award (206 and 306) ACIEEM Class 1 Bat Licence (NE) Class 1 Hazel Dormouse Licence (NE) Class 1 GCN Licence (NE)	Kane has over seven years' experience in ecological field survey and consultancy. As a Senior Ecologist with Ethos; Kane is responsible for leading and undertaking comprehensive habitat assessments protected species surveys and is a licenced bat and dormouse worker.	Great crested newt survey.
George Clutterbuck	Environmental Analyst	Level 2 Certificate and Diploma in Work-based Environmental Conservation Working towards a certificate of higher learning: Field Ecology - currently Level 2 Certificate and Diploma in Work-based Environmental Conservation	George has over six years' experience in ecological field survey and consultancy. George is responsible for undertaking comprehensive habitats and protected species assessments. Much of his time is spent digitising using GIS software to achieve Biodiversity Net Gain.	Wintering bird surveys.
Joel Sellors-Moore	Ecologist	BA (Hons) Working towards Master's in Applied Ecology at the University of Gloucestershire	Has over four years' experience in ecological field survey and consultancy. Joel is responsible for managing projects and undertaking comprehensive habitat and protected species assessments in addition to biodiversity net gain and nutrient neutrality assessments.	Report writing and Dormouse surveys.
Becky Morris	Ecologist	PhD, DIC, MSc, BSc MCIEEM	Becky has 16 years' experience working as an Ecological Consultant, specialising in botanical surveys. She holds a great crested newt survey licence.	Bat activity, dormouse and UKHab surveys. Report writing and bat static analysis.

Ecologist	Position	Qualification/Licence	Experience	Role in Assessment
Joe Bamforth	Ecologist	MSc, BSc (Hons)	Joe has over three years' experience in ecological consultancy and assists with habitat assessments, protected species surveys and data analysis.	Dormouse and UKHab surveys.
Sarah Roberts	Assistant Ecologist	MSc, BA, Qualifying CIEEM Class licence WML-CL29 To survey for barn owl (<i>Tyto alba</i>)	Sarah has over three years of consultancy and biodiversity project management experience. Sarah assists with fieldwork and report-writing for habitats and protected species. She specialises in ornithology and ecological provisions for urban developments.	Wintering bird surveys.
Ellie Shearn	Assistant Ecologist	BSc (Hons), Qualifying CIEEM	Ellie is an assistant ecologist at Ethos with relevant experience in ecological field survey. Ellie assists senior ecologists on site with protected species surveys including bat surveys and assessment.	Great crested newt survey and static data analysis.

3.8 Limitations

- 3.8.1 A data search was requested from WSBRC as part of the EclA. The background data search relies heavily upon submitted records and therefore absence of protected species records cannot determine likely absence. This information is used in conjunction with the assessment, which draws upon the results of the habitat survey and assessment for protected species.
- 3.8.2 The initial UK Habitat survey was undertaken in January, which is outside of the optimal survey period for identifying botanical species. This limitation was addressed by taking updating the UK habitat survey in June 2021, whilst carrying out further surveys for bats and dormouse on the site.
- 3.8.3 Condition assessments were undertaken for all the hedgerows on site for the BNG assessment. However, late in the process, it became apparent that several of the hedgerows will be subject to minor impacts (short sections of removal) to facilitate access through the site, a survey to determine their 'importance' as defined by the Hedgerow Regulations will therefore be needed. An addendum to this EclA will be issued by way of an update.
- 3.8.4 Bat transect surveys span across two activity seasons; late summer and autumn of 2020 and spring early summer of 2021. Due to low levels of bat activity from the initial transect surveys started in 2020; the scope and methodology of the 2021 bat static surveys increased the survey effort. Static detectors were deployed at 5 locations across

the site each monitoring period (oppose to the standard survey guidelines of 2 locations per transect). Numerous statics deployed simultaneously across the site would enable comparison of data across the site to determine usage of the various linear features associated with the site and identify season changes. This methodology would also assist in assessment of the rarer bat species, which are not so readily recorded or observed during transect surveys.

- 3.8.5 Since the preparation of the Preliminary Ecological Appraisal (Ethos, September 2021), the red line boundary for the proposed development was revised to a smaller proposed development area. In the PEA farmland bird surveys were recommended due to the suitability of habitat in wider development area. In particular the northern fields of the larger proposed development site had 6m field margins of tussocky grassland suitable to support ground nesting birds. Aside from one small section of tussocky grassland to the south of the copse (northwest corner of upper arable field), the revised red line boundary lacked suitable habitat that would be impacted. The woodland copse, hedgerow and this area of tussocky grassland is being retained, therefore, targeted farmland bird surveys were subsequently scoped out. The proposals provide opportunities to enhance habitat and foraging resources for farmland birds and other birds.

4 BASELINE ECOLOGICAL CONDITIONS

4.1 Designated Sites

Statutory designated sites

4.1.1 The desk study identified two statutory sites within a 2km search radius of the site, the Upton Cow Down Sites of Special Scientific Interest (SSSI) and the Salisbury Plain SSSI, Special Area of Conservation (SAC) and Special Protection Area (SPA) (see Figure 3 and table 4, below).

Table 4 Statutory Designated Sites

Site	Designation	Area (ha)	Description	Distance (m) and direction from site
Salisbury Plain	SAC, SPA, SSSI	21,465	Largest known expanse of unimproved chalk downland in north-west Europe containing 41% of Britain's remaining area of this habitat. Annex I habitats include; <i>Juniperis communis</i> formations on heaths or calcareous grasslands and Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i> (*important orchid sites). Annex II Species include Marsh Fritillary Butterfly (<i>Euphydryas</i> (<i>Eurodryas</i>, <i>Hypodryas</i>) <i>aurinia</i>). The SPA is designated due to the presence of significant breeding populations of stone curlew (<i>Burhinus oedicemus</i>), quail (<i>Coturnix coturnix</i>) and hobby (<i>Falco subbuteo</i>) as well as wintering populations of hen harrier (<i>Circus cyaneus</i>).	1,850m north-east
Upton Cow Down	SSSI	17	Botanically rich chalk grassland at the western extremity of Salisbury Plain.	1,900m north
Bath and Bradford on Avon Bats	SAC	106	A set of roosting sites for Annex II species; greater horseshoe bat, lesser horseshoe bat and Bechstein's bat. The sites include hibernation roosts for 15% of the UK's greater horseshoe population and small number of Bechstein's bat hibernating in abandoned mines.	The nearest component of the SAC is located 15.9km north. However, the site is located within 4km of a greater horseshoe core roost associated with the SAC.

4.1.2 A Habitats Regulations Assessment (HRA) of the Salisbury Plain SPA has identified impacts on breeding stone curlew populations arising from recreational pressures resulting from residential development within 6.4km of the SPA (Wiltshire Council, 2018). The site falls within this buffer and mitigation for the impacts arising from the

development will be funded through Community Infrastructure Levy (CIL) payments (Wiltshire Council, 2016). Ecological impacts are not considered further in this report as the effects have already been assessed and suitable mitigation set out in the HRA and Mitigation Strategy (Wiltshire Council, 2018). This is also reported in the accompanying shadow HRA -River Avon SAC and Salisbury Plain SPA (Ethos, September 2021).

- 4.1.3 Due to the botanical nature of the designations for Upton Cow Down and the distance from the development site, no significant impacts will arise from the proposals.
- 4.1.4 The site is located within the Bath and Bradford on Avon Bats SAC consultation area for greater horseshoe bats due to its proximity to one of the core roosts associated with the SAC, as identified in the SPD relating to the Bat SACs (Wiltshire Council, 2015b, see appendix 4 for a map of the consultation zone). Potential impacts arising from the development include physical changes to the environment through habitat fragmentation and the changes to potential foraging habitats and lighting impacts on foraging and commuting features.
- 4.1.5 Due to presence of greater and lesser horseshoe bats on site there is the potential for populations of bats associated with the the Bath and Bradford on Avon Bat SAC to be adversely affected by the proposed development. Potential impacts will therefore be considered and discussed further in section 6 (and in the supporting shadow HRA).

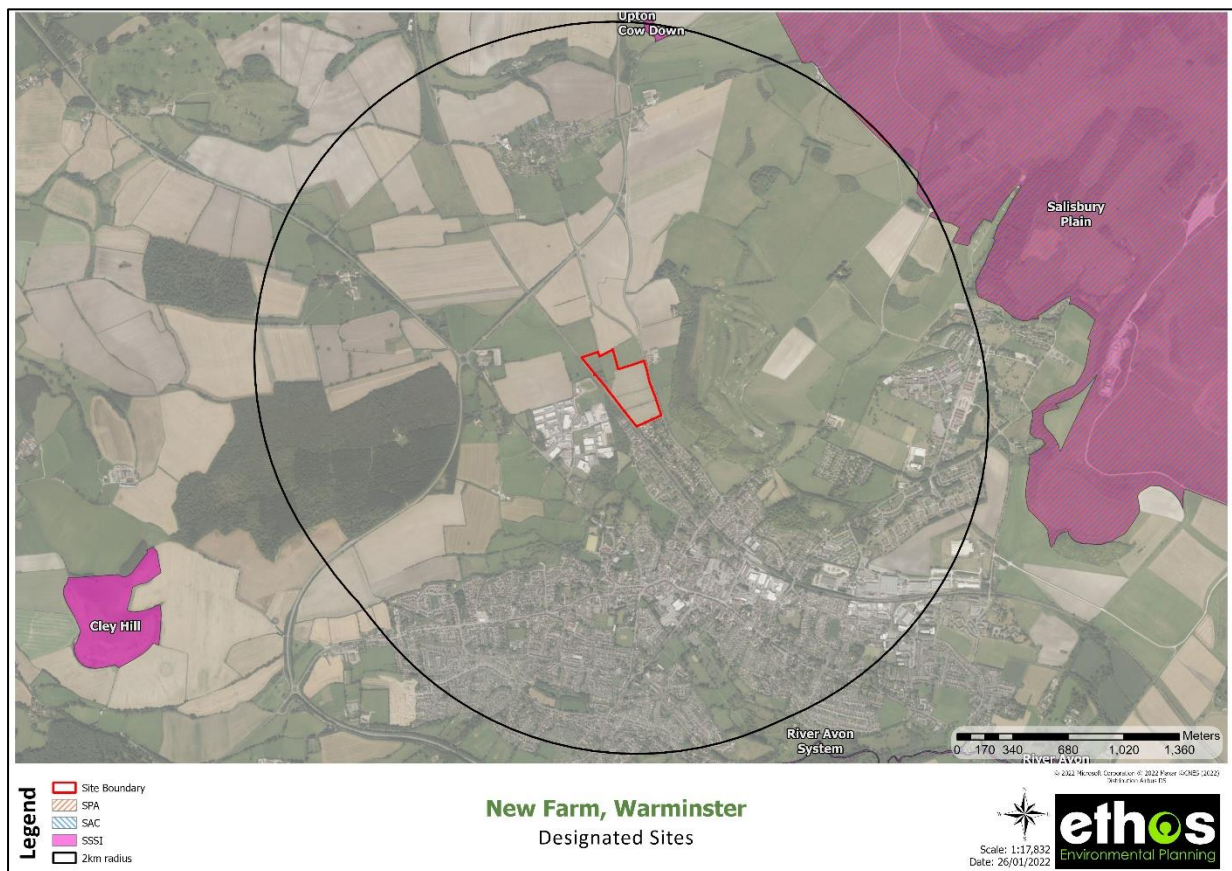


Figure 3 Statutory designated sites within 2km

Non-statutory designated sites

4.1.6 Six local wildlife sites (LWS) and two protected road verges were returned within the background data search which are described in table 5 and shown in Figure 4, below.

4.1.7 The majority of non-statutory sites were located a sufficient distance from the site to preclude any significant impacts on the habitats for which they are designated. However, the Westbury Road Verge is located along the road on which the main access onto the site will be located. There is therefore the potential for significant impacts both during the construction and operational phases of the development. A survey of the road verge has been carried out and details have been included in appendix 2.

4.1.8 Arn Hill LWS is located 60m to the east of the site and is separated from the development by the Westbury Road and agricultural fields. This was considered to constitute an adequate buffer to insulate the site from the impacts of the development and Arn Hill is not considered further in this report.

Table 5 Non-Statutory designated sites within 2km

Site	WSBRC Site Code	Designation	Area (ha)	Description	Distance (m) and direction from site
Westbury Road Verge	ST84.028	Protected Road Verge	3.063	Road verge along the eastern side of the Westbury Road (north of Elm Hill). Warminster is designated as a Protected Verge by Wiltshire Council for its species-rich chalk downland plant communities.	~10m east (southern end of site)
Arn Hill	ST84.013	LWS	21.93	Unimproved grassland and woodland on the fringes of a golf course.	60m East
Norridge Wood	ST84.012	LWS	123.61	A large ancient woodland site, mostly replanted with broadleaves & conifers, but with substantial semi-natural areas.	690m west
Fernicombe	ST84.034	LWS	6.16	A small chalk coombe and a smaller chalk bank to the north, with species-rich unimproved calcareous grassland.	750m north-east
Cop Heap	ST84.041	LWS	11.9	Calcareous and neutral grassland, broadleaved woodland, and scrub on a low chalk hill on the northern edge of Warminster.	810m south-east
Coldharbour Meadows	ST84.039	LWS	3.82	Species-rich grassland and swamp vegetation in a flood storage basin along with areas of reedbed, wet-woodland and associated habitats.	830m south-west
Smallbrook Meadows	ST84.030	LWS	21.8	A complex site which includes two LNRs and a WWT reserve and supports neutral grassland, wet and dry woodland, swamp, and fen vegetation within the southern part of Warminster.	1,250m south

Site	WSBRC Site Code	Designation	Area (ha)	Description	Distance (m) and direction from site
Upton Scudamore Road Verge	ST84.077	Protected Road Verge	3.21	A road verge located by the A350 Warminster Road to the east of Upton Scudamore designated as a Protected Verge by Wiltshire Council for its species-rich chalk downland plant communities.	1,250m north

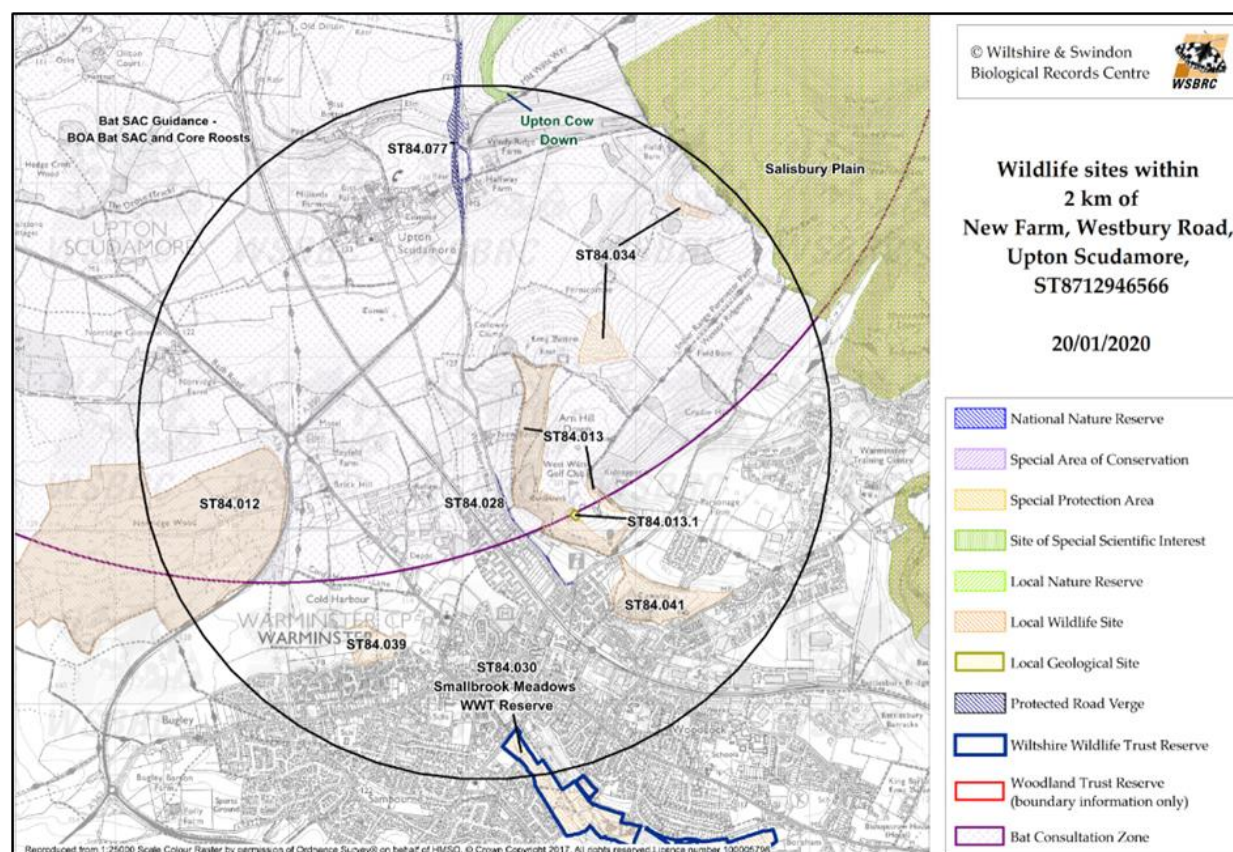


Figure 4 Non-designated sites within 2km

Priority Habitats

- 4.1.9 No priority habitats were identified within the site boundary from the data search. One parcel of ancient woodland, Norridge Wood, was located approximately 800m west of the site. Several parcels of deciduous woodland, lowland calcareous grassland and traditional orchard were present within 1km of the site boundary (see Figure 5). The majority of these habitat were located a sufficient distance from the site to preclude any significant impacts arising from the development and they are not considered further in this report.
- 4.1.10 An area of deciduous woodland located 25m west of the site on the other side of the railway line. As this habitat was separated from the site by the railway line, it will be

buffered from impacts arising from the development and it is not considered further in this report.

