North Somerset and Mendip Bats Special Area of Conservation (SAC)

Supplementary Planning Document

Version 2
April 2026



North Somerset Council

Purpose of the Document
This Supplementary Planning Document (SPD) is an update of an original version (1) which was adopted by North Somerset Council in January 2018.

This update (Version 2) has been produced following further research, including telemetry studies and population modelling by the University of the West of England and Geckoella Limited. These studies have provided more information regarding the behaviour of bat populations at key SAC roosts within North Somerset. Version 2 also incorporates feedback regarding use of the approaches in the original document.

The original SPD was based on guidance jointly produced by North Somerset Council, Natural England and Somerset local authorities. The guidance was based on approaches used for all bat SACs within Somerset, currently available at Habitat Regulations Assessment for Bats guidance (somerset.gov.uk). The guidance was converted into the SPD for North Somerset to ensure use in **planning decisions and to inform strategic planning where these are the responsibility of North Somerset Council**. The approach in the original SPD (Version 1) has been tested at planning appeal. This update (Version 2) has largely been completed by Sarah Dale MCIEEM of Avondale Ecology, with assistance from Larry Burrows MCIEEM formerly of Somerset County Council (author of Version 1) and Elliot Hails MCIEEM of Taw Marsh Ecology for HEP metric values. It has been subject to public consultation. It revises technicalities and detail of the original SPD approach rather than the fundamental principles. This version is an abridged version, as the technical details and principles of the approach have already been established. Where new information with regards to the ecology of the bat species (such as telemetry data) has become available, this is included within this version of the SPD. Technical information is available via the link above and will also be made available on North Somerset Council's website. A separate technical note will be provided with example calculations and case studies.

The SPD contains guidance on development regarding impacts on the North Somerset and Mendip Bats Special Area of Conservation (SAC; referred to as the 'Bat SAC') **within North Somerset**. Although the density bandings and data contained within this document include other authority areas, survey and mitigation requirements will be set out by the relevant authorities within guidance notes and/or their own SPD.

The Bat SAC was designated because of its international importance for **Greater and Lesser Horseshoe Bats**. This document relates solely to these species. This document must not be used to inform likely distribution or abundance of other bat species. Requirements for Preliminary Roost Assessments, emergence/night-time walkover surveys or mitigation to inform planning submissions for other bat species must instead be in accordance with national best practice guidance such as *Bat Surveys for Professional Ecologists – Good Practice Guidelines* 4th Edition (Collins Editor, 2023), Natural England standing advice and local guidance/local list requirements. The survey approach detailed in this SPD applies to impacts on both foraging habitat and dispersal corridors for horseshoe bats. The Habitat Evaluation Procedure (HEP) metric relates specifically to **replacement foraging habitat for horseshoe bat species.**

The SPD has been developed to enable a comparative and quantified analysis of impacts based on the best available scientific evidence. The mitigation strategy informed by this document should enable judgements to be made 'beyond reasonable scientific doubt' (as required by case law) to avoid significant negative impacts on the Bat SAC as a result of planning applications, development planning and other activities within North Somerset. Each individual plan or project will still need to be assessed on a case-by-case basis, informed by evidence-based ecological assessment, and the context of the site.

Although the approach uses a metric in a similar manner to Biodiversity Net Gain, the requirements of the HEP run parallel, **and in addition**, to Biodiversity Net Gain.

Following formal adoption of this guidance, there will be a 12 month transition period in enforcement. The version of the SPD which applied at the time at which bat activity surveys and bat monitoring for a given site was completed (which needs to remain up-to-date to within 18 months – 3 years for planning submission, as within CIEEM guidance) will be used. For example, if bat activity surveys have been completed in Summer 2025, Version 1 will apply.

Cover Photo: Frank Greenaway. Courtesy Vincent Wildlife Trust (http://www.vwt.org.uk/)

NORTH SOMERSET AND MENDIP BATS SAC: SUPPLEMENTARY PLANNING DOCUMENT

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PART A: Non-Technical Guidance

A1. Who is the Guidance Aimed at and Why?

A1.1 This advice is aimed at developers, consultants, and planners involved in assessing development proposals and strategic planning policy in the landscapes surrounding the North Somerset and Mendip Bats Special Area of Conservation (SAC).

A1.2 The overall aim is for a clearer and measurable approach to considering impacts of development on the Bat SAC. The guidance provides a consistent basis for understanding how rare horseshoe bats use the landscape and where there is likely to be greater risk or opportunity for development. This document is intended to inform strategic planning for the area's future housing needs, as well as evidence required in the decision-making process for smaller applications. The document brings together existing scientific and conservation information regarding the known and likely distribution and abundance of horseshoe bats in the North Somerset district, and presents an approach to inform mitigation and conservation outcomes. GIS mapping layers showing Greater Horseshoe and Lesser Horseshoe Bat Consultation Zones are available on North Somerset Council's Planning Constraints Map.

A1.3 The guidance is to be considered in combination with planning policy, such as policy DM8 (Nature Conservation) of the adopted Development Management Policies of the North Somerset Local Plan, and relevant sections of the National Planning Policy Framework (NPPF).

A1.4 At project level, the guidance will help identify key issues at pre-application stage that can inform the location and sensitive design of development proposals to minimise delays and uncertainty. Within the areas identified, there are clear requirements for survey information and a strong emphasis on retaining and enhancing key habitat for bats to provide effective mitigation. The approach can be used to demonstrate that development proposals will avoid harm to the designated bat populations, and support them where possible. Development must be sited and designed to minimise harm to these internationally-important bat populations and to maximise opportunities through conservation. The approach can also be used in consideration of suitable locations for off-site habitat creation to benefit species conservation and restoration, such as the proposed North Somerset Nature Parks. The document does not replace the need for case-by-case considerations based on site-specific survey information.

A1.5 The guidance explains how development activities can impact on the Bat SAC and the steps required to avoid or mitigate impacts, primarily in relation to loss of **functionally-linked horseshoe bat foraging habitat and dispersal corridors**. Other best practice guidance, local knowledge, environmental context and professional expertise are key for impact assessment and mitigation/compensation decisions relating to bat roosts. The guidance will be applied by the North Somerset Council to proposals which are likely to impact on functionally-linked habitat to SAC bat roosts and the populations they support; hence requiring screening for Habitats Regulations Assessment (HRA) or Appropriate Assessments to be completed. More details of the HRA process, including when this may be required, are detailed in Annex 7: Application of the Habitats Regulations.

A1.6 The guidance does not apply to minor developments which would not pose any credible risk of significant adverse impacts on a SAC from loss of functionally-linked habitat. This requires a judgement to be made based on location, scale and type of proposals, impacts such as lighting or habitat removal and best available scientific knowledge of bat populations. Decisions on whether the guidance applies need to be informed by an ecological assessment, and potentially further surveys, involving guidance from qualified ecologists, the Council's Ecologists

and Natural England. Sufficient evidence to demonstrate that there is no credible risk of significant adverse impacts on functionally-linked habitat to the SAC will be required with applications if the SPD approach has not been followed. Further guidance on exemptions and schemes likely to have minor impacts is detailed in Section A7. Proposed Developments with Minor Impacts on Foraging Habitat below. Applications will be refused if there is insufficient evidence and information to inform a Habitats Regulations Assessment as required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) and to meet national and local planning policy. There may still be risks to the SAC as a result of impacts on individual horseshoe bat roosts even for minor developments. Impacts as a result of roost loss, disturbance or modification must be informed by standard survey approaches; for example, as set out in *Bat Surveys for Professional Ecologists* 4th Edition (Collins *et al*, 2023).

A1.7 This guidance brings together best practice and learning from the original SPD and similar approaches, such as Somerset Council and South Hams, and the best scientific information available at the time of writing. It will be periodically reviewed by North Somerset Council and their partners and is endorsed by Natural England. The planning guidance is part of a wider approach that is being pursued by partner organisations to safeguard and improve habitat for rare bats that includes farm management. The guidance is also consistent with Natural England's Site Improvement Plan for the Bat SAC.

A2. What is a Bat SAC?

A2.1 Special Areas of Conservation (SAC) are sites of international importance for wildlife, which are protected under UK law, and devolved from international agreements including the Rio Convention 1992. The North Somerset and Mendip Bat SAC is important for two bat species, Greater and Lesser Horseshoe bats. The SAC comprises component Sites of Special Scientific Interest (SSSI) which within North Somerset include the two Greater Horseshoe bat maternity roosts at Brockley Hall Stables SSSI and King's Wood and Urchin Wood SSSI, and two hibernation roosts at Banwell Caves SSSI and Banwell Ochres Caves SSSI. There are also hibernation roosts within King's Wood and Urchin Wood SSSI. The SAC also includes the maternity and hibernation roosts in the Cheddar Complex SSSI and the hibernation roosts at Wookey Hole SSSI in Somerset and Compton Martin Ochre Mine SSSI in Bath and North East Somerset.

A2.2 The boundary of the SSSI unit designations relates only to roosts. Landscapes around designated SAC bat roost sites are important in providing foraging and commuting habitat needed to maintain the Favourable Conservation Status of bat populations. Associated habitat outside of the SAC designation boundary is termed 'functionally-linked' habitat and can include undesignated roosts, foraging habitat and dispersal corridors. This guidance sets out requirements for consultation, surveys and appropriate mitigation, to demonstrate that development proposals will not adversely impact on the designated SAC bat populations due to loss of or significant disturbance to functionally-linked habitat.

A2.3 It is important to remember that statutory designations apply to key roost sites which were designated 20+ years ago. Bats use roosts dynamically, with seasonal and annual variations, and have been found to travel up to 50 kilometres (km) between seasonal roosts. Both horseshoe bat species are recovering from the brink of local extinction. Taking a precautionary approach, as required by the law, all horseshoe bat roosts within the Consultation Zones are considered to be functionally-linked to the SAC. Therefore, they require consideration within a Habitats Regulations Assessment/Appropriate Assessment to maintain the Favourable Conservation Status of local horseshoe bat populations.

Figure A1 Location of North Somerset and Mendip Bats SAC

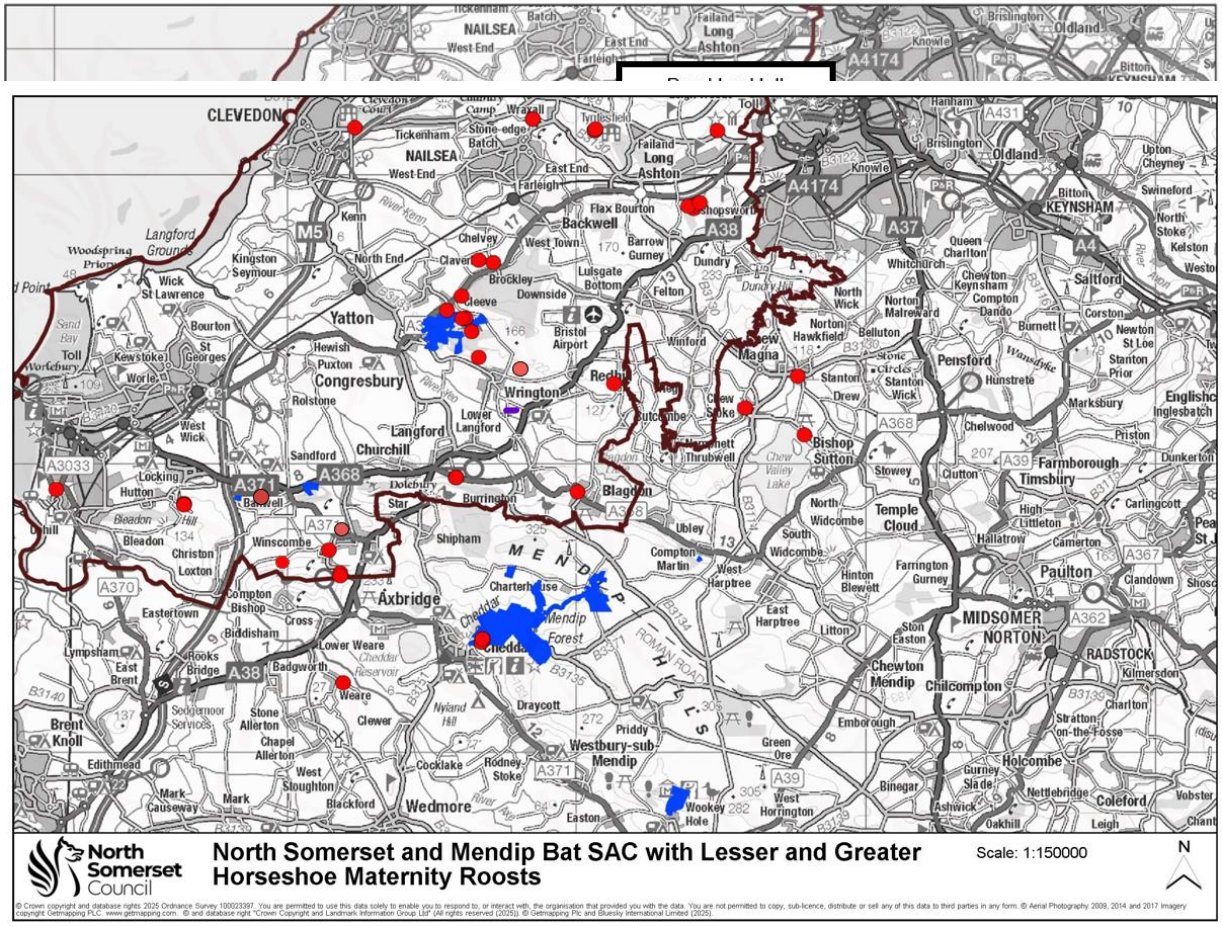


Figure A2 Location of North Somerset and Mendip Bats SAC showing Maternity Roosts

A3. Bat Consultation Zone

A3.1 This guidance identifies Greater Horseshoe Bat Consultation Zones and Lesser Horseshoe Bat Consultation Zones where SAC bats are most likely to be found. The Consultation Zones are divided into Bands A, B and C, reflecting the likely importance of the habitat for and proximity to known maternity and other roosts for **horseshoe bats** (but not other bat species).

A3.2 Within the Consultation Zones, development is likely to be subject to particular requirements, depending on the sensitivity of the site. This document is based on best available scientific evidence of horseshoe bat populations and is not a substitute for site-specific ecological assessment. A detailed ecological survey may identify that sites within different Bands are of increased or decreased value for horseshoe bats.

A4. Juvenile Sustenance Zones

A4.1 This guidance identifies the likely Juvenile Sustenance Zones (JSZs) around the maternity roosts. These zones contain vital habitat that supports juvenile bats in their first days of flight. Without a well-functioning JSZ, the size of local bat populations is likely to decline as fewer juveniles find enough food to survive to adulthood.

A4.2 New build development on greenfield sites in the Juvenile Sustenance Zones will require particularly careful scrutiny and stringent safeguards to prevent harm in view of the sensitivity and importance of the JSZs as suitable habitat as foraging areas for young bats. Such development will only be permitted where the Council is satisfied that mitigation to the highest level will be provided, with particular emphasis on the welfare of juvenile bats. The radius of the JSZ from maternity roosts has been expanded in this updated SPD based on new scientific evidence, and is now 5km. The same radius also now applies to Band A, so Band A and the JSZ are the same.

A5. Need for Early Consultation

A5.1 Section B3 emphasizes the need for pre-application consultation for development proposals. This is recommended within Bands A or B of the Consultation Zone, where proposals have the potential to affect features important to horseshoe bats (Section B3.4). As sufficient mitigation and compensation for development within the Juvenile Sustenance Zone (Band A) may not be easily achieved, and may impact on site feasibility and viability, pre-application consultations for any developments within this area are encouraged at the earliest possible opportunity. This particularly applies to, for example, greenfield sites affecting pasture within 5 km of Greater Horseshoe Bat maternity roosts and woodland, mature hedgerows or pasture within 600 m of Lesser Horseshoe Bat maternity roosts. Any developments which may cause significant impacts on horseshoe bat populations within Band C or outside of Consultation Zones would also benefit from pre-application consultation with the Council.

A6. Survey Requirements

A6.1 Section B3 and Annex 3 of the guidance sets out the survey requirements to assess impacts on **functionally-linked habitat** (including foraging habitat and dispersal corridors) for horseshoe bats in order to inform Habitats Regulations Assessments. The surveys may also record important information for other bat species and meet general requirements under best practice guidance for impact assessment for all bat species. Survey effort for impacts on bat roosts must be assessed following best practice guidance including *Bat Surveys for Professional Ecologists – Good Practice Guidelines* 4th Edition (Collins Ed., 2023). The survey requirements in this document are intended to complement rather than to replace national guidance.