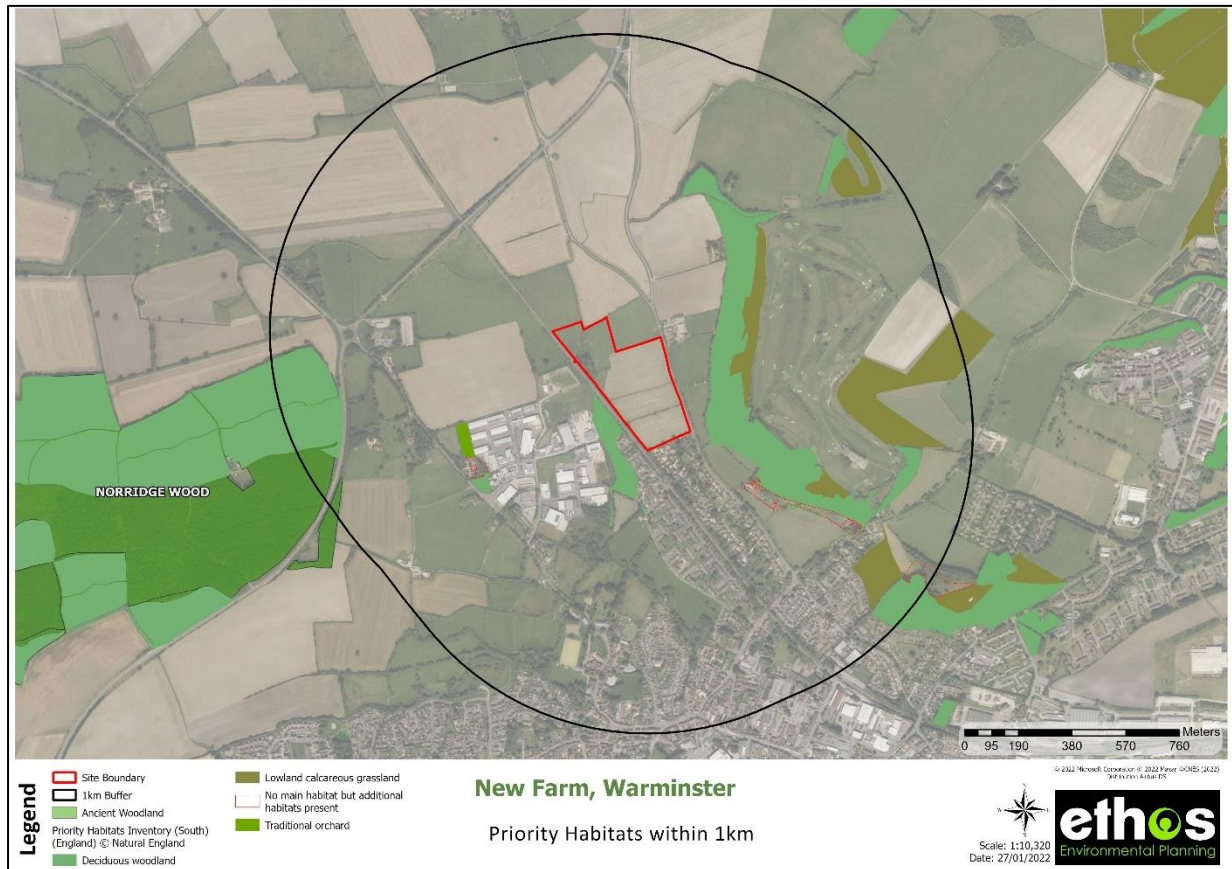


Figure 5 Priority Habitats within 1km

4.2 Habitats

General Site Description

- 4.2.1 The site was located within Warminster with residential properties to the south, arable fields to the north, east and west and Westbury Road to the east of the site, with a trainline running adjacent to the western boundary of the site. The site was dominated by arable land with three fields of permanent cropland within the centre and south-east of the site. There was an extensive network of hedgerows with associated ditches linking the site to the wider environment. There was a parcel of wet woodland including a pond on the western boundary; associated with a stream and an area of tussocky grassland, which was observed to be often waterlogged.

UKHabs classifications and map

- 4.2.2 Figure 6 below shows the mapped habitats using the UKHab classifications. The habitats present and respective habitat codes are:

- Other neutral Grassland (G3);

- Arable and Horticulture (C1);
- Hawthorn Scrub (H34);
- Streams and Ditches (R2);
- Wet Woodland (W1D); and
- Hedgerows (H2).



Figure 6 UK Habitat Classification Survey

Other Neutral Grassland (G3)

- 4.2.3 The north-western section of the site comprised permanent neutral grassland fields. Two of the fields (sections of larger fields to the north and east of the woodland) were assessed to be species poor and dominated by agriculturally intensified grassland.
- 4.2.4 The grassland was dominated by perennial rye-grass (*Lolium perenne*) and Yorkshire fog (*Holcus lanatus*). Other species included sweet vernal grass (*Anthoxanthum odoratum*), white clover (*Trifolium repens.*), daisy (*Bellis perennis*), creeping buttercup (*Ranunculus repens*), common dandelion (*Taraxacum officinale*), common nettle (*Urtica dioica*), cock's foot (*Dactylis glomerata*), meadow buttercup (*Ranunculus acris*), hedgerow cranesbill (*Geranium pyrenaicum*), common mouse-ear (*Cerastium fontanum*), spear thistle (*Cirsium vulgare*), red fescue (*Festuca rubra*) and creeping thistle (*Cirsium arvense*).

- 4.2.5 There was also a section of tussocky grassland (Photo 1) located to the west of the upper arable field, south of pond on the west boundary. The area was waterlogged and dominated by grasses, with species included cock's foot, willowherb (*Epilobium spp.*), false oat grass (*Arrhenatherum elatius*), common ragwort (*Senecio jacobaea*) and prickly sow thistle (*Sonchus asper*).
- 4.2.6 The pasture in the north-west of the site was intensively grazed to a short sward and dominated by common species and was assessed to be of site importance. The tussocky grassland south of the woodland was also species-poor but was managed less intensively, creating a structure of value to a range of species. Due to the small size and low botanical diversity of this habitat, it was considered to be of **site importance** only.



Photo 1 Tussocky grassland in the west of the site, south of the copse



Photo 2 Grassland indicative of much of the grassland onsite

Arable and Horticulture (C1)

- 4.2.7 There were multiple sections of arable land onsite which were under varying management and ecological condition. Several sections were recently cultivated resulting in bare earth, successional grasses and regrowth from the previous crop (Photos 3 and 4). This is an intensively managed agricultural habitat and is of **site importance** only.



Photo 3 Arable crop



Photo 4 Arable crop

Dense Scrub (H34)

- 4.2.8 There was a dense section of hawthorn (*Crataegus monogyna*) scrub located off site on the western site boundary (Photos 5 and 6). The scrub was dominated by dense hawthorn (>75%) with no glades and limited light at ground level. Other species included elder (*Sambucus nigra*) and blackthorn (*Punus spinosa*) and was bordered by common nettle and the arable land to the east. The ground flora was dominated by undesirable species such as nettle and the scrub edge was managed regularly, resulting in a hard edge along the fence line with no tall herbs present.
- 4.2.9 The scrub formed a linear habitat feature along the railway embankment with the potential to support a range of species but, due to the lack of botanical diversity and poor structure, was of **site importance** only.



Photo 5 Hawthorn scrub



Photo 6 Hawthorn scrub

Wet Woodland

- 4.2.10 There was a section of wet woodland located on the western boundary of the site. The woodland comprised crack willow (*Salix fragilis*) and alder (*Alnus glutinosa*) with

scattered hawthorn and blackthorn. The woodland canopy was closed with minimal ground flora present. The woodland was located adjacent to the stream (Photo 7) and pond 1 was located within the woodland.

- 4.2.11 The woodland was small, had low botanical diversity and vegetation was of a similar age with low structural diversity. While this habitat was connected to other habitats off site, the fragmentation caused by the railway line and the abundance of deciduous woodland in the wider environment meant that the on-site woodland was of **site importance** only.

Ponds

- 4.2.12 There was one pond (Pond 1) located on site within the wet woodland in the west of the site. Off-site there was a pond (Pond 2) within a field corner in the north-east of the site. The ponds are discussed in further detail in section 4.3.

Streams and Ditches (R2)

- 4.2.13 A stream was present in the north-west of the site, flowing along the eastern boundary of the woodland. The stream was clear and slow flowing within banks of herbaceous vegetation comprising nettle and *umbellifer spp.* along the eastern bank (Photos 7 and 8). Much of the vegetation on the banks had died-back but was assessed to be dominated by ruderal species such as nettle and umbellifers. The stream was connected to the ditch network traversing the site which are described in greater detail in table 5. The stream was of **local importance**.



Photo 7 Stream in the west of the site



Photo 8 Stream with herbaceous banks

Hedgerows

- 4.2.14 There was an extensive network of hedgerows onsite, which included boundary and internal hedgerows. These are detailed in Table 6 below and are displayed on Figure 7.

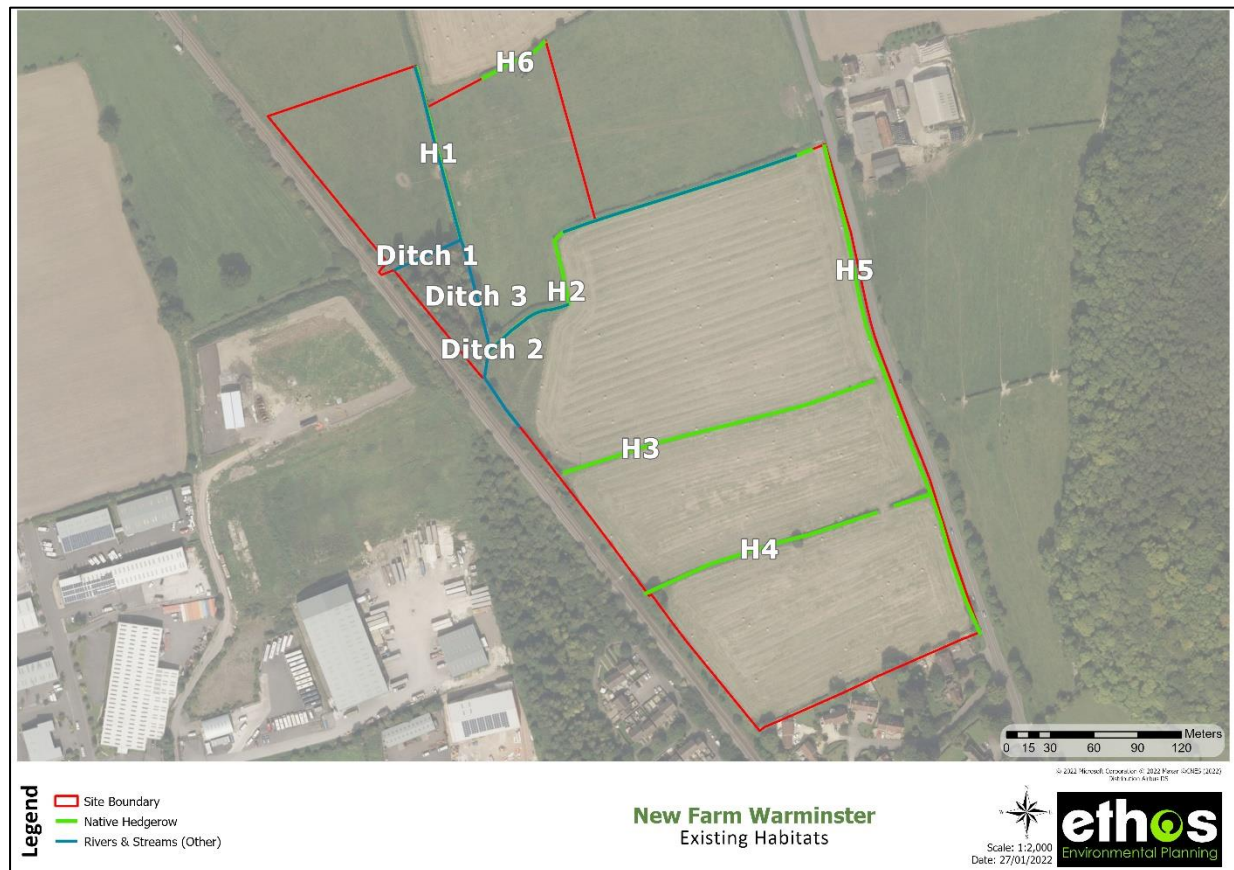


Figure 7 Hedgerows on site

Table 6 Hedgerows on site

No.	Description/Species	Type	Photo
H1	Hedgerow 1 was located to the north of the wet woodland. The hedgerow was dominated by hawthorn, with hazel (<i>Corylus avellana</i>), bramble, elm (<i>Ulmus procera</i>), field maple (<i>Acer campestre</i>) and willow (<i>Salix</i> spp.). Ground flora included lords and ladies (<i>Arum maculatum</i>) and common nettle, and was bordered by grassland field margins.	Native hedgerow with associated ditch	 Photo 9 H1 from east

No.	Description/Species	Type	Photo
H2	Hedgerow 2 was an internal hedgerow that traversed the site from east to west. The hedgerow was dominated by hawthorn (<i>Crtageous monogyna</i>) with scattered blackthorn (<i>Prunus spinosa</i>) present.	Native hedgerow	 Photo 10 H2 from east
H3	Hedgerow 3 was an internal hedgerow that traversed the site from east to west. The hedgerow was dominated by hawthorn (<i>Crtageous monogyna</i>) with scattered blackthorn (<i>Prunus spinosa</i>) present. The hedgerow had a poor vegetational structure, was gappy, and was assessed to be over managed.	Native hedgerow	 Photo 11 H3
H4	Hedgerow 4 was an internal hedgerow with four semi mature trees present. There were large gaps within the hedgerow some >20m. The hedgerow was assessed to be heavily managed resulting in a poor vegetational structure.	Native hedgerow with trees	 Photo 12 Western section of H4
H5	H5 bound Westbury Road. The hedgerow were dominated by hawthorn and was heavily managed. Other species present included blackthorn, privet (<i>Ligustrum</i> spp.), bramble, ash and elm. Ground flora included Lords and ladies and wood sedge (<i>Carex sylvatica</i>).	Native hedgerow	 Photo 13 Eastern section of H5 taken from the south

No.	Description/Species	Type	Photo
H6	A short section of H6 was present on the northern boundary. The hedge was intensively managed and dominated by hawthorn with occasional blackthorn.	Native Hedgerow	 Photo 14 H6

4.2.15 The native hedgerows on site were largely species poor, comprised of hawthorn with occasional blackthorn. They varied in condition and generally were heavily managed to a low height, gappy with a poor vegetative structure; in particular the central hedges, H3 and H4.

4.2.16 The hedgerows were well connected to the wider landscape. Under the updated UK Bap habitat definition, all hedgerows are priority habitat. Further assessment will be carried out to provide confirmation, however it is considered that none of the hedgerow on site are likely to fall under the classification of 'important' under the Hedgerow Regulations.