A6.2 For proposals within the Greater Horseshoe and Lesser Horseshoe Bat Consultation Zones, developers must employ an experienced consultant ecologist at an early stage to identify and assess any impacts. This document is not a substitute for a case-by-case, site specific assessment.

A6.3 For proposals within Bands A and B of the Greater and Lesser Horseshoe Bat Consultation Zones, full season surveys will be needed to identify likely importance for foraging and dispersing horseshoe bats, to the specification set out in Annex 3: Survey Specification for Planning Applications (unless minor or insignificant impacts can be demonstrated – see A7. Proposed Developments with Minor Impacts on Foraging Habitat). This must include automated bat detector surveys. Survey results are crucial for understanding how bats use the site, informing how impacts on horseshoe bats can be avoided, minimised or mitigated. Where mitigation is needed for loss of horseshoe bat foraging habitat, the survey results will inform the metric for calculating the amount of replacement habitat needed (see Annex 5: Methodology for Calculating Replacement Foraging Habitat).

A6.4 For proposals within Band C, survey effort required depends on the suitability of impacted and adjacent habitat to support prey species hunted by horseshoe bats. Whether there will be impacts on important dispersal/commuting corridors for horseshoe bats will also need to be considered; for example, fragmentation impacts as a result of light spill.

A6.5 Outside of the mapped Greater and Lesser Horseshoe Bat Consultation Zones, development proposals may still have impacts on horseshoe and other bat species across the entire Local Authority area. Developers should have regard to best practice guidelines, such as the Bat Conservation Trust's survey guidelines and Natural England's Standing Advice for Bats. North Somerset Council's guidance on surveys should also be followed as set out in Preliminary bat roost assessment and Ecological impact assessment.

A7. Proposed Developments with Minor Impacts on Foraging Habitat

A7.1 In some circumstances, a developer may be able to clearly demonstrate, based on a site assessment and report from a qualified ecologist, that the impacts of a proposed development on Horseshoe bat habitat are proven to be minor and/or can be avoided or mitigated. In these instances, activity surveys would not normally be required. This must be fully demonstrated and evidenced within information submitted to North Somerset Council with planning submissions.

A7.2 Examples of such developments may include (but are not limited to):

- Developments impacting on habitats which score zero in the Habitat Evaluation Procedure (HEP) metric such as urban areas and brownfield developed land comprising sealed surfaces;
- Small sites less than 0.2 hectare (ha) in size unless these are in very close proximity to important known or newly identified horseshoe bat roosts associated with the North Somerset and Mendip Bat SAC. This will include most householder and permitted development applications. Professional judgement and/or sufficient survey information is likely to be required to determine this;
- Sites within urban areas where habitats can be demonstrated, beyond reasonable scientific doubt, to be inaccessible to bat species (noting that horseshoe bats have been found in urban areas of Cheddar and Clevedon); and
- Sites where development has been designed to fully retain important functionally-linked habitat and where any impacts on retained habitat (such as light spill) have been demonstrated to be fully avoided.

A7.3 Impacts need to be assessed in a site context and must fully consider the impact of light spill, disturbance, fragmentation and displacement from nearby habitats as well as impacts within the site itself. Impacts must be assessed and qualified in accordance with best practice guidance including Guidelines for Ecological Impact Assessment (EcIA) (CIEEM, 2018) and Guidance Note 8 Bats and Artificial Lighting at Night (ILP, 2023), and any subsequent updates. All impacts of a scheme must be considered during both the construction and operational phases.

A7.4 Additional evidence to demonstrate that there is no credible risk of significant adverse impacts on functionally-linked habitat to the Bat SAC may still be requested for sites where the survey protocol does not apply. For example, horizontal and vertical lux contour plans for proposed lighting may be required to demonstrate that light spill onto suitable surrounding habitat will be below 0.4 lux on the vertical plane and 0.2 lux on the horizontal plane even where no foraging or functionally-linked habitat will be lost on site. Further requirements are detailed in Sections B4.14 to B4.22.

A8. Need for Mitigation, Including Replacement Habitat

A8.1 Appropriate avoidance and mitigation measures will be required within all bands of the Greater and Lesser Horseshoe Bat Consultation Zones, where SAC bat populations could be adversely affected by development.

A8.2 Development proposals must seek to retain and enhance existing habitats and/or features of value and accessible to bats such as those listed in B3.4 in this guidance. **The ecological mitigation hierarchy must be strictly followed, with avoidance considered in the first instance**. If impacts cannot be avoided, the reasons why activities are necessary must be fully evidenced in any planning submissions. Where avoidance or minimisation of impacts is not or is only partially possible, appropriate mitigation will be needed, and compensation such as the provision of replacement habitat only provided as a last resort. North Somerset Council's Ecologist will have regard to relevant considerations in determining the mitigation requirements, including survey results and calculations relating to quantity of replacement habitat. Annex 5: Methodology for Calculating Replacement Foraging Habitat sets out the Habitat Evaluation Procedure (HEP) methodology for calculating how much replacement habitat should be provided. Impacts on suitable foraging habitat within Band A would only be accepted if the mitigation proposed demonstrates beyond reasonable scientific doubt that the function and structure of habitats will be retained or appropriately replicated, particularly in relation to important feeding areas for juvenile, pregnant and lactating bats.

A8.3 Replacement habitat must be accessible to the bat population affected. **Replacement habitat must be located no further away from the designated SAC roosts than the proposed development site within Bands A and B.** Replacement habitat must prioritise creation of grazed pasture/rough tussocky grassland within Band A for Greater Horseshoe Bats and woodland and/or dense, mature hedgerows within Band A for Lesser Horseshoe Bats, which are their preferred habitats. Over time, this should benefit both development and bats, as degradation of habitats close to the roost expands the range of the bats, and therefore increases the obligations on more distant developments from roost locations.

A8.4 Where the replacement provision is to be made on land off-site (outside the red line development boundary), any existing value of the off-site land as bat habitat must be factored in to the HEP calculation. Bat surveys of this land in accordance with Annex 3 will usually be required (unless very low existing value to Horseshoe bats is evidenced) in order that an enhancement over its current value to bats can be determined, and to establish a baseline for monitoring. For this reason, it is strongly advised that a HEP calculation is completed at feasibility stage or early in the design process. **Off-site options must also be considered early on to avoid requiring two seasons of bat surveys.**

A8.5 The baseline values for the HEP calculation will be taken as habitats with the highest value for horseshoe bats within five years leading up to submission of the planning application, based on best available evidence. This enables a worst-case scenario assessment to be completed and is similar to the approach taken under the Environment Act 2021 in terms of pre-application clearance of development sites for Biodiversity Net Gain.

A8.6 Where the replacement provision is to be off site, and land in a different ownership is involved, legal agreements via a Section 106 agreement or Conservation Covenant will be needed to ensure that the mitigation is **secured in perpetuity**.

A8.7 An Ecological Management Plan for the site must be provided setting out how the site will be managed for SAC bats in perpetuity.

A8.8 Where appropriate (e.g. for sites within a Juvenile Sustenance Zone), a Monitoring Strategy must also be provided to ensure continued use of the site by SAC bats and include measures to rectify the situation if negative results occur.

A8.9 A calculator to be used to work out the quantity of replacement habitat required is available at Somerset Council's HEP webpage and is also available on North Somerset Council's website.

A8.10 Strategic sites are available for the provision of mitigation and equivalent hectares can be purchased via North Somerset Council. These sites are referred to as North Somerset Nature Parks (NSNP) and have been chosen in locations where scientific modelling has demonstrated that connectivity for bats is high and habitat quality is low. Enhancement of habitat through measures including the creation of grazed pasture, woodland and dense, mature hedgerows will provide greater availability of foraging potential for bats in areas where they are already commuting, or enhance land to such an extent (e.g. conversion of land from arable to pasture), that connectivity is created. NSNPs will be sited in locations close to maternity roosts (within Zone A). They will be available as mitigation options for any developments within North Somerset where it has been demonstrated that adequate on-site mitigation and/or compensation is not feasible. The cost of habitat units available via North Somerset Council's NSNPs scheme will be published at North Somerset Nature Parks | North Somerset Council.