4.2.17 As a priority habitat, and due to the green infrastructure connectivity of the hedgerows to the wider landscape, including the adjacent railway corridor to the east, and LWS woodland to the west, all the hedgerows on site are assessed to be of **local importance**.

4.3 Protected Species

NERC S. 41 Mammals

4.3.1 One record of polecat (*Mustela putorius*) was returned from Upton Scudamore, which was dated 2009. Three records of brown hare (*Lepus europaeus*) were recorded in 2015 and 2016 within the Salisbury Plain Training Area and there were 21 records of hedgehog from 2010 to 2019, which were widespread.

4.3.2 The boundary hedgerows contained suitable nesting and foraging habitat for hedgehog, and the tussocky grassland and offsite railway embankment on the western boundary and residential gardens to the south offered suitable foraging habitats. Hedgehogs are identified as a species of principal importance in Wiltshire. Any animals using the site are likely to form part of a wider population within the local area, which would be of **site importance**.

- 4.3.3 The site comprised a mosaic of arable, grassland and woodland with hedgerows which are suitable for brown hare. The habitats on site were intensively managed, limiting their value for this species and given the abundance of similar habitats in the wider environment, it was considered that any brown hare potentially present would be of **site importance**.
- 4.3.4 The stream and woodland offered a small amount of suitable habitat for polecat. Given the abundance of woodland and riparian habitats in the wider environment and the low quality of the habitats on site, it was assessed that any polecat potentially present are of **site importance**.
- 4.3.5 No records of harvest mouse were returned in the data search, however the arable habitat and grassland margins provide suitable foraging habitat for harvest mouse, and the scrub and hedgerows offer suitable cover. It was assessed that the potential presence of harvest mouse is of **site importance**.
- 4.3.6 No other records of NERC mammals were provided in the data search. The habitats on site were common and widespread, mainly comprising modified grassland and native hedgerows largely unsuitable for other species, they are therefore considered likely to be absent and will not be considered further in this assessment.

Badger

- 4.3.7 Six records of badger setts have been returned in the data search from 2000-2020 (locations withheld).
- 4.3.8 Four outlier badger setts (labels 1 to 4) were present on site in hedgerow H4 (south) and H5 (east boundary); with possible off-site sett (unconfirmed) to the north). Two latrines and badger hairs were found on the site, as shown in Figure 8 and described in table 7.



Figure 8 Badger evidence

Table 7 Badger evidence

No.	Date	Evidence	Photo
1	08/04/21	Hole located within centre of H4. Assessed to be active with clear trail leaving hole. No spoil heap present.	 Photo 15 Badger sett
2	08/04/21	An active hole with a clear mammal trail located on the eastern boundary at the junction of H5 and H3	 Photo 16 Badger sett

No.	Date	Evidence	Photo
3	05/02/20	Latrine	 <i>Photo 17 Badger latrine</i>
4	05/02/20	Badger hair	 <i>Photo 18 Badger hair</i>
5	05/02/20	Badger hair on barbed wire	 <i>Photo 19 Badger hair snagged on wire</i>
6	05/02/20	Possible badger hole due to size and shape but not well used, with rabbit holes nearby.	 <i>Photo 20 Possible badger hole</i>
7	08/04/21	Recently dug outlier sett or bolt hole. Partial Use – outlier sett	 <i>Photo 21: Badger sett</i>

No.	Date	Evidence	Photo
8	08/04/21	A sett with tunnel extending east under the road with vegetation growing on the spoil heap and no signs of recent use. Disused.	 <i>Photo 22: Badger sett</i>
9	08/04/21	Badger sett with tunnel extending east under road with guard hairs found in vegetation outside. Partial Use – outlier sett	 <i>Photo 23: Badger sett with guard hairs found outside</i>
10	08/06/21	Latrine found at western end of H4.	 <i>Photo 24: Latrine</i>

4.3.9 The locations of the setts indicate occasional use by badger as bolt holes/ outlier setts while foraging. There is suitable habitat for badger in the wider landscape, both along the railway corridor to the east and the woodland to the west. The woodland to the west provides suitable habitat for a main sett, and the surround farmland fields, provide suitable habitat. The site is assessed to be used by badger primarily for commuting as arable crop fields offer sub-optimal foraging habitat. From the locations of the outlier setts and latrine, it is assessed that they are likely entering/exiting the site on southern section of the east boundary, commuting along the southern hedgerow (H4) to reach the railway corridor and pasture habitat to the north of the site.

4.3.10 Badgers are not listed as a species of principal importance for the conservation of biodiversity in England, however due to their presence on site they will be considered further in this assessment in relation to their legal protection.

Hazel Dormouse

Desk Study

- 4.3.11 The data search included 3 records of dormouse within the search area. The closest record was located 710m southwest of the site (location restricted), all records were dated between 2012 and 2015.

Habitats

- 4.3.12 The site was located approximately 60m west of Arn Hill LWS and 700m to the east of Norridge Woods ASNW, which comprised of 178Ha of arboreal habitat which could provide potential habitat for dormouse. There were several coppices and small sections of woodland including a section adjacent to the south-west boundary of the site.
- 4.3.13 The site was bounded by roads in the east and a railway line to the west, which limited connectivity to the wider environment. However, there were several suitable links such as a double hedgerow linking (off-site) to H5 which provided a potential link to Arn Hill LWS to the east.
- 4.3.14 The site itself was dominated by grassland and arable land which provides negligible habitat for dormouse. The hedgerows on site were diverse in type and structure and were of varying ecological condition with numerous gaps to allow access for farm machinery between the fields. Overall, it was assessed that the hedgerows onsite provided low potential for dormouse.

Nest tube survey

- 4.3.15 Several wood mouse nests were found but no evidence of dormice was found during the 2021 survey. Given the score achieved by the survey (24), dormice are considered to be absent from the site and are not considered further in this report.

Riparian Mammals

- 4.3.16 There were ten records of water vole (*Arvicola amphibius*) from 2010 to 2020, the nearest record being just over 500m south-west of the site. Three records of otter were returned from 2010 to 2013, with the closest result approximately 1.2km west of the site.

Water vole

- 4.3.17 A desktop survey identified several water bodies including streams and ponds to the north-west of the site. The River Were was approximately 350m south-west of the site and the River Wyle and associated habitats were approximately 2km south of the site.

- 4.3.18 The site itself was dominated by arable fields and permanent pasture which were assessed to provide negligible to low suitability for water vole. Although the fields within the north-west of the site were waterlogged at the time of the survey, they consisted of bare soil or arable stubble, providing no cover or food source for water voles.
- 4.3.19 The key feature on site was assessed to be the stream which runs along the western boundary of the site and forms a link to the waterbodies to the north-west. The southern section of the stream flows alongside the wet woodland to the south and enters a standing waterbody (P3), approximately 130m south-west of the site. The stream was slow flowing, with banks of herbaceous vegetation adjacent to the field boundaries and several wooded sections, particularly around the arboreal habitats adjacent to Pond 1.
- 4.3.20 No evidence of water vole was found, however the stream provides some suitability, so precautionary mitigation would be needed. Water vole are therefore assessed to be of **site importance**.

Otter

- 4.3.21 It was assessed that the wider environment could provide potential riparian habitat for otter including streams, ponds and rivers. It was assessed that a key feature within the wider environment would be the River Wyle, located 1.2km south-west of the site.
- 4.3.22 The site was dominated by arable land and grassland providing poor terrestrial habitat for otter. The key feature was assessed to be the stream in the north-west of the site which provided potential transitional habitats for otter with suitable habitat in the wet woodland and ditch network.
- 4.3.23 Although no signs of otter were identified, they are a wide-ranging species and may on occasions utilise the stream area for commuting. Otter are therefore assessed to be of **site importance**.

Bats

Desk Study

- 4.3.24 The data search identified Numerous bat species have been recorded within the 2km radius, including Annex II listed species lesser horseshoe bat (*Rhinolophus hipposideros*), greater horseshoe bat (*Rhinolophus ferrumequinum*), Bechstein's (*Myotis bechsteinii*) and western barbastelle (*Barbastella barbastellus*).
- 4.3.25 One EPS licence was granted to allow the destruction of a resting place for common pipistrelle (*Pipistrellus pipistrellus*) and brown long-eared bat (*Plecotus auritus*) in 2013, approximately 1.5km east of the site.
- 4.3.26 The site is located in the consultation zone for greater horseshoe bats for the Bath and Bradford on Avon Bats SAC as it is within 4km of a core roost associated with the SAC.

Habitats

4.3.27 The site was dominated by arable farmland which offers low value foraging habitat for bats. However, the hedgerows, field margin habitat, stream and woodland copse offered suitable foraging and commuting habitat for a range of bat species. The site lies adjacent to a railway corridor, and over to the west along a ridge, lies Arns Hill Woodland. At the time of the surveys, the north-west section of the site was observed to be used as cattle-grazed pasture which is of high foraging value to greater horseshoe bats. Overall, the site was assessed to be of moderate value for bats.

Commuting and Foraging Activity

4.3.28 The results of the bat activity and static detector surveys are provided in Appendix 1. From spring and early summer activity transect data, only two species of bat were recorded – common pipistrelle and Natterers'; and activity on site was noted to be very low with only very few and sporadic passes of common pipistrelle.

4.3.29 From the full season of static surveys, at five locations across the site, a total of 14 species of bat were recorded across the site; these were: common pipistrelle, soprano pipistrelle, Nathusius's pipistrelle, noctule, Leisler's, serotine, brown long eared, Myotis spp., Brandt's, Daubenton's, Natterer's bat, barbastelle, greater horseshoe and lesser horseshoe bats.

4.3.30 From the Ecobat percentile analysis², the highest activity levels across the site are attributed to common pipistrelle (the only species to be within the top percentile, 80th) throughout the season; followed by serotine, noctule and Leisler (40th – 60th percentile). Activity levels of all the other bat species were low to very low (<40th percentile) and showed seasonal variation.

4.3.31 Overall, bat activity at the site was assessed to be low-moderate, with key activity areas along the western, southern and northern boundaries. This is likely due to the high suitability of these habitats as foraging and commuting routes with links to suitable habitat in the wider landscape.

Summary and assessment of nature conservation importance

Bath and Bradford on Avon Bat SAC Species – Greater and Lesser Horseshoe bats

4.3.32 The Annex II species regularly recorded on site were greater and lesser horseshoe. The key habitats for these species were the northern boundary of the site and the hedgerow toward the south of the site.

² Percentiles Analysis: the reference dataset was stratified to include records within 30 days of survey date/ records from within 100km radius of the survey location/ records using any make of bat detector - the values of total bat passes each night for each species is compared to the value in Ecobat's reference database in order to provide context to assessment of 'activity' levels.

- 4.3.33 There were low levels of greater horseshoe and lesser horseshoe bat activity across the site. There were relatively higher levels, and throughout the season, of lesser horseshoe bats recorded along the southern hedgerow (location 3). For greater horseshoes, low but regular activity through the season was noted on the north boundary and southern hedgerow.
- 4.3.34 From comparison with data at other static locations, and review of the habitats in the wider landscape, it is assessed that the southern hedgerow is the key commuting (east-west) and foraging feature for both lesser and greater horseshoe bats. This less managed hedgerow provides a strong linear connection between Arns Hill woodland to the east and the railway corridor to the west.
- 4.3.35 The northern boundary hedgerow is also assessed to be key commuting and foraging feature for greater horseshoe bats. Activity was recorded regularly through the season. This hedgerow bounds the field that was cattle grazed, and links to the wet woodland to the west.
- 4.3.36 Due to the evidence of both foraging and commuting along the northern boundary and southern section of the site and the proximity to great horseshoe core roost associated with the Bath and Bradford on Avon Bat SAC, the site is of **County importance** for greater and lesser horseshoe bats.

Other bats

- 4.3.37 Activity on site was dominated by common pipistrelle bats. The key features for this species, and other species of bats, are the hedgerows, all of which were used by foraging and commuting common pipistrelles. Common pipistrelle bat activity was high at all locations, in particular the north boundary, southern hedgerow and west boundary by the railway corridor. Activity was comparably lower at the central hedge and east boundary.
- 4.3.38 Moderate activity levels of serotine, noctule and Leisler's bats were recorded, and low to very low activity levels of all the other bat species. Barbastelle were recorded on occasions at different static locations, however due to the very low and sporadic nature of calls over the survey period, the site is not considered to support habitat or features of importance to barbastelle bats. The mitigation for greater and lesser horseshoe bats will benefit barbastelle.
- 4.3.39 with activity focused on the hedgerows both for foraging and commuting. The populations of other bat species recorded on site are assessed as being of **site importance**. The mitigation measures for horseshoe bats will benefit all bat species.

Birds

Desk Study

- 4.3.40 The data search identified numerous bird species were recorded within the 2km radius and include those that are listed on the Birds of Conservation Concern (BoCC) Red List, are Schedule 1 and UKBAP / Section 41 Priority Species.
- 4.3.41 Schedule 1 species records included; Barn owl (*Tyto alba*), brambling (*Fringilla montifringilla*), fieldfare (*Turdus pilaris*), green sandpiper (*Tringa ochropus*), hobby (*Falco Subbuteo*), kingfisher (*Alcedo atthis*), merlin (*Falco columbarius*), osprey (*Pandion haliaetus*), peregrine (*Falco peregrinus*), red kite (*Milvus milvus*) and redwing (*Turdus iliacus*). A list of all birds within the data search has been provided within Appendix 5 of this report.

Habitats

- 4.3.42 The site consisted of a mix of arable land and permanent pasture with associated hedgerows and riparian habitats. The hedgerows and offsite scrub provided suitable nesting habitats for a range of species but the arable fields and pasture (in the revised red line area) were intensively managed and lacked suitable habitat for farmland birds. It was assessed that the site had potential foraging and breeding habitat for a range of common bird species but any bird population present would be of **site importance**.

Reptiles

Desk study

- 4.3.43 There were five records of common lizard (*Zootoca vivipara*) recorded from 2010 to 2020 with two adults recorded at the Arn Hill LWS in 2018. Four records of slow worm (*Anguis fragilis*) were recorded from 2017 to 2019, the nearest record submitted approximately 400m south of the site and eleven records of grass snake (*Natrix Helvetica*) were returned from 2012 to 2019, the closest approximately 800m south of the site.

Habitats

- 4.3.44 The site was dominated by arable land and agriculturally intensified grassland which provides poor habitat suitability for reptiles. There were several sections of suitable reptile habitat identified onsite, including the section of rough grassland located south of the woodland and the field margins adjacent to the stream on the western boundary. These habitats offered shelter and basking areas for reptiles and were located adjacent to riparian habitats which provide a suitable food source for reptiles such as grass snake.
- 4.3.45 Overall, the site was dominated by habitats unsuitable for reptiles although small areas of suitable habitat were present in the west of the site. Due to the small amount of suitable habitat, any reptiles present are of **site importance**.

Amphibians

Desk Study

4.3.46 No records of GCN were recorded within 2km of the site. There was a single record of common toad submitted from Smallbrooks Meadows LNR, 2.9km south-west and common frog was recorded over 1km south of the site with a maximum count of seven frogs.

Habitats

4.3.47 There were multiple ditches on site which contained running water at the time of survey, which may provide low potential transitory habitat for amphibians. However, amphibians (GCN in particular) tend to avoid flowing watercourses. Much of the site was dominated by species-poor intensively managed farmland which provides poor habitat suitability for amphibians. The key terrestrial features were assessed to be the rough grassland, wet woodland and western field margin located adjacent to the stream, as well as Pond 1.

4.3.48 Two ponds were present within 500m of the site including one onsite pond located within the woodland (Pond 1). All ponds within 500m of the site are shown below in Figure 9.

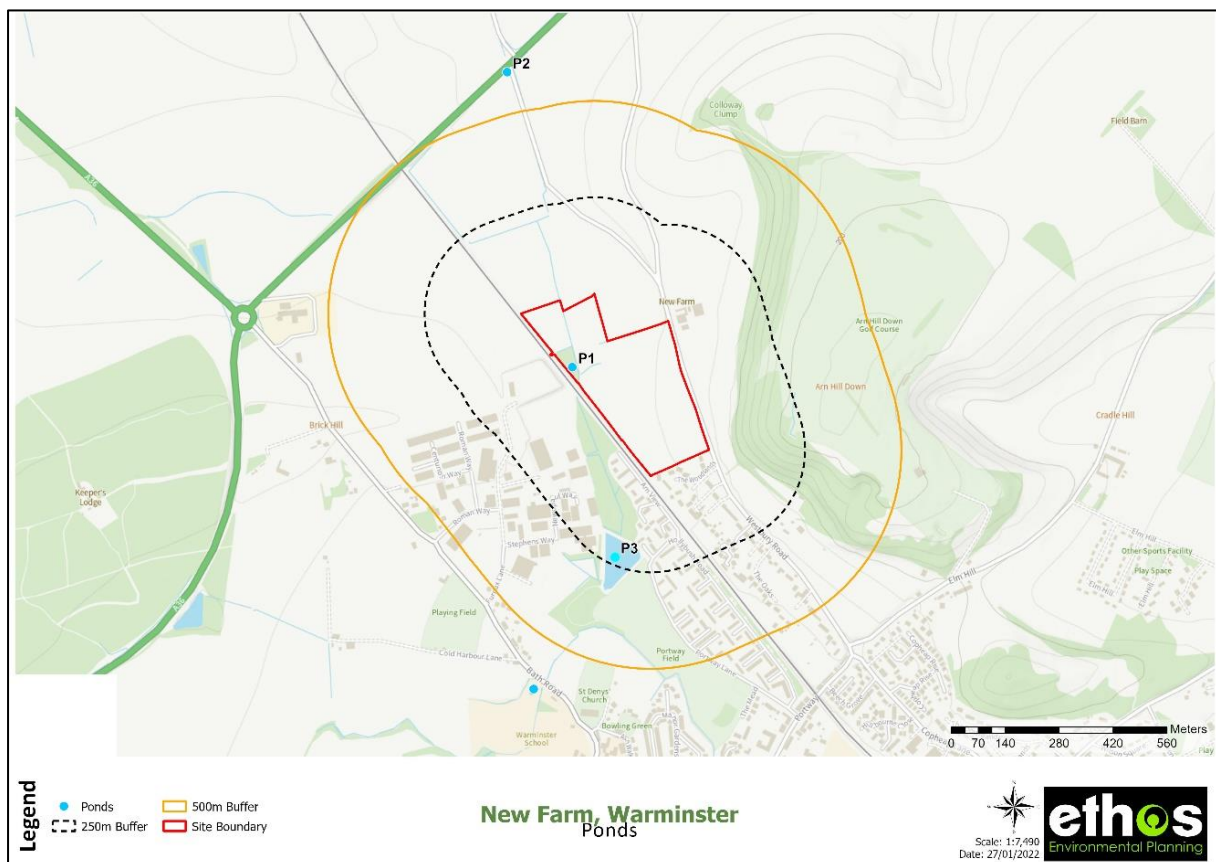


Figure 9 Ponds within 500m

HSI Surveys

- 4.3.49 Pond 1 in the west of the site (Photo 26) was fed by a stream which ran along the western boundary of the site. The pond was bordered by trees and scrub and was located adjacent to the rough grassland which was assessed to provide suitable terrestrial habitat for GCN. The pond was assessed to provide '**Good**' suitability regarding its potential to support GCN.
- 4.3.50 Pond 2 (Photo 27) was located approximately 600m to the north of the site within an off-site field and has been included in the assessment as it is connected to the site through the hedgerow network extending from the site to the north. The pond was bordered by scrub vegetation and was located adjacent to arable field margins which were assessed to provide suitable terrestrial habitat for amphibians. The pond scored '**Below average**' regarding its suitability to support GCN.
- 4.3.51 Pond 3 (Photo 28) was located 180m south-west of the site and was connected to the site by the stream and section of wet woodland. The pond was large ($>5000\text{m}^2$). There were waterfowl present at the time of survey and the pond was bordered by paths and amenity grassland. The pond was assessed to be '**Poor**' regarding its suitability to support GCN.
- 4.3.52 The full results of the HSI survey are included in appendix 3.



Photo 25 Pond 1



Photo 26 Pond 2



Photo 27 Pond 3

eDNA Survey

4.3.53 Pond 1 was subject to an eDNA survey which returned a negative result for the presence of GCN. A copy of the results of the eDNA test are included in appendix 7.

4.3.54 Due to the absence of GCN from the pond off site and the low suitability of the terrestrial habitats on site, this species has been assessed to be absent and is not considered further in this report.

Invertebrates

Desk Study

4.3.55 There were a range of invertebrates returned by the data search which have been recorded within the past ten years. This included 24 species of principle importance (NERC S41) and UK BAP. There were no records of white-clawed crayfish (*Austropotamobius pallipes*) identified by the data search. A full list of the invertebrates returned in the data search is included in appendix 6.

Habitats

4.3.56 The key features on site were assessed to be the tussocky grassland to the south of the woodland copse which comprised rough grassland which could provide potential habitat for species identified within the background data search such as black oil-beetle (*Meloe proscarabaeus*).

4.3.57 The riparian features on site such as the pond and the stream were assessed to provide suitable habitat for a range of aquatic invertebrates which would, in turn, provide a food source for species that feed upon them.

4.3.58 It was assessed that the habitats on site were widespread and common, providing low potential habitat for rarer specialised invertebrates. Any invertebrate population potentially present was therefore assessed to be of **site importance**.

4.4 Summary

4.4.1 The important ecological features of relevance to this assessment and their importance are summarised in Table 2. Likely significant effects on ecological features of local importance and above are assessed for potential significant impact in section 6.

4.4.2 The ecological features of site value are scoped out the assessment of significant key effects, however they are still given consideration with regard to mitigation and legislative requirements, as well as for enhancement opportunities.

Table 8 Summary of important ecological features

Important ecological features	Scale of Importance
River Avon SAC	National
Bath and Bradford-upon-Avon Bats SAC	National
Stream	Local
Hedgerows	Local
Greater and Lesser Horseshoe Bats	County
Riparian Mammals (water vole and otter)	Site
Section 41 Mammals – hedgehog Brown Hare, Polecat	Site
Other bat species	Site
Invertebrates	Site
Birds	Site
Badger	Site

5 DESCRIPTION OF THE PROPOSED DEVELOPMENT

5.1 The development proposals comprise the construction of up to 250 residential dwellings, community hub, public open space, access, infrastructure with associated and ancillary development, as shown in Figure 10.

5.2 The layout of the development has been developed to minimise impacts on site ecology as follows:

- Buffering of retained hedgerows and enhancement to improve structure and diversity;
- New native tree and mixed scrub planting along north boundary to enhance northern GI link, and replacement hedgerow planting to maintain link to wet woodland and railway corridor;
- New native tree and mixed scrub habitat planting along southern boundary to create a new linear feature and GI along the southern boundary (no existing hedgerow). Links to railway corridor;
- New native tree and mixed scrub habitat planting along the west boundary (south), minimum of 20m, providing a wide habitat buffer between plots and the railway corridor and connecting hedgerow, strengthening GI on site.
- Retention of continuous canopy along H4, to retain linear feature for bats;
- Enhancement of areas of retained modified grassland to species-rich grassland;
- Substantial buffering of stream and created wetland habitat;
- Integrated open space, allotments, recreational areas, Sustainable Drainage Systems, and wetland floating filtration system that are all managed for biodiversity and wildlife in the northwest of the site.



6 ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

6.1 Designated Sites

River Avon SAC

- 6.1.1 The site is within the catchment area for the River Avon SAC, which encompasses five rivers flowing into the River Avon at Salisbury; River Nadder, River Wylfe, River Till, River Avon and River Bourne. The River Avon is designated for its river habitat characterised by water crowfoot and starwort, as well as supporting species population of international importance: Atlantic salmon, bullhead, brook lamprey, sea lamprey, and Desmoulin's whorl snail.
- 6.1.2 The development has the potential to impact the integrity of the SAC through increased total phosphate levels, through a combination of surface water run-off and foul water discharge. A Shadow Habitats Regulation Assessment (sHRA) has been produced by Ethos (Ethos, 2021) which discusses this impact through an Appropriate Assessment.
- 6.1.3 The proposed mitigation strategy, a wetland treatment system to intercept the surface and foul drainage from the development, along with other design measures, was assessed to deliver a total phosphorous budget of -19.29kg TP/year. The calculations and system details are presented in the nutrient neutrality strategy (Marian Cameron Consultants, 2021).
- 6.1.4 Provided the nutrient neutrality strategy is implemented and appropriately managed through the CEMP and LEMP, it is assessed that they would be no adverse effect on the conservation objectives of the River Avon SAC, either alone or in combination with other plans or projects, as a result of water quality (total phosphate) impacts.

Bath and Bradford on Avon Bats SAC

- 6.1.5 The site is within the 4000m consultation buffer for greater horseshoe bats, associated with Bath and Bradford on Avon Bats SAC. Greater horseshoe and lesser horseshoe bats are using linear features (hedgerows 2 and 4) of the site for commuting and foraging. The development has the potential to impact commuting and/or foraging behaviour of horseshoe bats. Information to support a Habitats Regulation Assessment (HRA) has been produced by Ethos (Ethos, 2022) which discusses likely significant effects. The likely significant effects are considered to be potential fragmentation H4 and external lighting.
- 6.1.6 Provided the mitigation to retain a continuous canopy on H4, and a sensitive lighting plan is implemented to retain dark corridors along H2 and H4, and that hedgerows are appropriately managed and buffered for bats, it is considered likely that there would be no adverse effect on the favourable conservation status of greater and lesser horseshoe bats, either alone or in combination with other plans or projects.

6.2 Habitats

Hedgerows

Construction

- 6.2.1 During the construction phase, the retained hedgerows (including trees) are at risk from impacts of vehicle movement and machinery on root protection areas, which can cause direct damage to the individual woody species affected. Without mitigation, these effects will be temporarily adverse, very localised to the hedge/tree affected.
- 6.2.2 Mitigation measures will be required during construction to avoid such impacts, including tree protection fencing to ensure root protection zones are safeguarded. Other good practice measures include the damping down of potential dust sources; appropriate storage of chemicals and hazardous wastes to avoid and minimise particulate deposition on hedgerow vegetation. This will be set out within a Construction Environment Management Plan (CEMP), which can be conditioned.

Operation

- 6.2.3 To facilitate access to the site, a number of sections of hedgerow require removal for roads (approximated between 10-15m gaps) and footpaths (approximated around 3m).
- 6.2.4 The gaps in hedgerows for the proposed scheme comprise:
- East boundary (H5) – 2 roads, 2 footpaths
 - Central hedge (H3) – 1 road, 1 footpath – 2 gaps
 - Southern hedge (H4) – 1 road, 2 footpaths – 2 gaps
 - Northern hedge (H2) – 1 single lane, 1 footpath
- 6.2.5 The approximately 3 – 15m gaps are not considered to cause a significant loss of hedgerow habitat, nor cause a significant fragmentation effect. There are already numerous gaps and existing field access gaps in the hedges.
- 6.2.6 The boundary hedgerows across the site will be subject to substantial buffer planting, which will provide stronger and less disturbed green corridors for wildlife around the periphery of the site. The BNG metric demonstrates the delivery of a net gain in hedgerow habitat.
- 6.2.7 The retained hedgerows will be less managed to develop taller and wider in form. New habitat planting and swales adjacent to the retained hedgerows will enhance the hedgerows, create an ecological buffer and strengthen the hedgerows as ecological corridors for wildlife such as badger, hedgehog, bats and birds. Overall this is assessed to have a beneficial impact on hedgerows in the long term.
- 6.2.8 With suitable mitigation implemented the proposed development is considered likely to have **no significant effect** on the hedgerows on site.

Stream

- 6.2.9 An unnamed stream flows through the northwest corner of the site which is a tributary of The Ware; and drains through a culver under the Wessex main Railway and south to The Were that then flows southeast through Warminster to the River Wylfe. The topography of the site gently falls from the east towards the watercourse and culvert.

Construction

- 6.2.10 There are hydrological links to the on site stream and wider riparian habitat, where without mitigation, activities could result in the degradation of water quality. Pollution pathways include pollution entering the watercourse directly, or via natural ditches or reaching the water table. Such effects will be temporary and generally unlikely to cause a long term adverse effect, although pollution incidents could lead to minor degradation of bankside habitats in the short-term.
- 6.2.11 To avoid and minimise the potential impacts on the water quality from construction run-off, the construction works will be carried out under strict pollution prevention controls. Controls to safeguard water quality include appropriate storage of chemical and hazardous material, secure storage of cement and sand to avoid risk of being washed into surface water systems, covering up of drains, use of spill kits and collection of wastewater from site activities into settlement tanks (to separate water for discharge from the remaining sludge for appropriate disposal).

Operation

- 6.2.12 Without mitigation, there are likely infiltration and run-off effects from the change of land (greenfield to developed) where water quantity (increase in surface water run-off flow rates due to reduced soil infiltration) and water quality (contaminants entering the system) could be impacted, which could lead to degradation of the river water and associated habitat and species and/or changes to the water ecosystem.
- 6.2.13 The surface water drainage strategy and ground water quality strategy are integral to the design of the proposed development, and the phosphorus nutrient report details the proposed on site mitigation to deliver nutrient neutrality. In addition to the wetland floatation system, there are various other embedded measures for control of surface water runoff and the protection of groundwater quality - which include SuDS features (attenuation ponds, swales), petrol interceptor (NW corner), various flow control devices, and rainwater harvesting.
- 6.2.14 Taking into account the embedded mitigation, the overall effect on the stream and its associated habitats is considered to be neutral and controlled by various design measures and integration of equipment to reduce flow rates and to prevent contaminants entering the system. It is considered that without additional mitigation (monitoring and management of the systems and operational activities) that there could be potential temporary adverse effects. The LEMP will detail the necessary on-going monitoring and management.

6.3 Protected Species

Great and Lesser Horseshoe Bats

Construction

- 6.3.1 Horseshoe bats are known to be a very light-sensitive species and tend to avoid illuminated areas. Introduction of lighting can cause fragmentation effects on linear commuting features and may disrupt/impact foraging behaviour.
- 6.3.2 During the construction period, as works will be restricted to good practice working hours, there will be limited effects on foraging and commuting bat during the night. There is unlikely to be disturbance from noise or vibration, dust deposition or other impacts from construction activities. The only potential adverse effect, without mitigation, would be construction lighting. For example, security lighting that may be required into night hours and for a short period at the end of the working day when daylight hours in day become shorter during the autumn/winter months. A sensitive lighting strategy will be provided in the CEMP to avoid any spillage of light onto H2 or H4 during the construction period.

Operation

- 6.3.3 The habitats being lost to development were assessed to be of low value to foraging bats (arable field); the linear feature identified as commuting and foraging routes, are being retained and enhanced as bat habitat.
- 6.3.4 The key linear features on site for horseshoe bats was extrapolated from analysis of static data at various locations across the site, to be the north and south hedgerows, providing east-west links between the woodland habitat and railway corridor for wider dispersal (see Figure 11) . There is new road routed through the centre of the southern hedgerow. Whilst bats do fly over field access gaps in hedges, particularly if it is favoured commuting route; to avoid potential fragmentation effects on this feature, a tree-hop over will be installed to maintain continuous canopy cover.