A9. Biodiversity Net Gain and the SPD Approach

A9.1 North Somerset Council has produced a separate Biodiversity SPD . More information is available at NSC's Biodiversity Net Gain webpage. Replacement horseshoe bat habitat needs to be provided in perpetuity, whereas BNG obligations only legally apply for a 30-year period.

A9.2 Unless exempt, a proposed development will need to provide at least 10% biodiversity net gain (BNG) demonstrated through the statutory Defra metric in accordance with the requirements set out in the Environment Act 2021. Habitats resulting in BNG may not be the same habitat types required to mitigate the effects of the proposed development on bats. The requirements for horseshoe bats differ in that an abundance of prey species and their supporting flora is needed to maintain the affected population. Abundance of prey is often a product of management as opposed to BNG's focus on diversity of botanical species and habitat structure and quality. Similarly, whilst the BNG process permits mitigation remote from the development site, horseshoe bats require the mitigation to be within easy reach of the home roost.

A9.3 A key principle of BNG is that it must be **additional** to mitigation requirements. The ecological mitigation hierarchy must be fully followed for BNG to be achieved. The current approach, supported by planning and appeal decisions and informed by advice from Natural England, is that replacement horseshoe bat habitat can only contribute to BNG calculations up to 'no net loss'. Any quantum of created habitat must demonstrate at least 10% biodiversity net gain through the Defra metric **plus** no net loss of horseshoe bat habitat. Double counting of biodiversity gain as replacement horseshoe bat habitat is not a scientifically-valid approach. There must be clear demonstration of allocated BNG and horseshoe bat habitat within submissions, as shown on plans, GIS layers, etc. The comments section in the HEP calculations needs to be clearly annotated or explanation provided within ecological reports confirming which habitats are being considered for Biodiversity Net Gain and which are earmarked as horseshoe bat habitat. The approach regarding additionality will be based on the stance of the UK Government, North Somerset Council (for example, as set out in the Biodiversity Net Gain Supplementary Planning Document) and Natural England at the time of consideration of planning applications.



Lesser Horseshoe Bats: Mother and Pup
(Photo: Frank Greenaway.
Courtesy Vincent Wildlife Trust)

PART B: Technical Guidance

B1 Introduction

B1.1 The North Somerset and Mendip Bats SAC was originally designated under the Habitats Directive 92/43/EEC, which was transposed into UK law under the Conservation of Habitats and Species Regulations 2017 (as amended) (known as the 'Habitats Regulations'). This means that the populations of horseshoe bats supported by this site are of international importance. They are therefore afforded high levels of protection, placing legal duties on decision-makers to prevent damage to bat roosts, foraging areas and the routes used by bats to travel between these locations (commuting/dispersal corridors) to maintain Favourable Conservation Status.

B1.2 The primary reason for designation of the North Somerset and Mendip Bat SAC is the presence of two species listed under Annex II of the Habitats Directive 1992 as specified in the Habitats Regulations 12, 3:

- Greater Horseshoe Bat *Rhinolophus ferrumequinum* (maternity and hibernation roosts)*;* and
- Lesser Horseshoe Bat *Rhinolophus hipposideros* (hibernation roosts)*.*

B1.3 References in this document to 'horseshoe bats' relate to both species. Where a distinction needs to be made between different requirements, the particular species will be referred to. The Habitat Evaluation Procedure (HEP) calculations need to be completed, and to achieve no net loss of habitat for **both** horseshoe bat species, for the proposed mitigation to be acceptable where sites fall within Consultation Zones. See

PART C: Annexes

Annex 1: Details of the North Somerset and Mendip Bats Special Area of Conservation for more details.

B1.4 The Conservation Objectives for North Somerset & Mendip Bats SAC are to ensure that the integrity of the site is maintained or restored. The SAC contributes to achieving the Favourable Conservation Status of its Qualifying Features [i.e. horseshoe bats], by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and,
- The distribution of qualifying species within the site.

B1.5 Habitats and features which support the populations of SAC bats outside the designated site which are functionally-linked are a material consideration in ensuring the integrity of the designated site. Functionally-linked land is considered for the purposes of Habitats Regulations Assessments in the same way as direct impacts with the boundary of designated SAC units. This principle is established in law[1].

B1.6 The purpose of this advice is not to duplicate or override existing legal requirements for protected bat species or their roosts. These aspects are well governed by the Natural England licensing procedures for protected species. This document has been developed to fulfil a particular need for quantitative and comparable assessments of impacts on foraging habitats and dispersal corridors for SAC bats to enable Habitats Regulations Assessments (HRA) to be completed under Regulation 63 of the law. This document provides a survey protocol and metric for replacement horseshoe bat foraging habitat. The survey protocol will also inform impact assessment on dispersal corridors, although qualitative rather than quantitative assessment on a case-by-case basis considering landscape context is most useful for these features. Whilst impacts on roosts also need to be fully considered, best practice guidance has already established methodologies which provide a sufficient evidence base for HRA.

B1.7 The guidance applies to development proposals that could affect the SAC and trigger the requirements of the Habitats Regulations (see Annex 6). The local planning authority will consider, on the basis of evidence available, whether planning applications are likely to impact on SAC bats and hence require screening for Habitats Regulations Assessment (HRA). A HRA is required whenever there is a credible risk of significant adverse impacts on the SAC, including functionally-linked habitat, as a result of a plan or project. A Stage 1 screening Test of Likely Significant Effect is required in the first instance, with plans or projects progressing to Stage 2 Appropriate Assessment if significant adverse effects cannot be screened out. Stages 3 and 4, requiring a more complex and wider scale assessment, would apply if impacts cannot be sufficiently mitigated under Stage 2 consideration. Further detail is provided at Appropriate assessment - GOV.UK. A HRA will be required for proposals with a credible risk of significant negative impacts on functionally-linked habitat to the SAC including impacts on roosts, foraging habitat and potential dispersal corridors. A template for a Shadow HRA is provided in Annex 7: Application of the Habitats Regulations. A Stage 2 Appropriate Assessment is not required for developments which have no credible risk of posing significant adverse effects on functionally-linked habitat to the SAC (see A7. Proposed Developments with Minor Impacts on Foraging Habitat).

B1.8 **An important objective of the guidance is to identify areas in which development proposals might significantly impact on the designated populations at an early stage of the planning process, in order to inform sensitive siting and design, and to avoid**

[1] Detailed analysis provided in Natural England Commissioned Report NECR 207 (2016). *Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions* NECR207_edition_1.pdf

unnecessary delays to project. As set out in Section A8.2, the ecological mitigation hierarchy must be followed for developments with alternative options/avoidance measures considered in the first instance, and rationale fully demonstrated for applications with likely significant impacts.

B1.9 This technical guidance is based on the advice from experts and ecological consultants[2], current best practice, operational use and the best scientific information available at the time of writing. It will be kept under review by North Somerset Council and Natural England. This SPD has been developed from work at a county level for North Somerset and Somerset. Unless there is scientific evidence specific to the North Somerset and Mendip Bats SAC to indicate otherwise, the approach and guidance is consistent with Somerset Council's guidance.

B2. Sensitive Zones for Horseshoe Bats

B2.1 To facilitate decision making and in order to provide key information for potential developers at an early stage using the best available data, a Consultation Zone for Greater Horseshoe Bats and Lesser Horseshoe Bats affecting North Somerset and Somerset districts (see Figures B1 and B2 below) have been identified. This is based on an accumulation of known data, including roost records from Bristol Regional Environmental Records Centre, planning submissions and the 1999, 2001 and 2020-2021 telemetry studies of Greater Horseshoe Bat maternity roosts within the SAC[3]. The data is constantly being added to and updated as further research is carried out and surveys are undertaken for development sites. Figures B1 and B2 reflect the current understanding of key roosts and habitat associated with the SAC. The guidance on band widths can be applied to additional horseshoe bat roosts if not identified in the mapping exercise which underpins this SPD, including to inform a HRA if they are likely to be functionally-linked to the SAC.