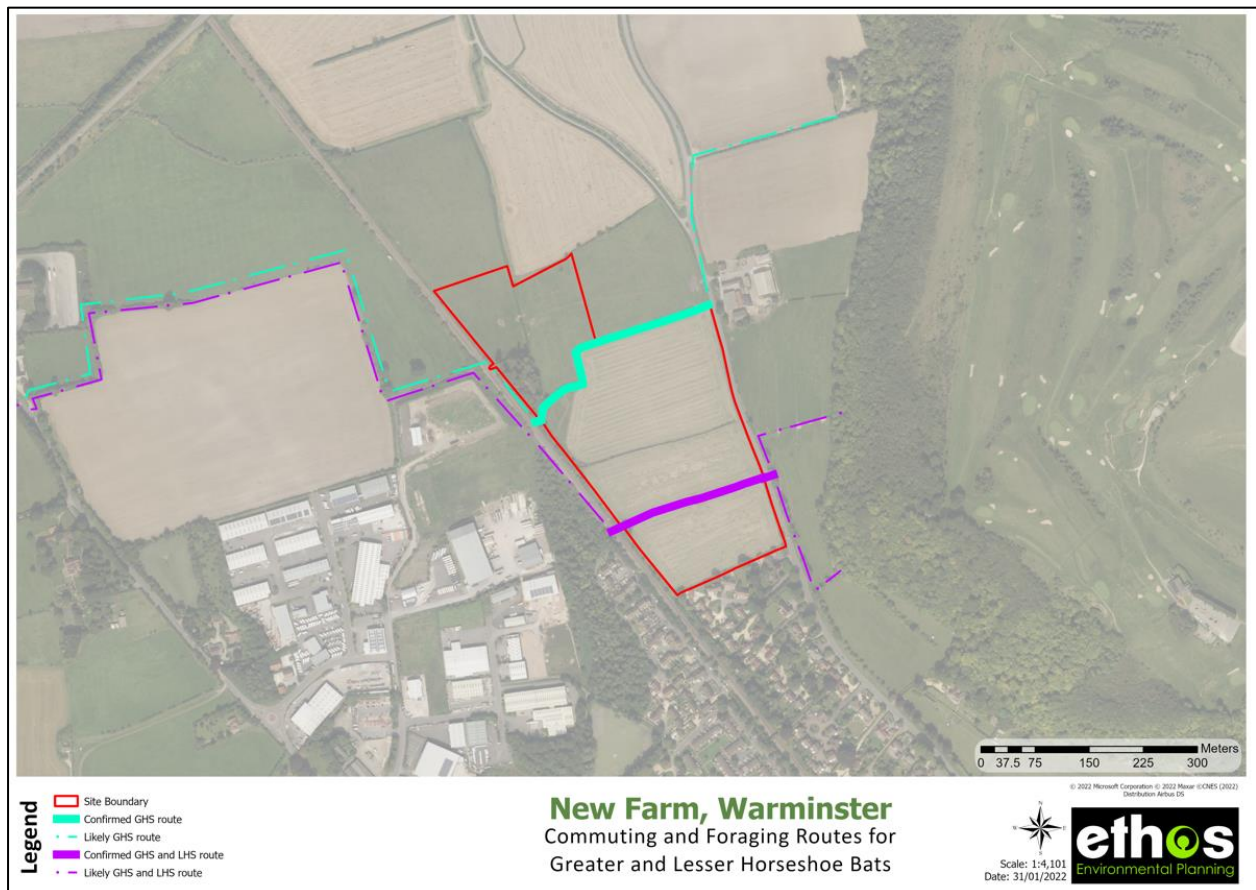


Figure 11 Greater and lesser horseshoe commuting and foraging routes, assessed and predicted

- 6.3.5 The impacts of lighting on bat behaviour varies between species, with some bat species such as common pipistrelle being light-tolerant and known to utilise lights as a foraging focus for insects attracted to lights (BCT and ILE, 2009). However, many bat species particularly horseshoe bats, and other light sensitive species including brown long-eared and Myotis bats, will avoid lit areas. This effect can be compounded by the attraction of insects to lit areas resulting in adjacent 'dark' habitats supporting reduced numbers of insects, further impacting on the ability of light-sensitive bats being able to feed. This is often referred to as the 'vacuum effect' (BCT and ILE, 2009).
- 6.3.6 With the introduction of external lighting associate with the development, without mitigation, likely significant effects on foraging and commuting horseshoe bats could affect their behaviour which in turn could impact their ability to forage/reproduce and therefore favourable conservation status.
- 6.3.7 The sensitive lighting strategy will be prepared in line with bats and lighting guidance. Whilst focused on the mitigation being for horseshoe bats. This will in turn provide dark corridors for all bat species; and minimisation of lighting in general will reduce any 'vacuum effect' on foraging resources for all light- sensitive species.

- 6.3.8 Two dark corridors (below 0.5 lux) will be retained along the northern boundary and the southern hedgerow. Street lighting layout will be adjusted in this area to retain a dark crossover point where the new road dissects the hedgerow. In general, sensitive lighting will minimise excessive light spill across the site in line with best practice. Mitigation measures include use of LED, low column luminaires, downward facing (no upward light/dark sky friendly) and use of shields.
- 6.3.9 In addition to strategic placement of columns to ensure there are 'dark' crossovers retained east-south, other mitigation measures can include changes to the duration and timing of lighting regimes by dimming and/or switching off luminaires as an effective strategy to meet both human and wildlife use of the area but minimising effects of lighting (fragmentation of commuting routes; avoidance behaviour; reduced foraging opportunities) on bats (Stone et al. 2015).

Species of Site Importance – Mitigation Measures

Water Vole and Otter

Construction

- 6.3.10 The nutrient mitigation works will entail the diversion of the stream into attenuation ponds at two locations along the watercourse. Target bankside surveys found no evidence of water vole or otter. However due to their transient nature, a pre-works survey check will be required. The results of which will inform a mitigation strategy for the CEMP, if needed.

Operation

- 6.3.11 The wetland habitat creation in the northwest of the site will enhance the availability of riparian habitat for water vole and otter. There is the opportunity to improve the bankside habitat quality of the stream and other ditches on site to provide greater suitability for water vole. Overall, this is assessed to have a beneficial impact on riparian species in the long term.

Badger

- 6.3.12 Due to the transient nature of badger, the mitigation strategy will need to be informed by pre-works badger surveys. At present there are two setts which may require a licence from Natural England for closure (sett locations 1 and 9 in Figure 8); and two that may be disturbed by the works (sett locations 2 and 8 in Figure 8). A badger mitigation strategy will be produced detailing the mitigation measures required to protect badgers. The pre-works survey will provide up to date information on the extent of setts and usage.
- 6.3.13 While construction works will temporarily impact availability of foraging habitat, once completed the proposals will offer a greater diversity of resources for badger, and the planted-up boundaries to the south and north will retain green corridors for dispersal between the railway corridor and woodland habitat.

Birds

- 6.3.14 The site was assessed to provide nesting habitat in the form of scrub and hedgerow for widespread and common species of bird. Additionally, the area of tussock grassland to the south of the wetland woodland, was assessed to provide nesting opportunities for ground nesting birds. Mitigation to avoid the impacts on these species will include appropriate timing of vegetation clearance works, pre-works checks and supervised watching brief by an Ecological Clerk of Works.

Section 41 Mammals

- 6.3.15 The majority of boundary habitat, suitable to support section 41 mammals is being retained. There are sections of hedgerows being removed for roadway and footpath accesses. For these sections, habitat removal will be sensitively timed and overseen by an Ecological Clerk of Works. Any animals found will be carefully relocated to an undisturbed area of retained suitable habitat.

Other bats

- 6.3.16 A total of fourteen bat species were recorded on site, with the majority of activity being attributed to common pipistrelle. The mitigation measures required for horseshoe bats will provide suitable mitigation for all bat species during construction and operation.

Invertebrates

- 6.3.17 The boundary habitats, which offer shelter and refuge to invertebrates are largely being retained. Terrestrial and aquatic invertebrates may be indirectly adversely impacted from poor construction practices during the construction phase, leading to silting of the watercourse, dust deposition or pollution incidents which can result in degradation of water quality and associated habitats. To avoid and minimise potential impacts on invertebrate assemblages the CEMP will detail good practice construction methods as detailed under measures to avoid impacts on the watercourse.

6.4 Summary

- 6.1 A summary of the predicted significance of any effects, as well as the proposed mitigation/compensation measures and how these may be secured are outlined in Table 10.

Table 9 Summary of significance of effects and mitigation/compensation

Ecological Feature	Significance of effects	Mitigation/Compensation	Mechanism for securing delivery
River Avon SAC	National scale	• Creation SuDS and floating filtration system in NW section of site. • Pollution control measures during construction • Surface water drainage strategy for pollution control measures integrated into the design.	SHRA, Appropriate Assessment. Mitigation measures secured through a CEMP. Monitoring and habitat management secured through LEMP.
Bath and Bradford on Avon Bat SAC	National Scale	• Mitigation to avoid and minimised potential fragmentation of linear features used by horseshoe bats. • Dark corridors (<0.5 lux) on commuting and foraging features used by horseshoe bats. • Sensitive lighting strategy for construction and operation. • Advance landscaping.	SHRA Appropriate Assessment. Mitigation measures secured through a CEMP. Monitoring and habitat management secured through LEMP
Stream	Local scale	• Pollution control measures, good practice construction working.	Mitigation measures secured through a CEMP.
Hedgerows	Local scale	• Installation of protective tree fencing. • Provision of ecological buffers. • Replacement hedgerow planting. • Bolster planting, new hedgerow planting. • Less frequent management of hedgerows for bat habitat.	Mitigation measures secured through a CEMP. Detailed landscape plan Monitoring and management secured through a LEMP.
Greater and lesser horseshoe bats	County scale	• Hedgerow removal works sensitively timed to winter months. • Sensitive lighting strategy – construction and operation. • Advance works landscaping • Soft landscaping planting mix with species selected for value to attract invertebrates including night scented species. • Creation of new habitats for foraging benefit SuDs and wetland habitat.	SHRA, Appropriate Assessment. Mitigation measures secured through a CEMP. Monitoring and habitat management secured through LEMP. Lighting strategy secured by condition.
Riparian Mammals	Site scale	• Pre-works survey. • Precautionary construction measures • Bank side habitat enhancements.	Mitigation measures secured through a CEMP.

Ecological Feature	Significance of effects	Mitigation/Compensation	Mechanism for securing delivery
			Monitoring and habitat management secured through LEMP
Hedgehog	Site scale	- Precautionary construction measures. - Measures to ensure site remains permeable post-construction (hedgehog gaps)	Mitigation measures secured through a CEMP. Monitoring and habitat management secured through LEMP
Birds	Site scale	- Timing of hedgerow removal works to avoid nesting bird season, or supervision of hedgerow removal under ECoW. - Replacement and new hedgerow planting. - Soft landscaping planting mix with species selected for foraging value.	Mitigation measures secured through a CEMP.
Badger	Site scale	- Pre-works survey. - Preparation of badger mitigation strategy - Precautionary construction measures - Landscape buffer corridors (north and south) and hedgerow buffers to ensure site remains permeable post-construction. - Soft landscaping planting mix with species selected for foraging value.	Badger mitigation Strategy secured by condition. CEMP secured by condition
Other bats	Site scale	- Hedgerow removal works sensitively timed to winter months. - Sensitive lighting strategy – construction and operation. - Advance works landscaping - Soft landscaping planting mix with species selected for value to attract invertebrates including night scented species. - Creation of new habitats for foraging benefit SuDs and wetland habitat.	Mitigation measures secured through a CEMP. Monitoring and habitat management secured through LEMP. Lighting strategy secured by condition.
Invertebrates	Site scale	Pollution control measures, good practice construction working.	Mitigation measures secured through a CEMP.

6.5 Cumulative Effects

Bat SAC Horseshoe bats

6.1 A review of the cumulative schemes identified from Wiltshire's Council Planning Portal was undertaken to determine the likelihood of the proposed development leading to significant cumulative effects with these nearby schemes.

- ***Land at the proposed West Warminster Urban Extension North of Victoria Road & to the West of Bath Road (Ref: 15/01800/OUT)***
Outline planning application for up to 1,000 dwellings, 5.6ha of employment area, school and local centre. Ecology surveys of the site have been undertaken in 2012-13 including a suite of bat activity surveys during which no horseshoe bats were recorded.
- ***Land at Westbury Sailing Lake, Station Road, Westbury (Ref: 15/12551/OUT)***
Outline planning application for up to 300 dwellings. Ecology surveys including bat activity, emergence/re-entry and static detector surveys were undertaken in 2015. A low number of greater horseshoe passes were recorded during the static detector surveys.
- ***Land at Glenmore Farm, Westbury (Ref: 15/07071/OUT)***
Outline planning application for up to 145 dwellings. Ecology surveys were undertaken in 2014 comprising roost assessment surveys, emergence/re-entry surveys, activity and static detector surveys. Four passes of GHS were recorded on two nights of the survey. HRA of the application concluded no impacts on the SAC.

6.2 Where nearby applications converge it will be important to review buffers and sensitive lighting strategy on a landscape scale to retain 'dark' GI corridors north-south to avoid in-combination/cumulative effects. To avoid a potential cumulative effect of landscape-scale fragmentation (direct- habitat impacts; in-direct – lighting), a strategic approach should be employed to safeguard linear features linking other developments.

Protected Species

6.3 It is considered that the impacts on habitats and protected species from development effects within the zone of influence of each individual scheme will be addressed without giving rise to potential cumulative effects through site-specific mitigation, compensation and enhancement measures, and the delivery of net gain in biodiversity.

7 ENHANCEMENTS

- 7.1 A separate Biodiversity Net Gain report (has been produced, which covers the residential development and HSA. This shows that a significant gain, over the 10%, will be delivered as a result of the scheme.
- 7.2 The habitats on site were dominated by species-poor, intensively farmed agricultural land providing low potential for wildlife. The development footprint would be best suited within these areas to avoid impacts on protected species and to avoid a significant loss in terms of biodiversity. The key habitats were assessed to be the hedgerows which varied in type, quality and condition. The riparian habitats were also a key feature, including the stream, ditches and woodland pond. The riparian habitats were located adjacent to sections of permanent grassland including an area of rough tussocky grassland. The riparian habitats and the associated terrestrial habitats are retained and buffered.
- 7.3 The following planting is recommended to be included within the landscape plans to minimise the fragmentation of existing linear features; to retain and enhance existing green corridors, and to create new green corridors:
- Hedgerows will be retained with access gaps kept to a minimum and enhanced to improve structure and diversity.
 - Long sward grassland buffers will maintained to establish tussocky grassland along the hedgerow habitat.
 - The retained grassland will be managed infrequently to provide enhanced structure and diversity.
 - Tree planting and native hedgerows will be incorporated site-wide as well as integrated into the street scene.
- 7.4 The stream and ditches on site provide valuable habitat for a range of species and will buffered from the effects of the development. The nutrient mitigation strategy will provide significant areas of wetland habitat on site with a wide range of biodiversity benefits, including rich foraging resources for local wildlife.
- The stream will be retained with a minimum 10m buffer and enhanced by buffering and the creation of specific planting.
 - During construction standard pollution prevention controls should be implemented to avoid impacts on the stream, as followed:
 - No refuelling of machinery or storage of materials within 10m of the stream.
 - All contractors should have access to a spill kit for use if needed.
 - Additional measures may be necessary to avoid run-off and silt deposition into the stream.
- 7.5 The floating treatment wetland (FTW) system mitigation measure provides a biological method to remove suspended solids, nitrogen and phosphorous from the catchment

runoff prior to discharge. It is proposed to use native species only and the design layout incorporates bank to bank arrangements to provide connectivity and refuge opportunities for wildlife across these areas.

- 7.6 In the built development, ecological enhancements to be included within the scheme, including species specific provisions: integrated bird bricks and integrated bat boxes, bee bricks, and hedgehog gaps in any closed board fencing.
- 7.7 In the buffers and green spaces of the site, species provisions will include bird and bat boxes on trees, night roost provision for lesser horseshoe bats in the wetland habitat area, hibernacula for reptiles and amphibians and invertebrate log piles/ bug hotels.

8 MONITORING

- 8.1 The mitigation measures set out in Section 6 which will be supervised by an ECoW will be recorded as a 'site note' by the ECoW, and if required made available to the LPA.
- 8.2 The provision of the ecological enhancements as set out in section 8 will be subject to an ecological compliance report undertaken by the ECoW.
- 8.3 The habitat on site provided for biodiversity net gain will be monitored for success every five years for 30 years. This will be the responsibility of the management company who will appoint an ecologist to undertake this.

9 CONCLUSIONS

- 9.1 The site was dominated by three arable fields bordered by hedgerows with pasture grassland and a small woodland copse with pond in the northeast of the site. There is an unnamed watercourse flowing through the north-western corner of the site which is a tributary of The Were.
- 9.2 Potential impacts on the River Avon SAC from nutrient overloading have been identified as a result of the development. An onsite solution which includes the creation of SuDS with a native species floating filtration system has been proposed to deliver a nutrient neutrality scheme. The calculations in the nutrient strategy have shown through calculations of total phosphorous budget, that a betterment can be achieved.
- 9.3 The site has been assessed to support commuting and foraging routes for horsehoe bats along the northern boundary hedgerow and southern hedgerow. This linear features link key habitat to the east and wets. Potential impacts on the Bath and Bradford on Avon SAC have been assessed and mitigation is required to avoid potential fragmentation effect during construction and operation. Measure include sensitive lighting strategy with retention of dark corridors, hop-over tree features to maintain continuous canopy and advanced planting.
- 9.4 The layout design has included significant areas of new native planting including trees, hedgerows, grassland and wetland, which will provide habitats to enable species such as bats, birds and reptiles to continue using the site. The large area of open space will include an allotment area, dedicated wildlife habitat, floating wetland nutrient treatment ponds, SUDs including an attenuation pond and swales to provide enriched ecological habitat for flora and fauna.
- 9.5 There will be significant landscape buffering around the boundary of the site, including a woodland buffer to the north, south and west. The scheme includes comprehensive ecological and wildlife features including bat corridors, which will be maintained dark through a sensitive lighting strategy.
- 9.6 The site and development proposals offer a good opportunity for ecological enhancements to be included within the scheme, including species specific provisions: integrated bird and bat boxes, bee bricks, invertebrate hotels, log piles, and hedgehog gaps in any closed board fencing.
- 9.7 Assuming the implementation of effective mitigation measures, as summarised in Table 10, no adverse ecological effects are predicted on habitats or protected/ notable species. The enhancement measures proposed are expected to deliver a beneficial ecological effect, which would be significant at the local scale, and would deliver an overall net gain for biodiversity; in line with local policy 50 and 52.

REFERENCES

CIEEM (2016) *UK Guidelines for Accessing and Using Biodiversity Data*. Chartered Institute of Ecology and Environmental Management (CIEEM), Winchester.

CIEEM (2017^a) *Guidelines on Ecological Report Writing*. Chartered Institute of Ecology and Environmental Management (CIEEM), Winchester.

CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester.

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

Countryside and Rights of Way Act 2000. Available at:
<http://www.legislation.gov.uk/ukpga/2000/37/contents> [11th January 2022]

Dean, M., Strachan, R., Gow, D., Andrews, R. (2016) *The Water Vole Mitigation Handbook. The Mammal Society Mitigation Guidance Series*. Eds Fiona Mathews and Paul Channin. The Mammal Society. London

Ethos Environmental Planning (2016). *Ecological Assessment. Stones Farm, Cricklade*.

Ethos Environmental Planning (2022^a). *Shadow Habitats Regulations Assessment and Habitat Support Area Strategy*.

Harris, S., Cresswell, P. and Jefferies, D. J. (1989) Surveying Badgers. Issue 9 of *Occasional Publication of the Mammal Society*. ISBN- 978-0906282069.

JNCC (2010) Handbook for Phase 1 Habitat Survey. A Technique for Environmental Audit. JNCC, Peterborough. ISBN-978-0-86139-636-8.

Langton, T. E. S., Beckett, C. I., and Foster, J. P. (2001) Great Crested Newt Conservation Handbook, Froglife, Halesworth.

Marian Cameron Consultants (2021) *Land West of Westbury Road, Warminster, Phosphorous Neutrality Report*.

Mitchell-Jones, A. J. (ed.) (2004) *Bat Mitigation Guidelines*. English Nature, Peterborough. ISBN-1 85716-781-3.

Mitchell-Jones, A.J, & McLeish, A.P. Ed., (2004) *3rd Edition Bat Workers' Manual*, 178 pages b/w photos, softback, ISBN-1 86107 558 8.

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Available at: <https://www.legislation.gov.uk/ukdsi/2019/9780111176573/contents> [11th January 2022]

Wildlife and Countryside Act 1981. Available at: <http://www.legislation.gov.uk/ukpga/1981/69>
[11th January 2022]

Wiltshire Council (2015a) *Wiltshire Core Strategy: Adopted January 2015*

Wiltshire Council (2015b) *Bat Special Areas of Conservation (SAC): Planning Guidance for Wiltshire. Issue 3.0 (10 September 2015)*.

Wiltshire Council (2016) *Wiltshire Community Infrastructure Levy: Revised Wiltshire Planning Obligations Supplementary Planning Document, October 2016*

Wiltshire Council (2018) *HRA and Mitigation Strategy for Salisbury Plain SPA (in relation to recreational pressure from residential development) – Reviewed in May 2018*

APPENDIX 1 BAT SURVEY DATA

From the activity and static surveys undertaken between 2020 and 2021 a total of 14 species of bat were recorded across the site, namely common pipistrelle, soprano pipistrelle, Nathusius's pipistrelle, noctule, Leisler's, serotine, brown long eared, *Myotis spp.*, Brandt's, Daubenton's, Natterer's bat, barbastelle, greater horseshoe and lesser horseshoe bats.

Activity Transect Surveys

A summary of the activity surveys is provided below, and the environmental variables recorded in table 11.

28th July 2020

Low levels of activity were recorded across the site with common pipistrelle, soprano pipistrelle, serotine and noctule. Common pipistrelle bats were recorded foraging in the west of the site near the woodland edge and commuting along the northern boundary. Single passes of commuting serotine were recorded on H4 and the southern boundary and noctule were recorded near the eastern boundary.

20th August 2020

Low activity was recorded across the site with common pipistrelle, serotine and myotis bats recorded. Common pipistrelles were recorded commuting along the southern boundary and a single bat was recorded foraging along the railway line. Three passes of serotine were recorded with bats commuting along the north-eastern boundary, across the centre of the site and flying north along H5.

16th September 2020

Low levels of activity were recorded and was focused on the cattle-grazed pasture in the north of the site. Species recorded included serotine, common pipistrelle and a single pass of daubenton's bat. Two serotines were recorded foraging over the pasture in the north of the site which continued throughout the survey. Pipistrelle bats were recorded foraging on the eastern boundary and internal hedgerows (H3 and H4) and over the pasture in the north. The Daubenton's bat was recorded over the cattle pasture.

15th October 2020

Very low levels of activity were recorded with three bat passes recorded during the survey which comprised single passes of serotine on the eastern boundary southern end of the railway line and a single common pipistrelle foraging in the south-west corner of the site.

21st April 2021

It was very quiet across the whole site with only four single pass recordings of common pipistrelle between 20:49 and 21:10. These were recorded in the north of the site between railway foot crossing and road.

11th May 2021

Activity was low throughout the site with fewer than 5 bats recorded during the survey. Most of the activity was focused on the western boundary and over the gardens to the south of the site. Two species were recorded; common pipistrelle and a single pass of a Natterers' along the western boundary in a north to south direction.

8th June 2021

Low activity levels were recorded with 6 passes of common pipistrelle between 22:03 and 23:24 at locations across the site; along the northern boundary, western boundary, south-east corner and by the railway.

21st April 2021

It was very quiet across the whole site with only four single pass recordings of common pipistrelle between 20:49 and 21:10. These were recorded in the north of the site between railway foot crossing and road.

11th May 2021

Activity was low throughout the site with fewer than 5 bats recorded during the survey. Most of the activity was focused on the western boundary and over the gardens to the south of the site. Two species were recorded; common pipistrelle and a single pass of a Natterers' along the western boundary in a north to south direction.

8th June 2021

Low activity levels were recorded with 6 passes of common pipistrelle between 22:03 and 23:24 at locations across the site; along the northern boundary, western boundary, south-east corner and by the railway.

Table 10 Environmental variables

	28 th July 2020		20 th August 2020		16 th September 2020		15 th October 2020		21 st April 2021		11 th May 2021		8 th June 2021	
Sunset	21:00		20:51		19:30		18:15		20:14		20:46		21:24	
	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
Time	21:00	23:02	20:50	22:50	19:30	21:45	18:15	20:16	20:14	22:15	20:45	22:42	21:24	06:46
Temperature (°C)	16	15	16.8	14.3	19	15.7	8.2	9.1	11	8	10	9	18	15
Relative Humidity (%)	66.9	71	58	67	67	83	55	62	59	65	83	83	68.5	69
Cloud Coverage (oktas)	2	3	3	1	0	0	6	1	0	0	7	4	1	0
Average Wind Speed (mph)	0.9	3.9	4.1	3.4	1.6	0.9	0.6	0	4	6	3	4	0.7	0
Precipitation	Previous day		Earlier in the day		None		Earlier in the day		None		Earlier in the day		None	

Static detector surveys – five locations per survey

Overall, 14 species of bat were recorded over 82 recording nights, with 19,327 bat calls recorded. The majority of calls recorded were of CP with moderate levels of recordings from SP and SER. Low levels of activity were recorded for NP, LEI, BLE, MYO, BRA, DAUB, NATT, GHS and LHS.

Location 4 (railway) recorded the highest levels of bat activity over other locations, with 9,564 calls. Common pipistrelle was the most recorded bat on site across all detectors, comprising 75.3% of all bat calls. Serotine bats had the second most recorded calls across all detectors, comprising 7.7% of all bat calls.

Common pipistrelle showed high activity levels at all locations, with the highest being at the north boundary, southern hedgerow and west boundary by the railway corridor. Activity was comparably lower at the central hedge and east boundary.

There were low levels of GHS and LHS activity across the site, with higher levels of LHS recorded along the southern hedgerow (location 3), indicative of foraging as there were not corresponding high activity levels on nearby detectors (e.g. 4 or 5), which would indicate a commuting route through the site.

Barbastelle was erratically and sporadically recorded, with occasional recordings through the season at all locations except the NE corner.

Table 11 Summary table showing the number of night recorded bat activity fell into each activity band for key species records on site (Annex II – GHS, LHS, rare species – BARB, and the two most commonly recorded bat species (CP, SER))

Ref	Location	Species	Nights of high activity	Nights of high/mod activity	Nights of Mod activity	Nights of low/mod activity	Nights of low activity
1	NE corner	CP	33	20	2	1	2
		SER	16	13	5	2	3
		GHS	0	0	1	8	13
		LHS	0	0	0	2	3
		BARB	0	0	0	0	0
2	central hedge	CP	13	15	4	11	6
		SER	0	6	4	2	6
		GHS	0	0	0	1	5
		LHS	0	0	0	3	17
		BARB	0	0	0	0	6
3	South hedge	CP	46	13	8	3	3
		SER	1	9	5	8	18
		GHS	0	0	1	4	13
		LHS	1	7	3	7	16
		BARB	0	0	0	0	5

4	Adj. railway /west boundary	CP	36	6	5	2	1
		SER	0	3	9	7	9
		GHS	0	0	1	2	9
		LHS	0	0	0	0	2
		BARB	0	0	0	0	1
5	east boundary (south)	CP	20	12	8	5	2
		SER	2	10	6	7	10
		GHS	0	0	1	1	1
		LHS	0	1	0	2	6
		BARB	0	0	0	0	2

A breakdown of the number of bat passes is included in Table 12 and presented in Figure 11. It is important to note that the number of bat passes does not directly relate to the number of bats in a location i.e, a single bat could be foraging within the area throughout the night and subsequently, this would result in numerous passes by the same bat.

Table 12 Static Survey Results Summary

Species	Passes (No.)	Percentage of total (%)
Common pipistrelle	14556	75.3
Soprano pipistrelle	624	3.2
Nathusius'	75	0.4
Noctule	571	3.0
Leisler's	838	4.3
Serotine	1483	7.7
Brown long-eared	190	1.0
Myotis	127	0.7
Brandt's	143	0.7
Daubenton's	366	1.9
Natterer's	107	0.6
Barbastelle	14	0.1
Greater horseshoe	84	0.4
Lesser horseshoe	149	0.8
Total	19327	100.1

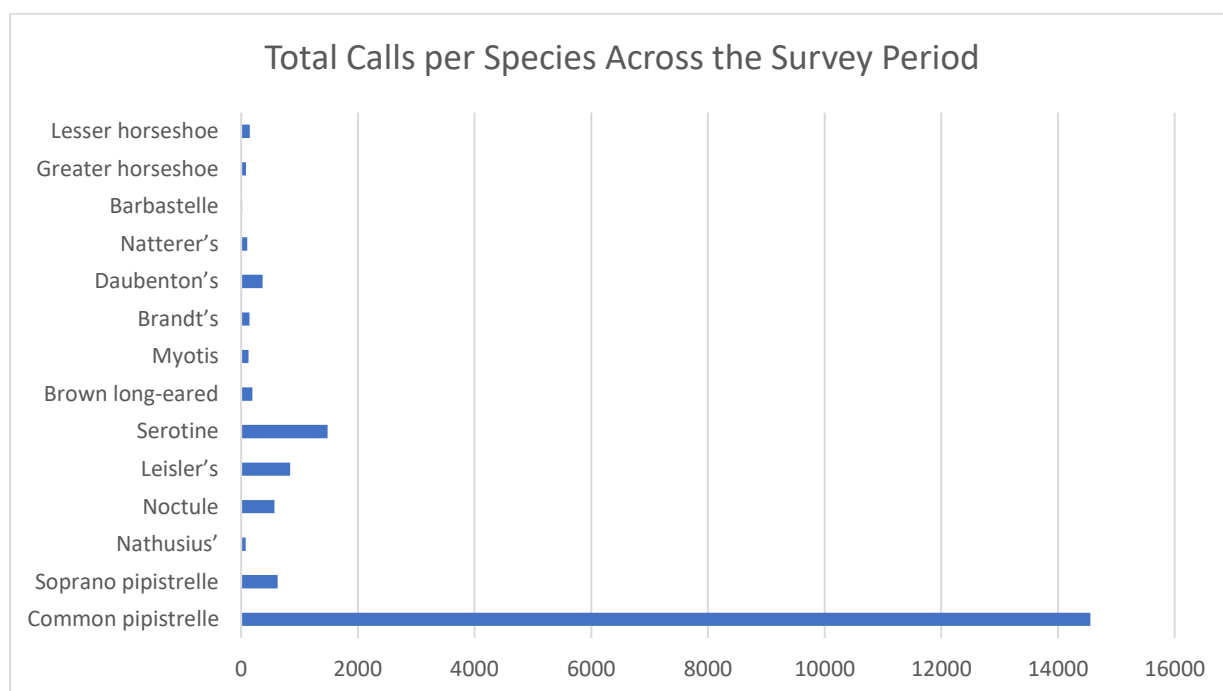


Figure 12 Total Calls per species across survey period

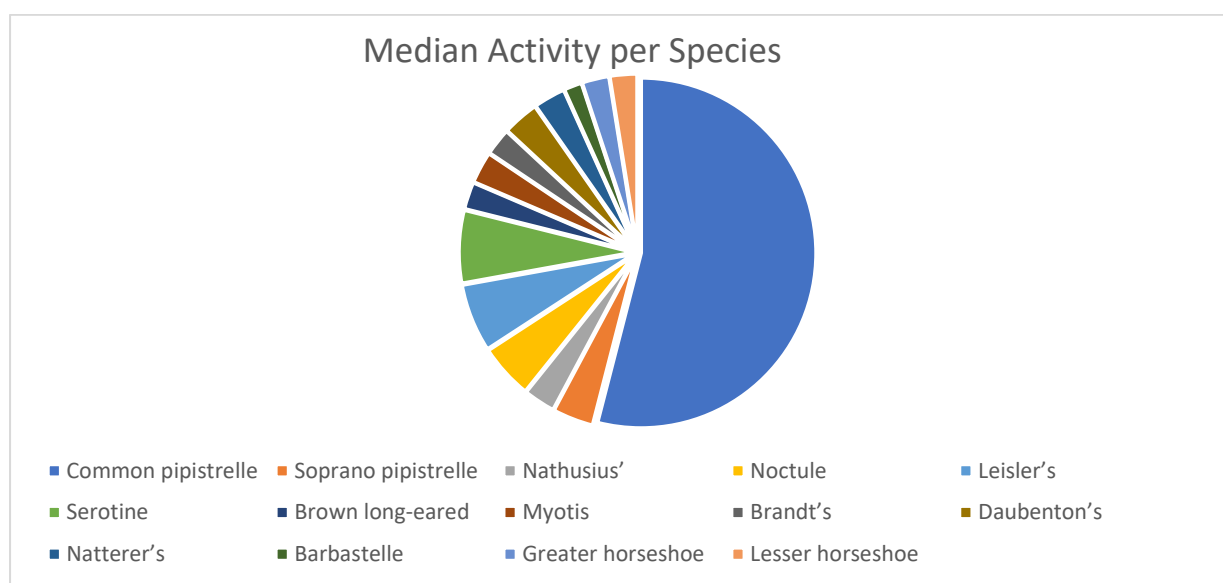


Figure 13 Median bat activity per species.

The median number of bat passes per hour, per night was highest in September at 26 CP nightly pass rate for location 4. All locations highest bat nightly pass rate was for CP, with location 1 having a maximum nightly pass rate of 4 in September, location 2 having a maximum of 5.5 nightly pass rate in August, location 3 with 3.1 in September and location 5 with 1.5 in June. Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean.

Figure 14 below shows the high levels of common pipistrelle activity, with the highest nightly pass rate (passes/hour/night) occurring at location 4 in June. It must be considered that the

scale bar on this graph, and those of other species are at different levels, and therefore a direct visual comparison of the graphs cannot be made, given the large variation in scale.