B.2.2 Greater Horseshoe and Lesser Horseshoe Bat Consultation Zones illustrate the geographic area where each species is likely to be found and where functionally-linked habitat is located. As detailed in Section B2.1, this may vary as new roosts are located. The SPD has been published based on the best available scientific knowledge at the time of publication and will be subject to further review in future based on any forthcoming evidence. The zoning band widths are set out in Table B1 below, with justification provided in Annex 2. Where bands overlap, the highest level of consideration has been applied, rather than two different bandings being mapped.

B2.3 The Consultation Zone is divided into three bandings; A, B and C which represents for maternity roosts:

- Band A: the Juvenile Sustenance Zone (JSZ), which is also likely to be of critical importance for the core of the adult bat populations including lactating females;
- Band B: the wider Sustenance Zone, where adult bats have been found to regularly use foraging territories; and
- Band C: the maximum distance in which bats from maternity roosts have been recorded travelling in one evening i.e. home range.

These areas have been defined by the distance bats (including juvenile bats) have been recorded travelling from a roost site in telemetry studies and represents the home range of the local population. It is also based on recent modelling studies completed by the University of the West of England (UWE)[4]. Telemetry studies only recorded the movements of a small number of bats

[2] See acknowledgements

[3] Billington, G. (2001). *Radio-tracking study of Greater Horseshoe bats at Brockley Hall Stables Site of Special Scientific Interest. May-August 2001.* English Nature Research Report No. 442. English Nature, Peterborough
*Foxley, T., Lintott, P., Stonehouse, S., Flannigan, J. and Stone, E.L. (2025) A high resolution spatial modelling framework for landscape-level, strategic conservation planning. Ecological Informatics. 91, p. 103363. https://doi.org/10.1016/j.ecoinf.2025.103363*Geckoella (2022). *North Somerset Council Greater Horseshoe Bat Radio-tracking 2022.* Geckoella Ltd on behalf of North Somerset Council, Weston-super-Mare.
Jones, G, and Billington, G. (1999). *Radio-tracking study of Greater Horseshoe bats at Cheddar, North Somerset.* English Nature, Taunton.

[4] Foxley, T., Lintott, P., Stonehouse, S., Flannigan, J. and Stone, E.L. (2025) A high resolution spatial modelling framework for landscape-level, strategic conservation planning. Ecological Informatics. 91, p. 103363. https://doi.org/10.1016/j.ecoinf.2025.103363

from each of the maternity roosts, which is why a radius from key roosts has been used in modelling of likely distribution.

B2.4 The original SPD (Version 1) assumed pasture within 1 km of maternity roosts for Greater Horseshoe Bats was of key importance for juvenile bats, based on historic radiotracking studies from more than 20 years ago. This updated Version 2 has increased the JSZs around Greater Horseshoe Bat maternity roosts to pasture up to 5 km, based on recent scientific studies. The increase is likely to have arisen from increased competition for insect prey as roosts have grown larger as the population recovers (e.g. at least a five-fold increase in local Greater Horseshoe Bat populations since 2001) and the decline in quality and accessibility of core foraging habitat within 1 km, including livestock within fields. Mature woodland within 600 metres (m) of a Lesser Horseshoe Bat maternity roost remains the assumed JSZ for young Lesser Horseshoe bats. This radius may be revised if new scientific evidence becomes available in future. New build developments must aim to avoid and minimise the loss of foraging habitat and connecting habitat between foraging areas and roosts, and mitigate to a high standard.

B2.5 As the foraging territory of individual bats is based on prey availability, it is logical that the home range and furthest distance travelled by bats from the roost will expand when roosts are larger and contract when roosts are smaller (as demonstrated by evidence from UWE – see Annex 8: Horseshoe Bat Survey and Mitigation Flow Chart). An evidence-based justification based on roost counts may be accepted in some instances e.g. which estimating density bands for newly identified roosts. It must however also be considered that populations are still locally vulnerable, with concerning recent decreasing trends at key Greater Horseshoe roosts in North Somerset from 2020-2024. It is estimated that the capacity for the Greater Horseshoe Bat population nationally is approximately 60,000 bats and at present, the national population is estimated at 9000-18000[5]. Habitat management and creation must seek to create **capacity** for the bat species to forage and disperse in future as they recover as well as mitigating or compensating for current impacts.

B2.6 The A, B and C bandings for other (non-maternity) roosts comprise:

- Band A: not included as no Juvenile Sustenance Zone is required.
- Band B: The likely distance that core foraging habitat is located around smaller and hibernation roosts.
- Band C: The likely home range of bats from smaller and hibernation roosts.

[5] Devon Greater Horseshoe Bat Project and Pers. Comm. Daniel Hargreaves, Vincent Wildlife Trust

Table B1: Band Widths for Horseshoe Bat Consultation Zone (in metres)

Band	Greater Horseshoe bat		Lesser Horseshoe bat	
	Maternity Roost	Other Roost	Maternity Roost	Other Roost
A	0-5000	N/A	0-600	N/A
B	5001-12000	0-610	601-2300	0-1250
C	12001-14000	611-2440	2301-6000	1251-2100

B2.7 The Juvenile Sustenance Zone around Greater Horseshoe Bat maternity roosts are assumed to extend to a radius of 5 km. This is based on recent radiotracking studies, including a small subset of juvenile bats, and modelling completed by the UWE based on this data. It is possible due to the small number of juvenile bats tracked, that the banding is an underestimate, highlighting the importance of site-specific considerations and appropriate surveys within Band B. In North Somerset, the JSZ includes some urban areas of Nailsea, Backwell, Cleeve, Congresbury and Yatton. The urban area of Cheddar is also included. Some of the JSZ/Band A will include existing urban areas or habitats with very limited suitability for Greater Horseshoe Bats. In these instances, the input of a qualified consultant ecologist, the Council Ecologist and/or Natural England will be needed to confirm whether impacts on SAC bats can be ruled out. Pre-application discussions would be strongly encouraged for any development within the Greater Horseshoe JSZ/Band A which may directly or indirectly impact on suitable habitat.

B2.8 The guidance applies to suitable and available habitat. Juvenile Greater Horseshoe Bats are highly dependent on prey produced by cattle grazed pasture and rough tussocky grassland within Band A.[6] It is likely to be difficult to replace existing foraging habitat within development proposals in the JSZ. Any pasture, particularly whole fields of historically grazed pasture proposed for greenfield development will need to be very carefully considered within Band A of the Greater Horseshoe Consultation Zone, with the aim of minimising or avoiding loss wherever possible, and mitigating by replacement habitat, with appropriate high-quality management, as a last resort. Retention of these habitats must also be treated as a priority within Band B. Developments on land of low value for horseshoe bats or in a location inaccessible to these species (e.g. as a result of fragmentation or light spill) can make a case for exemption from the guidance as set out in A7. Proposed Developments with Minor Impacts on Foraging Habitat.

B2.9 Optimal habitat for Lesser Horseshoe Bats includes woodland, dense hedgerows and wetlands. Fields of grazed pasture surrounded by dense/thick hedgerows of high ecological value can also be of importance. Juvenile Sustenance Zones are assumed around Lesser Horseshoe Bat maternity roosts to a radius of 600 m. As few telemetry studies of Lesser Horseshoe Bat maternity roosts has been completed within North Somerset, studies from Hestercombe House in Somerset and elsewhere have been used. Radio tracking of the Hestercombe House SAC Lesser Horseshoe bat population revealed that individuals were commuting up to 6 km to hunt.[7] Radio-tracking of a colony of 300 bats in the Wye Valley radio-tracking revealed that the longest distance travelled to forage was 4.2 km. Bats foraged up to half the time within 600 m of their summer roost but areas up to 2.3 km were used more than expected. Bontadina *et al* (2002) recommended that a radius of 600 m around a Lesser Horseshoe Bat maternity roost should have special consideration. [8] For this reason, the JSZ for Lesser Horseshoe Bats has been defined as being up 600 m from roosts. Juvenile Lesser Horseshoe Bats preferentially feed in woodland habitats within this area. New build development on greenfield sites which will impact directly or indirectly on woodland, wetland and/or dense mature hedgerows with trees should be very carefully designed with stringent measures to avoid, minimise and mitigate any impacts. Removal of any woodland, dense hedgerows, waterbodies and wetland habitats within 600 m of Lesser Horseshoe Bat maternity roosts must be avoided wherever possible, and where

[6] Ransome, R. D. 1996. *The management of feeding areas for Greater Horseshoe bats*: *English Nature Research Reports Number 174.* Peterborough: English Nature.
[7] Billington, G. 2005. *Radio tracking study of Lesser Horseshoe bats at Hestercombe House Site of Special Scientific Interest, July 2005.* English Nature Somerset & Gloucestershire Team; Duvergé, L. 2008. *Report on bat surveys carried out at Hestercombe House SSSI Taunton, Somerset, in 2007 and 2008.* Cullompton: Kestrel Wildlife Consultants.
[8] Bontadina, F., Schofield, H. & Naef-Daenzer, B. 2002. Radio-tracking reveals that Lesser Horseshoe bats (Rhinolophus hipposideros) forage in woodland. *J. Zool. Lond. (2002) 258, 281-290*.

exceptionally permitted must be carefully mitigated for. Consideration also needs to be given to connecting flight routes between maternity roosts and woodlands.

B2.10 Data for Lesser Horseshoe Bat JSZs is not specific to North Somerset, where optimal woodland and wetland habitats is often fragmented around urban areas, and individual consideration should be applied on a case-by-case basis using this SPD as a guide. High quality woodland and wetland habitats more than 600 m distant from a maternity roost may, for example, be of high importance. Although the SAC citation relates solely to hibernation sites for Lesser Horseshoe bats, maternity roosts are key to ensuring Favourable Conservation Status of the species. Therefore, maternity roosts and subsidiary roosts which are likely to be an important part of the SAC population are treated as functionally-linked habitat, based on the Precautionary Principle, and are subject to the requirements of the Habitats Regulations, including HRAs where necessary. Some of the JSZ/Band A will include existing urban areas or habitats with very limited suitability for Lesser Horseshoe Bats. In these instances, the input of a qualified consultant ecologist, the Council Ecologist and/or Natural England will be needed to confirm whether impacts on SAC bats can be ruled out. Pre-application discussions would be strongly encouraged for any development within the Lesser Horseshoe JSZ which may directly or indirectly impact on suitable habitat.

B2.11 Three of the four SSSI component units of the North Somerset and Mendip Bats SAC within North Somerset are designated due to hibernation sites for Greater and Lesser Horseshoe Bats. Like other bat species, these species feed throughout the winter, depending on temperature. Radio-tracking of Lesser Horseshoe Bats revealed that they foraged on average to a maximum distance of 1.2 km from the hibernation site. One bat travelled to an absolute maximum distance of 2.1 km. The winter foraging range appears to be less than half the area covered in the summer months.[9]

B2.12 Band A is shown in orange shading; Band B in dark yellow; and Band C in pale yellow reflecting the decreasing density at which Greater and Lesser Horseshoe Bats are likely to occur away from the home roost.

B3. Consultation and Surveys

B3.1 Early discussion refers to pre-application stage prior to submission of a planning application; and, essentially, ***before*** any Master Plan proposals are designed or finalised. This will ensure that appropriate advice on site feasibility is provided and adequate survey data is obtained. It is encouraged that a site lighting plan with existing (pre-development) night time lux levels is provided at the earliest possible stage. This would evidence any areas currently exposed to high levels of light and inform likely significant impacts of any proposed changes to the site on commuting and foraging horseshoe bats.

B3.2 Early discussions will also help inform likely mitigation requirements, and ensure, for example, that proposals seek to retain and enhance key features and habitats, and that sufficient land can be allocated for required mitigation and/or compensation measures. This should ensure that avoidance measures are fully considered, bespoke mitigation measures are designed in at an appropriately early stage and that the ecological mitigation hierarchy is followed.

B3.3 For development proposals within the JSZ (Band A), it is essential that North Somerset Council, and where appropriate Natural England, are consulted at an early stage of the process. It is essential that development is designed and mitigated with the utmost diligence and care, so it is of a sufficiently very high standard to be acceptable, due to the critical nature of the area in supporting the population of a maternity roost. This is likely to be particularly challenging for new build development on greenfield sites of existing value to horseshoe bats.

B3.4 Where a proposal within Bands A or B of a Greater or Lesser Horseshoe Bat Consultation Zone has the potential to affect the features identified below, early discussions with the local planning authority (who will consult Natural England as necessary) are also strongly encouraged:

[9] Bat Conservation Trust/ BMT Cordah Limited. 2005. *A Review and Synthesis of Published Information and Practical Experience on Bat Conservation within a Fragmented Landscape*. The Three Welsh National Parks, Pembrokeshire County Council & Countryside Commission for Wales.

- Known horseshoe bat roost;
- On or adjacent to a Site of Special Scientific Interest (SSSI);
- Linear features: hedgerows, tree lines, watercourses, stone walls, railway cuttings, pasture, hay meadow, stream line, woodland, parkland or woodland edge;
- Wetland habitat: ponds, marsh, reedbed, rivers, streams, rhynes;
- Suitable buildings or bridges, if there is a large void with potential horseshoe bat access;
- Cellars, mines, ice houses, tunnels or other structures with voids which produce tunnel-like conditions;
- Development which introduces significant new lighting;
- New wind turbine and solar farm proposals (in respect of displacement)[10]; and
- Creation of Biodiversity Net Gain habitat banks, where this will result in changes in grazed or rough tussocky grassland management or quality of habitats for horseshoe Bats.

B3.5 For all proposals within the Greater Horseshoe or Lesser Horseshoe Bat Consultation Zones, an ecological consultant[11] should be commissioned at an early stage to identify and assess any potential impacts of the proposals. Pre-application discussions with the Council may also be beneficial for large-scale schemes or schemes which may have potentially high impacts on horseshoe bat habitats even outside of the Consultation Zones. It has been established that impacts some distance from horseshoe bat SACs may need to be considered through the HRA process, where schemes result in potential significant adverse effects on dispersal corridors[12].

B3.6 **Failure to provide the necessary information in support of an application is likely to lead to delays in registration and determination, and the application may need to be withdrawn. If insufficient information is submitted to allow the Council to assess the application in accordance with the Habitats Regulations, the application will be considered unacceptable, and likely recommended for refusal.** Common further information requirements include:

- Details of bat activity surveys compliant with the SPD which demonstrate the current value of sites for horseshoe bats including tabulated raw data* to evidence conclusions;
- An impact assessment based on clear landscape and layout plans, including retention and enhancement of foraging habitat and appropriately buffered dark vegetated dispersal corridors;
- Provision of HEP calculations which demonstrate that sufficient replacement horseshoe bat foraging habitat will be provided to ensure no net loss of functionally-linked habitat;
- HEP calculations for both Greater Horseshoe and Lesser Horseshoe bats, depending on Consultation Zones;
- On or off-site mitigation to be clearly shown on a plan;
- Mitigation to be outside of residential curtilages;
- Relevant survey information and HEP calculations for any off-site components of mitigation;
- Clear delineation of replacement horseshoe bat foraging habitat from any Biodiversity Net Gain (over and above no net loss) using the Defra metric both within the calculations and as shown on a site plan; and

[10] Horseshoe bat casualties from wind turbines are very rare with only one Greater Horseshoe, one Bechstein's being recorded in Europe over the ten-year period 2003 to 2013. Five Barbastelle bats were recorded as being killed in the same period (Eurobats. 2014. *Report of the Intercessional Working Group on Wind Turbines and Bat Populations*. EUROBATS.StC9-AC19.12). Bats appear to be displaced by solar farms as found by Tinsley, E., Froidevaux, J.S.P., Zsebok, S., Szabadi, K. L. and Jones, G. (2023). *Renewable energies and biodiversity: Impact of ground-mounted solar photovoltaic sites on bat activity.* Journal of Applied Ecology 60 (9), 1752-1762.

[11] Consultant ecologists should be members of CIEEM www.cieem.net and have sufficient experience with Horseshoe bats.

[12] For example, appeals APP/P1133/W/19/3237127 and APP/P1133/W/18/3205558 for Land at Wolborough Barton, Newton Abbot, Devon, TQ12 1EJ

*Raw data does not need to include the files or full details of each bat pass. It should however include fully analysed data including species recorded, passes per night/per hour (or both) and sufficient information to evidence any conclusions in relation to foraging or commuting activity. This could include for example, the percentage of passes recorded within an hour of sunset or sunrise (indicating commuting from nearby roosts) and analysis of any clustered passes suggesting foraging activity. This will enable a comparative analysis of likely importance of sites to be assessed.