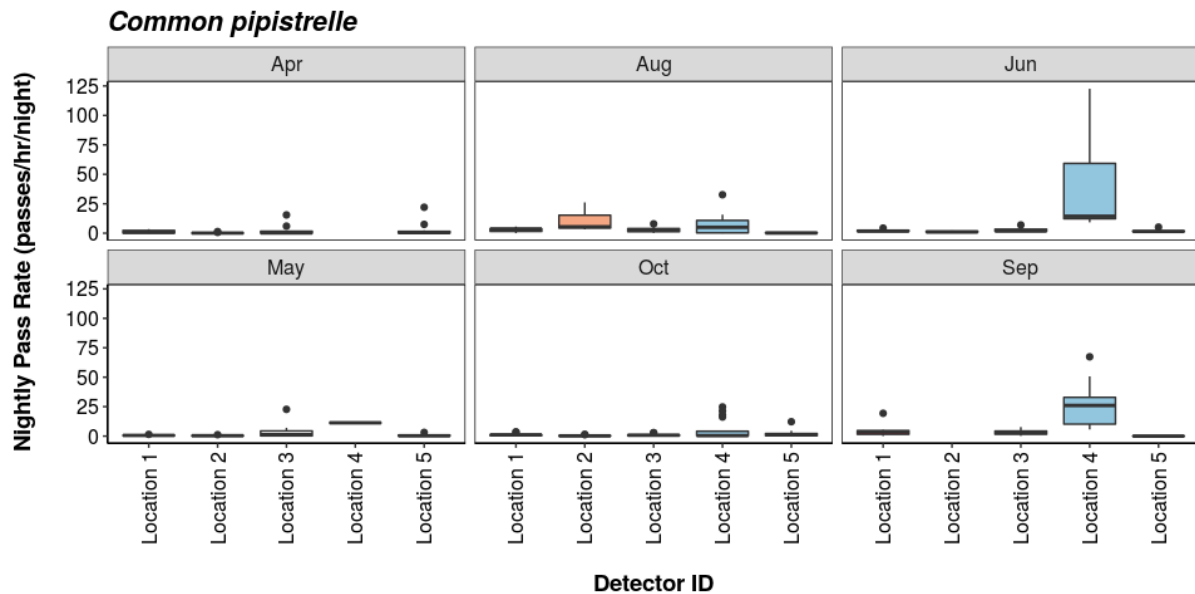


Figure 14, nightly pass rate of common pipistrelle passes throughout the survey period.

Figure 15 below shows the levels of greater horseshoe activity, with the highest levels of activity occurring in June, July and August activity across the site. There was also a noted level of activity in location 1 during September and October indicating activity on site during the breeding season.

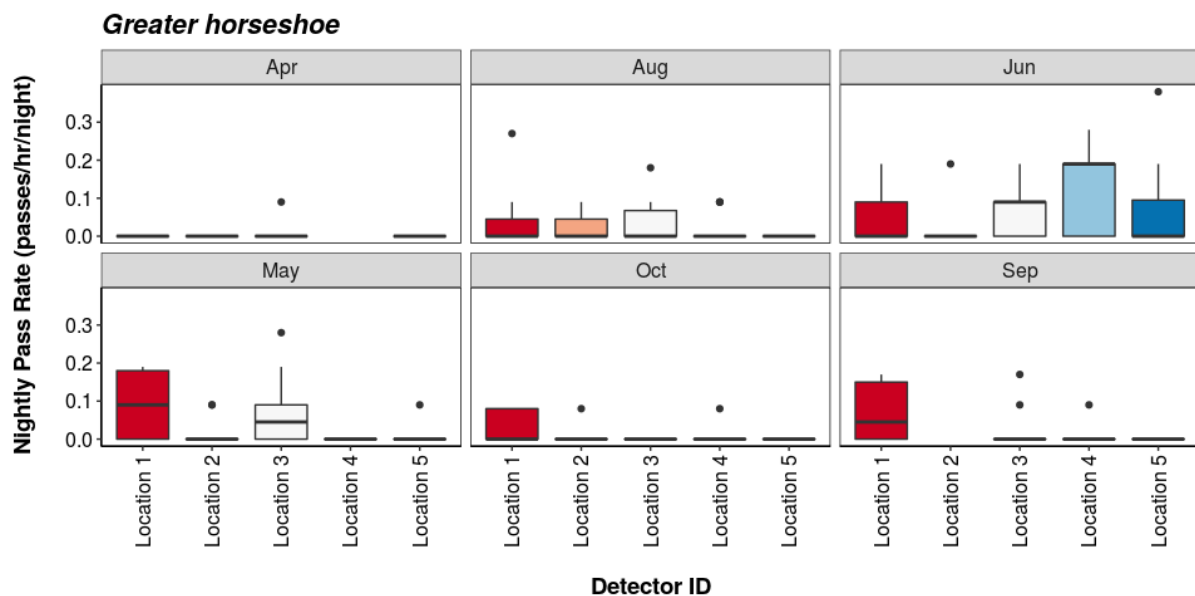


Figure 15 Mean nightly pass rate of greater horseshoe passes throughout the survey period.

Figure 16 below shows the levels of lesser horseshoe activity, with the highest levels of activity occurring in May and June across the site. It should be noted that the scale bar for these graphs varies with each species.

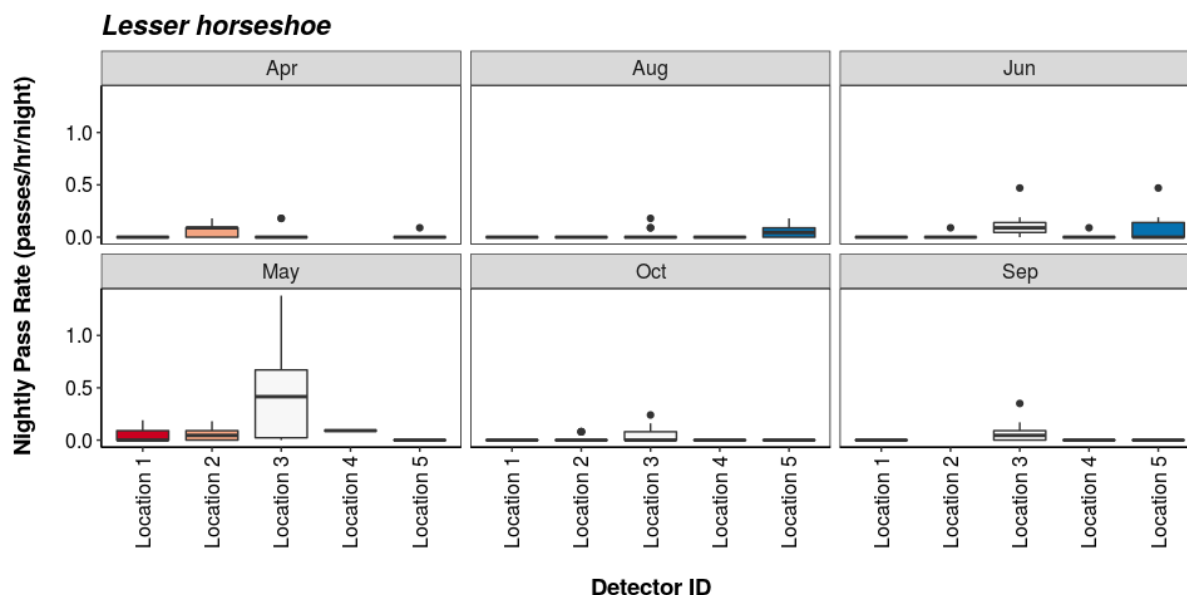


Figure 16 Mean nightly pass rate of lesser horseshoe throughout the survey period.

Figure 17 below was extracted from the Ecobat report and shows the activity level of all bat species for the entire survey period. This data was compared with results within 100km of the site in order to provide context and greater meaning to the term 'activity'. Percentiles provide a numerical indicator of the relative importance of a nights' worth of bat activity by comparing it with a national database. For example, activity data in the 80th percentile would indicate that the recorded data were in the top 20% of activity for the reference range. Key observations are made below:

- CP were in the 80th percentile when compared to the database.
- NOC, LEI and SER were in the 40-60th percentile when compared to the database.
- The remainder of species were low to very low (<40th percentile) when compared to the database.

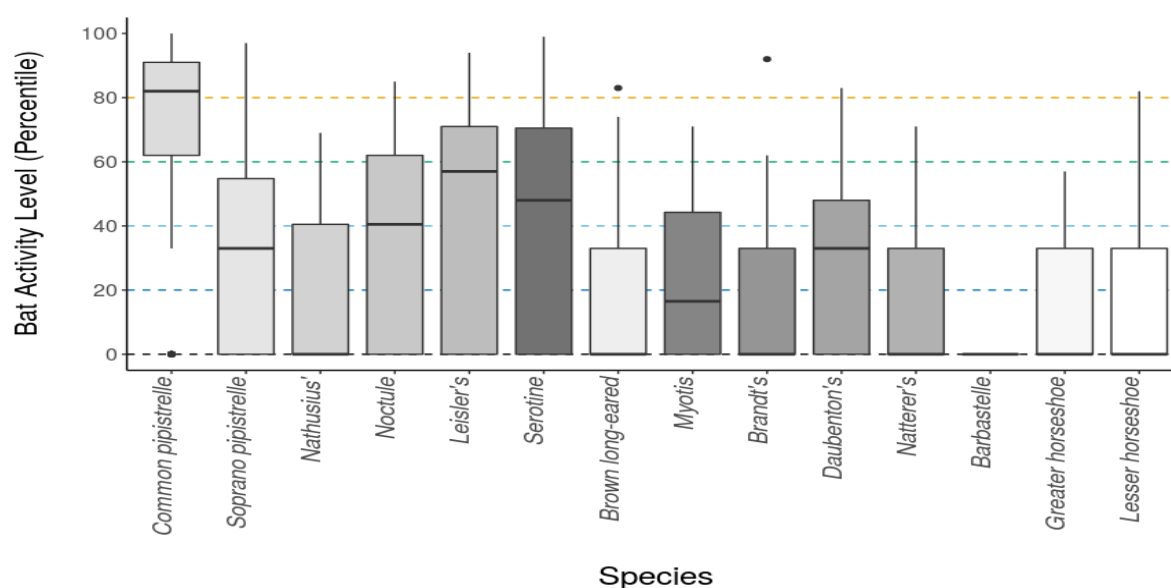


Figure 17 Percentiles of bat activity per species.

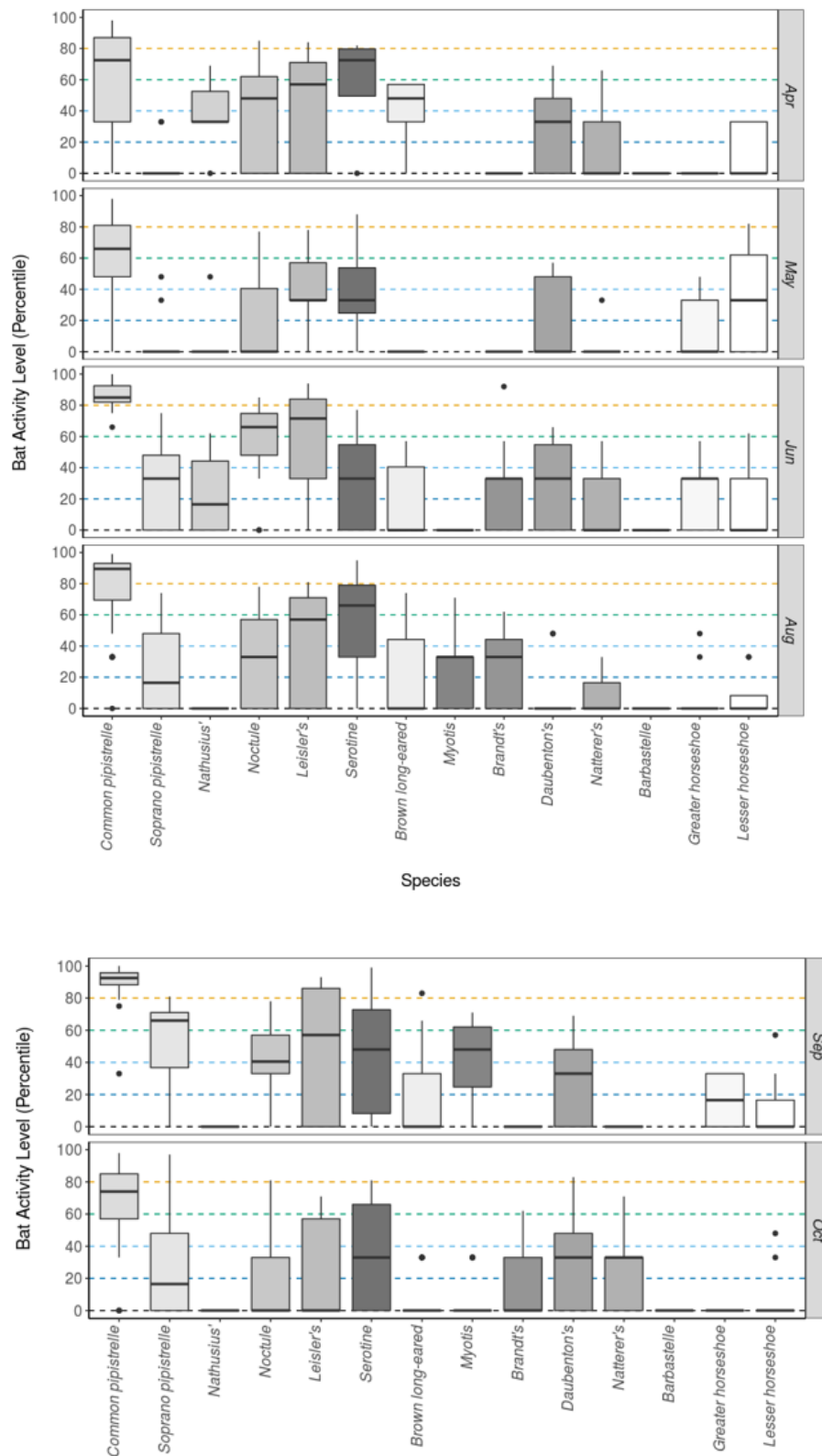


Figure 18 Percentiles of bat activity per species per month through the activity season

APPENDIX 2 PROTECTED VERGE SURVEY

AI.1 Introduction and Background

The off-site road verge along the north-eastern side of the Westbury Road, Warminster is designated as a Protected Verge by Wiltshire Council for its species-rich chalk downland plant communities. This habitat has likely come about by the cutting of the road through the chalk bedrock.

Wiltshire Council coordinate the Protected Road Verge (PRV) Scheme in Wiltshire. This particular protected road verge was designated for its botanical flora and community value; its quality has varied over the years, likely due to agricultural runoff from the field behind at the top of the bank. The verge is maintained by the local Highways team of Wiltshire Council, with occasional bespoke cut/collect by a specialist contractor.

AI.2 Methodology

A walkover survey was conducted on 15th June 2021, by Becky Morris (MIEEM), to assess the extent and species within the Westbury Road, Warminster protected verge.

AI.3 Habitat Description

The key features described within this section are:

- Calcareous Grassland
- Ornamental Scrub (R2)
- Other neutral Grassland (G3)
- Cypress Hedgerows .

AI.3.1 Calcareous Grassland (G3)

Calcareous grassland is present along the Westbury Road verge both along the flatter regularly mown section by the road and along the bank. The calcareous grassland dominated the verge but is in places forms small patches intermingled with hawthorn scrub, ornamental cotoneaster scrub and in areas of shade a degraded semi-improved form dominated by false-oat grass (*Arrhenatherum elatius*) and woodland edge species including wood brome (*Brachypodium sylvaticum*), cow parsley (*Anthriscus sylvestris*).



Photo 1: Protected verge bordered by hawthorn trees



Photo 2: Protected verge bordered by hawthorn trees

The grassland was dominated by red fescue (*Festuca rubra*) with some false oat-grass with mouse-ear hawkweed (*Pilosella officinarum*), oxeye daisy (*Leucanthemum vulgare*) glaucous sedge (*Carex flacca*), black medick (*Medicago lupulina*), ribwort plantain (*Plantago lanceolata*), yellow oat-grass (*Trisetum flavescens*), hoary plantain (*Plantago media*), red clover (*Trifolium pratense*) and in places common spotted orchids (*Dactylorhiza fuchsii*), and pyramidal orchids (*Anacamptis pyramidalis*) frequently found. Knapweed broomrape (*Orobanche elatior*) is commonly present with its host plant greater knapweed (*Centaurea scabiosa*). In places ash tree saplings (*Fraxinus excelsior*) are frequent in the sward.