- Details of lighting proposals to demonstrate that there will not be significant adverse effects as a result of displacement from retained, enhanced or created habitats for horseshoe bats as set out in Section B4.14 to B4.22.

Although mitigation for bat roosts is not a key component of this SPD, compensatory roosting provision also needs to be clearly shown in an area accessible to horseshoe bats. This needs to be available before destruction or disturbance of the existing roost. Details of dimensions and access features need to be provided. Some of the details above such as accessibility to foraging habitat and dispersal corridors is of relevance to assessing suitability of proposed compensatory roosting provision. In some cases, the provision of standalone night roosts on replacement sites may help exploitation of new habitat enhancement. As development will alter the location of foraging areas and connectivity across landscapes, the use of day and night roosts will also alter. Therefore, major applications are strongly encouraged to incorporate additional standalone roosts constructed to best practice standards within any retained, enhanced or created habitat for horseshoe bats. Off-site replacement habitat must also incorporate provision of roosting opportunities wherever possible.

B3.7 The survey methodology must be followed in relation to both foraging habitats (also called feeding or hunting grounds) and dispersal corridors (also called fly-ways or commuting routes). Surveys must determine the use of the site by horseshoe bats i.e. whether the site is being used as a commuting route, or contains foraging territories, or both. Survey results inform the HEP metric for calculating the amount of replacement foraging habitat required in the methodology set out in Annex 4. The principles of mitigation for dispersal corridors is set out in Section B4.13. Consideration must be given to the landscape context of the site and of additional or indirect impacts as a result of the operation of proposals, such as highway safety measures (e.g. hedgerow removal for visibility splays), additional enabling or construction requirements and additional street lighting required.

B3.8 Surveys should be carried out in accordance with Annex 3: Survey Specification for Planning Applications. Exact survey requirements will reflect the sensitivity of the site, and the nature and scale of the proposals. The ecological consultant will advise on detailed requirements following a preliminary site assessment and desk study. Any deviations from the Survey Specification must be fully evidence-based, referring to scientific data and this SPD. It is strongly recommended that any deviations are agreed in writing with the Council, and Natural England as required, through the pre-application process.

B3.9 Bat surveys are **seasonally constrained**. For proposals which have the potential to significantly negatively impact on habitats used by the SAC populations during the summer months, a full season (April to October inclusive) will be required. This may not be necessary in certain circumstances, where it is demonstrated to the North Somerset Council's ecologist that habitats of value for horseshoe bat species will not be directly or indirectly impacted (See B4.23 and B4.24). The survey period may need to be extended to include autumn, winter and early spring bat activity monitoring for developments in close proximity to hibernation roosts where suitable foraging habitat and dispersal corridors will be impacted. Surveys need to be included in project delivery planning at an early stage to avoid a potential 12-month delay.

B3.10 Baseline habitat assessments and bat activity surveys are also required on off-site land where this is to be used for mitigating habitat loss, following the same survey methodology as set out in Annex 2. This is important to establish the baseline value of the off-site provisions for horseshoe bats and to inform the necessary HEP calculations. There may be exceptions, for example if existing habitat quality is very low e.g. arable habitat or defunct hedgerows, where avoidance of baseline surveys for off-site habitats would be acceptable. This would need to be fully justified and agreed with the Council Ecologist, and Natural England as required.

B3.11 Favourable Conservation Status for horseshoe bats will be assessed based on the Conservation Objectives of the North Somerset and Mendip Bats SAC, as well as other

guidance[13]. Outside of the Horseshoe Bat Consultation Zones, development proposals will have impacts on the Favourable Conservation Status of other bat populations and their roosts. Where there will be direct impacts on roosts for horseshoe bat species, bespoke mitigation will need to be designed by a qualified ecologist on a case-by-case basis. All species of bat and their roosts are protected by the Wildlife and Countryside Act 1981 (as amended) and maintenance of populations under the Habitats Regulations 2017 (as amended). Further advice on potential impacts to bats is contained in Natural England's Standing Advice for Development Impacts on Bats, Bat Mitigation Guidelines (English Nature, 2004), UK Bat Mitigation Guidelines 2023 (Reason and Wray, 2023) and the Bat Conservation Trust's survey guidelines 4th Edition (Collins Editor, 2023). North Somerset Council also have guidance on survey expectations as set out in Preliminary bat roost assessment and Ecological impact assessment. It is preferable for the horseshoe bats to have dedicated roosting provisions in a stand-alone structure away from human disturbance.

B4. Mitigation within the Consultation Zone

B4.1 Within the Horseshoe Bat Consultation Zones, appropriate mitigation will be required where SAC bats will or may be negatively affected by development. The aim should be to retain, enhance and create new habitat and features of value to bats, such as those listed in Section B3.4 through appropriate scheme design. North Somerset Council's Ecologist will have regard to relevant considerations in determining the mitigation requirements, including survey results and calculations relating to replacement habitat.

B4.2 The following are important principles for mitigation:

- Seek to maintain the quality of all semi-natural habitats and design the development to enhance existing habitats, making sure that they remain accessible to the affected bats, including avoiding displacement by light spill and connectivity to habitat corridors.
- Maintain bat roosts *in situ*, maintain or replace night roosts and consider creating or enhancing provision of roosts. Night roosts, for example, are important for resting, feeding and grooming, particularly those located at distance from the main roost.
- Consider the site context and connectivity to off-site areas of importance for Horseshoe bats.
- Consider the impacts on the invertebrate prey of horseshoe bats. For example, for larger developments on farmland, whether any herds of grazing animals can be retained within the wider landholding following the development, and whether grazed pasture will remain accessible to horseshoe bat species.

Foraging Habitat

B4.3 Where impacts on foraging habitat cannot be avoided, replacement habitat will be needed to avoid net loss of habitat. Replacement habitat should always aim to be optimal for the species affected. Examples of impacted habitats which must be retained in the first instance or appropriate replacement habitat provided include hunting habitat such as grazed pasture, hedgerows, woodland edges, tree lines, wetlands and hay meadows. The developer's Ecologist must carry out the HEP calculations for both horseshoe bat species and submit them with the planning application to be reviewed by the planning officer and North Somerset Council's Ecologist. A site plan clearly showing HEP allocated areas post-construction will need to be provided alongside the HEP calculations, with areas allocated for Biodiversity Net Gain shown to demonstrate that all legal obligations will be met.

B4.4 Where replacement foraging habitat provision is necessary, the type(s) of habitat to be provided and the location of the provision shall be agreed with North Somerset Council's Ecologist and/or Natural England as appropriate. It is recommended that on-site HEP provisions are made in the first instance, with off-site provisions provided as a last resort, in accordance with the ecological mitigation hierarchy.

[13] UK conservation status assessment for S1303 - Lesser horseshoe bat (Rhinolophus hipposideros) as part of the Fourth Report by the United Kingdom under Article 17 of the EU Habitats Directive (jncc.gov.uk) ; Definition of Favourable Conservation Status for Greater horseshoe bat (Rhinolophus ferrumequinum) - RP2963 (naturalengland.org.uk).

B4.5 Where replacement foraging habitat is proposed off-site, the land must not be a designated Site of Special Scientific Interest or under countryside stewardship prescriptions for bats. Additionality on top of 10% Biodiversity Net Gain as set out in Section A9.3 needs to be demonstrated.

B4.6 Replacement foraging habitat must aim to be the optimal for the prey of the bat species affected (see Annex 4: Habitat Requirements of Horseshoe Bats). The following are examples of habitats of value to horseshoe bats and which may be created or enhanced as the replacement provision. Planting will be expected to consist of native species that produce an abundance of invertebrates.

- Hedgerows with trees: tall, bushy hedgerows at least 3 metres wide and 3 metres tall, managed so that there are perching opportunities;
- Wildflower meadow or semi-improved rough grassland: managed for moths, e.g., long swards[14];
- Grazed pasture (essential for juveniles): difficult to recreate on site and only feasible with management agreements with local landowners over and above existing regimes. Even so, there may be issues which prevent grazing in the future[15] Because of this issue, a change to grazing regime without any additional enhancement to habitats present, may only be accepted in exceptional circumstances, such as where there is a clear mechanism for legally securing and enforcing the amended grazing regime. It should be noted that there have been challenges to securing and enforcing long-term (in perpetuity) provision for grazing through the planning process for other applications[16];
- Ponds: for drinking and a prey source for Lesser Horseshoe Bats;
- Woodland/copses; and
- Provision of additional roosting (e.g. night roosting) opportunities on site.