Photo 3: Pyramidal orchids in sward near cotoneasters



Photo 4: Sward with common spotted orchids in flat verge



Photo 5: flat verge and grassland habitat shaded by cypress hedging



Photo 6: flat verge and grassland habitat shaded by cypress hedging.

AI.3.2 Ornamental shrub (G3)

There are two cotoneaster species within the ornamental shrub habitat on the south eastern end of the verge towards Elm Hill, and both of these species are Schedule 9 species. The shrubs here are mature specimens that cover much of the sloping verge.



Photo 7: Cotoneaster shrubs along southern part of verge near Elm Hill Junction



Photo 8: Cotoneaster shrubs along southern part of verge near Elm Hill Junction

AI.3.3 Other Neutral Grassland (G3)

The northern section of the verge, leaving the residential part of the town narrows and has become Other Neutral Grassland dominated by cow parley (*Anthriscus sylvestris*) and false oat-grass with patches of bramble near the field margin.



Photo 9: bramble scrub in northern section



Photo 10: other neutral grassland dominated by bow parsley and false-oat grass.

AI.4 Discussion and Recommendations

Associated with the development proposals for New Farm Warminster a cycle route is being considered along the eastern verge of Westbury Road along the existing Protected Verge. The proposed route will impact the regularly mown flat section of the verge adjacent to the road.

The condition of the calcareous grassland varies along the verge: in places it is in a degraded condition particularly where it is in heavy continuous shade under cotoneaster shrubs where it is reduced to small patches between the shrubs. This also occurs in shade of hawthorn, sycamore, and other woody species where the grassland has reduced diversity and has become dominated by false-oat grass, hogweed, wood brome and cow parsley. The hedgerow of cypress trees, field runoff and heavy mowing of the lower verge have also had a negative impact reducing species diversity.

To accommodate the proposed route some of the calcareous grassland present on the lower verge would be lost to hard standing. However, as patches of the existing verge are in poor condition due to non-native (and invasive) shrub replacement, and shading, there is an opportunity to enhance and restore the condition of these patches through soil removal and turf translocation.

The turf from the cycle track area could be translocated to the degraded locations and used to replace the cotoneasters. In addition, to increase the amount of light available to the verge and allow meadow species to thrive thinning the crowns of larger trees and removing smaller shrubs where appropriate would help to achieve this.

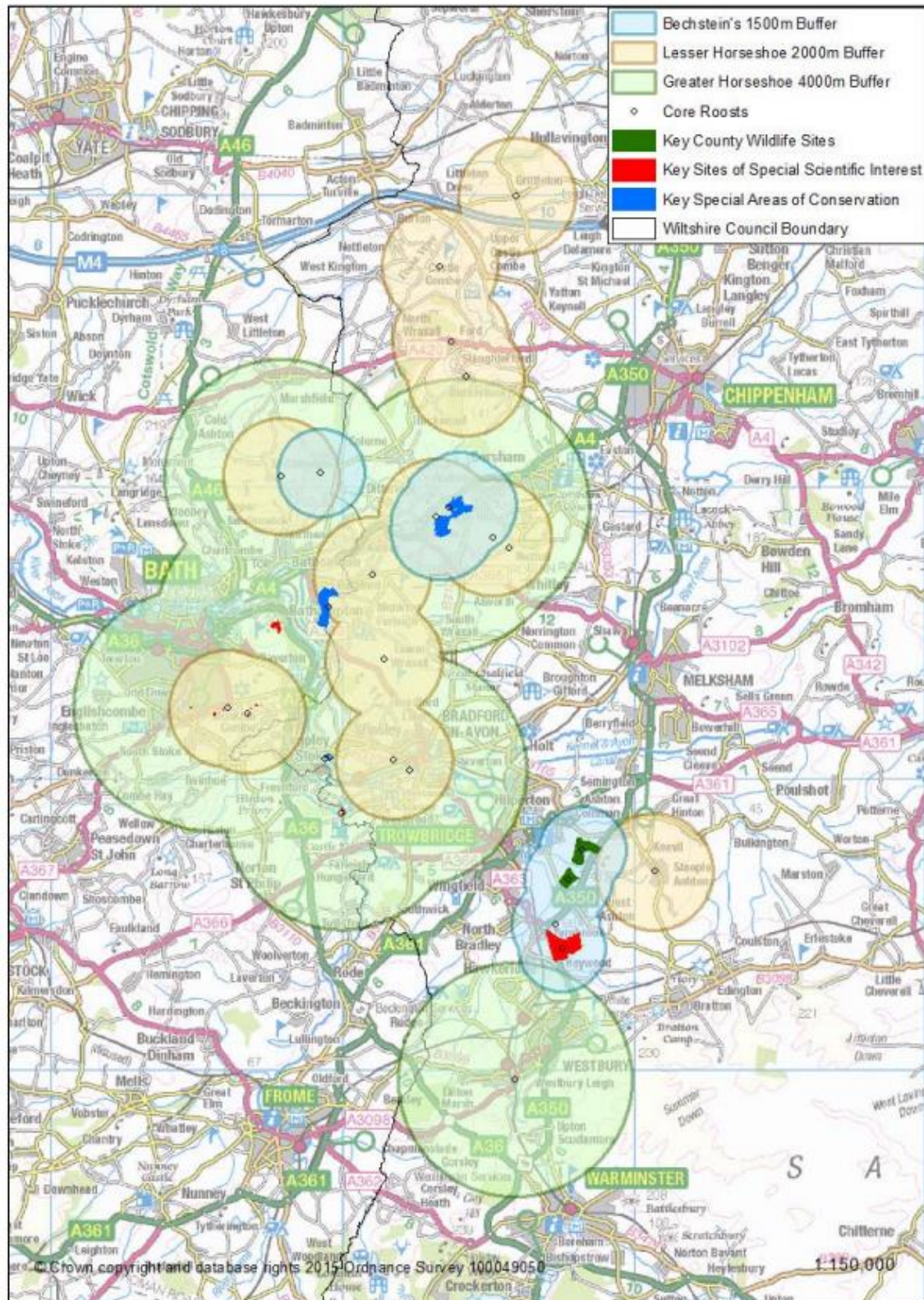
APPENDIX 3 HABITAT SUITABILITY INDEX RESULTS

Habitat Suitability results of all ponds within 500m of the site boundary. the ponds are displayed in section 6.8 figure 4.

Parameter	Description	Pond 1		Pond 2		Pond 3	
		Score	Index	Score	Index	Score	Index
Location	England = optimal	Optimal	1.00	Optimal	1.00	Optimal	1.00
Pond Area	Measure pond surface area (m ²) and round to nearest 50m ²	1542.00	0.87	150.00	0.30	5000.00	0.80
Pond Drying		Never	0.90	Rarely	1.00	Never	0.90
Water Quality	Abundant/Moderate/Low invertebrate community/Few submerged plants/clearly polluted	Good	1.00	Moderate	0.67	Moderate	0.67
Shade	Estimate percentage perimeter shaded to 1m from shore	60.00	1.00	95.00	0.30	20.00	1.00
Fowl	No evidence/present but little impact/severe impact	Absent	1.00	Minor	0.67	Major	0.01
Fish	No records/no evidence but local conditions suggest they may be present/small number of carp, goldfish or stickelback/ dense populations	Minor	0.33	Possible	0.67	Minor	0.33
Ponds	Count number of ponds within 1km of survey pond, not separated by major barriers	4.00	0.69	4.00	0.69	4.00	0.69
Terrestrial Habitat		Good	1.00	Moderate	0.67	Moderate	0.67
Macrophytes	Estimate percentage of pond surface occupied	10.00	0.40	0.00	0.30	5.00	0.35
		TOTAL	0.768	TOTAL	0.572	TOTAL	0.437
		CATEGORY	Good	CATEGORY	Below Average	CATEGORY	Poor

APPENDIX 4 BAT SAC CORE ZONES

The core zones and corresponding consultation zones of the Bath and Bradford on Avon bat consultation zone.



APPENDIX 5 BIRD RECORDS

Birds returned within the background data search.

Common Name	Scientific Name	NERC S. 41	W&CA (1981)	UK BAP
barn owl	<i>Tyto alba</i>	-	Schedule 1	-
brambling	<i>Fringilla montifringilla</i>	-	Schedule 1	-
fieldfare	<i>Turdus pilaris</i>	-	Schedule 1	UK BAP
green sandpiper	<i>Tringa ochropus</i>	-	Schedule 1	-
hobby	<i>Falco subbuteo</i>	-	Schedule 1	-
kingfisher	<i>Alcedo atthis</i>	-	Schedule 1	-
merlin	<i>Falco columbarius</i>	-	Schedule 1	-
osprey	<i>Pandion haliaetus</i>	-	Schedule 1	-
peregrine	<i>Falco peregrinus</i>	-	Schedule 1	-
red kite	<i>Milvus milvus</i>	-	Schedule 1	-
redwing	<i>Turdus iliacus</i>	-	Schedule 1	UK BAP
corn bunting	<i>Emberiza calandra</i>	European concern	-	UK BAP
cuckoo	<i>Cuculus canorus</i>	European concern	-	UK BAP
golden plover	<i>Pluvialis apricaria</i>	-	-	-
grasshopper warbler	<i>Locustella naevia</i>	National concern	-	UK BAP
grey partridge	<i>Perdix perdix</i>	European concern	-	UK BAP
grey wagtail	<i>Motacilla cinerea</i>	-	-	-
Herring Gull	<i>Larus argentatus</i>	Global concern	-	UK BAP
house sparrow	<i>Passer domesticus</i>	European concern	-	UK BAP
lapwing	<i>Vanellus vanellus</i>	European concern	-	UK BAP
Lesser Redpoll	<i>Carduelis cabaret</i>	National concern	-	UK BAP
linnet	<i>Carduelis cannabina</i>	European concern	-	UK BAP
little egret	<i>Egretta garzetta</i>	-	-	-
mistle thrush	<i>Turdus viscivorus</i>	-	-	-
Reed Bunting	<i>Emberiza schoeniclus</i>	European concern	-	-
nightingale	<i>Luscinia megarhynchos</i>	-	-	-
pochard	<i>Aythya ferina</i>	-	-	-
skylark	<i>Alauda arvensis</i>	European concern	-	UK BAP
song thrush	<i>Turdus philomelos</i>	Global concern	-	UK BAP
spotted flycatcher	<i>Muscicapa striata</i>	European concern	-	UK BAP
starling	<i>Sturnus vulgaris</i>	European concern	-	UK BAP
tree pipit	<i>Anthus trivialis</i>	European concern	-	UK BAP
tree sparrow	<i>Passer montanus</i>	European concern	-	UK BAP
starling	<i>Sturnus vulgaris</i>	European concern	-	UK BAP
whinchat	<i>Saxicola rubetra</i>	-	-	-
woodcock	<i>Scolopax rusticola</i>	-	-	-
yellow wagtail	<i>Motacilla flava</i>	European concern	-	UK BAP
yellowhammer	<i>Emberiza citrinella</i>	European concern	-	UK BAP

APPENDIX 6 INVERTEBRATE RECORDS

NERC s41, UK BAP, and schedule 1 invertebrate species returned within the data search.

Species Name	Common Name	Sect 41	UKBap	WCA
<i>Meloe proscarabaeus</i>	Black Oil-beetle	✓	✓	
<i>Platyrhinus resinosus</i>	Cramp-Ball Fungus Weevil			
<i>Erynnis tages</i>	Dingy Skipper	✓	✓	
<i>Erynnis tages tages</i>	Dingy Skipper	✓	✓	
<i>Pyrgus malvae</i>	Grizzled Skipper	✓	✓	
<i>Lasiommata megera</i>	Wall			
<i>Coenonympha pamphilus</i>	Small Heath	✓	✓	
<i>Coenonympha pamphilus pamphilus</i>	Small Heath	✓	✓	
<i>Hipparchia semele</i>	Grayling	✓	✓	
<i>Apatura iris</i>	Purple Emperor			
<i>Euphydryas aurinia</i>	Marsh Fritillary	✓	✓	✓
<i>Hamearis lucina</i>	Duke of Burgundy	✓	✓	
<i>Thecla betulae</i>	Brown Hairstreak	✓	✓	
<i>Cupido minimus</i>	Small Blue	✓	✓	
<i>Polyommatus bellargus</i>	Adonis Blue			
<i>Polyommatus coridon</i>	Chalk Hill Blue			
<i>Hepialus humuli</i>	Ghost Moth	✓	✓	
<i>Adscita statice</i>	Forester	✓	✓	
<i>Watsonalla binaria</i>	Oak Hook-tip	✓	✓	
<i>Timandra comae</i>	Blood-vein	✓	✓	
<i>Scotopteryx chenopodiata</i>	Shaded Broad-bar	✓	✓	
<i>Ecliptopera silaceata</i>	Small Phoenix	✓	✓	
<i>Chesias legatella</i>	Streak	✓	✓	
<i>Chiasmia clathrata</i>	Latticed Heath	✓	✓	
<i>Ennomos quercinaria</i>	August Thorn	✓	✓	
<i>Ennomos fuscantaria</i>	Dusky Thorn	✓	✓	
<i>Lycia hirtaria</i>	Brindled Beauty	✓	✓	
<i>Hemistola chrysoprasaria</i>	Small Emerald	✓	✓	
<i>Spilosoma lutea</i>	Buff Ermine	✓	✓	
<i>Spilosoma lubricipeda</i>	White Ermine	✓	✓	
<i>Arctia caja</i>	Garden Tiger	✓	✓	
<i>Tyria jacobaeae</i>	Cinnabar	✓	✓	
<i>Acronicta psi</i>	Grey Dagger	✓	✓	

Species Name	Common Name	Sect 41	UKBap	WCA
<i>Hydraecia micacea</i>	Rosy Rustic	✓	✓	
<i>Agrochola lychnidis</i>	Beaded Chestnut	✓	✓	
<i>Aporophyla lutulenta</i>	Deep-brown Dart	✓	✓	
<i>Orthosia gracilis</i>	Powdered Quaker	✓	✓	
<i>Melanchra persicariae</i>	Dot Moth	✓	✓	
<i>Diarsia rubi</i>	Small Square-spot	✓	✓	
<i>Bombylius discolor</i>	Dotted Bee-fly			
<i>Osmia bicolor</i>	Red-tailed Mason Bee			
<i>Dolichovespula media</i>	insect - hymenopteran			
<i>Nomada fucata</i>	Painted Nomad Bee			

APPENDIX 7 EDNA SURVEY RESULTS

Client: Rachel Fayers,
Ethos Environmental Planning



ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-0781 Condition on Receipt: Low Sediment Volume: Passed
Client Identifier: P1 Warminster Description: pond water samples in preservative
Date of Receipt: 04/05/2021 Material Tested: eDNA from pond water samples

Determinant	Result	Method	Date of Analysis
Inhibition Control [†]	2 of 2	Real Time PCR	12/05/2021
Degradation Control [§]	Within Limits	Real Time PCR	12/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	12/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10 ⁻⁴ ng/μL) [#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by: Dr Helen Rees Report Issued by: Dr Ben Maddison

Signed:

Signed:

Position:

Director: Biotechnology

Position:

MD: Biotechnology

Date of preparation:

12/05/2021

Date of issue:

12/05/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#] Additional positive controls (10⁻¹, 10⁻², 10⁻³ ng/μL) are also routinely run, results not shown here.

Client: Rachel Fayers,
Ethos Environmental Planning



ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-0789 Condition on Receipt: Low Sediment Volume: Passed
Client Identifier: Attenuation Pond Thatchers Description: pond water samples in preservative
Date of Receipt: 04/05/2021 Material Tested: eDNA from pond water samples

Determinant	Result	Method	Date of Analysis
Inhibition Control [†]	2 of 2	Real Time PCR	12/05/2021
Degradation Control [§]	Within Limits	Real Time PCR	12/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	12/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10 ⁻⁴ ng/μL) [#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by: Dr Helen Rees Report Issued by: Dr Ben Maddison

Signed:

Signed:

Position: Director: Biotechnology Position: MD: Biotechnology

Date of preparation: 12/05/2021 Date of issue: 12/05/2021

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[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#] Additional positive controls (10⁻¹, 10⁻², 10⁻³ ng/μL) are also routinely run, results not shown here.

Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)