B4.7 The method for checking the adequacy of replacement habitat provided with an application or in master planning of a proposed development, is provided in Annex 5: Methodology for Calculating Replacement Foraging Habitat .

B4.8 It is important that provision of the replacement habitat is carried out to timescales to be agreed by the local authority, and Natural England as required, and secured through an appropriate mechanism within the planning process (e.g. timescale to be set out in a S106 agreement). Replacement habitat should ideally be created in advance of or at least concurrent to a development proceeding to demonstrate no significant adverse effect beyond reasonable scientific doubt. This will allow for vegetation to establish and ensure continuity in HEP provisions.

B4.9 In the case of quarries, waste sites or other large-scale sites where restoration is proposed, this should not be considered as mitigation for habitat lost to horseshoe bats. The timescale to when these restorations is likely to be implemented, which may be 40 years after the quarry has been worked, is too long to provide any replacement to maintain the existing population at the time of impact.

B4.10 **It is vital that any replacement foraging habitat is accessible to the bat population affected. This includes consideration of distance from SAC roosts and large maternity roosts, landscape connectivity and fragmentation and potential displacement as a result of barriers such as unacceptable levels of light spill.**

[14] For example, the main species of moth species eaten by Greater Horseshoe bats are Large Yellow Underwing; Small Yellow Underwing; Heart and Dart; and Dark Arches at Woodchester (Jones, G., Barlow, K., Ransome, R. & Gilmour, L. 2015. *Greater Horseshoe bats and their insect prey: the impact and importance of climate change and agri-environment schemes*. Bristol: University of Bristol). See Annex 5 for information on habitats and food plants used by these species.
[15] For example, see paragraphs 41 to 50 of Appeal Ref: APP/X1165/A/13/2205208 Land at Churston Golf Club, Churston, Devon, TQ5 0LA.
[16] For example, see paragraphs 41 to 50 of Appeal Ref: APP/X1165/A/13/2205208 Land at Churston Golf Club, Churston, Devon, TQ5 0LA.

B4.11 An Ecological Management Plan for the site and any off-site land must be provided setting out how the site will be managed for horseshoe bats in perpetuity, with periodic review and remedial measures as required. Where appropriate, a Monitoring Strategy also needs to be included in order to ensure continued use of the site by SAC bats and includes measures to rectify the situation if negative results occur. This could form part of a Landscape and Ecological Management Plan or be provided as a stand-alone document. Monitoring could include emerging survey techniques such as infrared and thermal imaging.

Dispersal Corridors and Connectivity

B4.12 It is important to maintain connecting habitat for horseshoe bats across a proposed development site to ensure continued dispersal and function of the SAC population. Dispersal corridors are required for passage between maternity, hibernation, mating and other roosts, foraging areas and breeding between different populations to maintain genetic diversity. Features regularly used by horseshoe bats, which often fly lower than 2 m above ground level, include dark vegetated linear corridors such as mature hedgerows, built linear features such as stone walls, habitat edges e.g. woodland edges, embankments and networks of rhynes and watercourses on the North Somerset Levels and Moors. Proposals must seek to retain existing functioning linear commuting features as replacement of dark vegetated corridors such hedgerows is likely to require a significant period to establish. The HEP metric has no site-specific or landscape context and, for this reason, is not appropriate to inform creation or maintenance of dispersal corridors/commuting habitat.

B4.13 The following is required as mitigation to ensure continuous connectivity across a site, with the corridor width as wide as possible:

- For major developments[17] (which will generally have greater impacts), there should be a minimum width of 10 m of a landscape buffer of open, rough/tussocky grassland maintained each side of natural linear features such as hedgerows, woodland edge, or vegetated watercourses. Ideally, there should be a second linear feature e.g. hedgerow at the new, inner edge of the landscape buffer. **The distance must be measured from the edge and not the centreline of the feature.** In some cases, this requirement may also apply to tall, continuous built features such as embankments and significant walls.
- Significant and strategic development, for example, in a pinch-point location for horseshoe bat dispersal may require as much as a 30 m buffer or corridor.
- For minor developments, or where a narrower dark corridor can be justified ecologically, the corridor should be as above but a minimum of 6 m wide. Minor applications in particularly sensitive locations or which impact on flightlines of significant importance may need to consider wider buffers, such as the 10 m (or wider) buffers required for major developments.
- Buffers must be clearly shown on an annotated plan and accompanied by scaled cross-section/profile drawings.
- The buffer area must be allocated specifically as HEP provision/horseshoe bat habitat, and not exposed to damage by human activity, although suitable low intensity dual use may be acceptable.
- Vegetated corridors (hedgerows and treelines) must be maintained at a minimum height of 3 m and sufficiently dense, or with an associated solid barrier (see below), to prevent light spill penetrating the corridor. This may need to be evidenced in light modelling.
- Where affected by illumination, including vertically onto planting, a minimum 1.8 m high close-boarded fence with concrete posts must be installed as a screen on the outside of the planting. In this instance, connectivity measures for other species such as hedgehog, badger, reptiles and amphibians may need to be incorporated to enable landscape permeability through the solid boundary. The distance from the light source will also need to be considered.
- If dark foraging habitat is required, the corridor may need to be far wider with the planting and management specifications carefully considered to benefit the target species.

[17] Statutory definition as per Town and Country Planning (Development Management Procedure) Order 2015

- The dark corridor must be maintained in perpetuity and be protected from the start of construction. Appropriate planning conditions or legal agreements will be required to enable this.
- The grassland should be created and managed to maximise insect prey. To benefit moths, any grassland mix should be as species-rich as possible (suitable to the soil type) (see Annex 4: Habitat Requirements of Horseshoe Bats). Use of wildflower meadow is encouraged wherever feasible. The key factor over and above species diversity is structure of the grassland and the management regime, to maximise places of shelter for invertebrates as well as providing a wide range of food plants.
- Wherever possible, the dark corridor should be incorporated into the public realm rather than being a separate, isolated, corridor. The corridor may include a mown unadopted footpath 1 m wide.

Lighting

B4.14 Loss of habitat refers not only to physical removal but also indirectly from the effects of lighting. Both horseshoe bat species are known to be very light sensitive. Recent research suggests that preferred dispersal corridors for Lesser Horseshoe bats are at lux levels even lower than previously thought: "*under natural, unlit conditions ... 0.04 lux*" Lacking evidence to the contrary, it is assumed that Greater Horseshoe Bats react in the same way.[18]

B4.15 Key issues for horseshoe bats from lighting are:

- Slower-flying, broad-winged bats, including horseshoe bats, are often light-averse and avoid lit areas.
- Many night-flying species of insect such as moths, a key prey species for horseshoe bats, are attracted to light, especially lamps that emit an ultra-violet component and particularly if it is a single light source in a dark area. Insects are attracted to illuminated areas from further afield, resulting in adjacent habitats supporting reduced numbers of insects. This is likely to further impact on the ability of the bats to be able to feed.[19]
- Streetlights have detrimental effects on local caterpillar assemblages and artificial lighting is likely to be contributing to overall declines in the moth population, reducing prey availability for SAC bat species[20].
- LEDs can offer greater control over the type, intensity and spread of light. However, recent studies have shown that light-sensitive bats avoid LED lights even when dimmed and that continuous lighting along roads introduces barriers that some bat species cannot cross[21].
- In addition to impacts on movement and feeding, light falling on a bat roost access point can delay bats from emerging. This then reduces the time available for foraging. Lighting may also cause bats to abandon a roost.
- At a landscape scale, artificial lighting can disrupt navigation along linear features as much as the physical removal of such features. Light spill onto commuting routes can force bats to use alternative routes (if available) and this can, in turn, result in an additional energetic burden on individual bats. If no alternative routes are available, roosts and foraging habitats may be abandoned. Lighting can, therefore, lead to bat populations becoming fragmented into smaller units which in turn become more vulnerable to local extinction.

[18] Average light levels recorded along preferred commuting routes of Lesser Horseshoe bats under natural unlit conditions were 0.04 lux across eight sites (Stone, E.L 2013. *Bats and Lighting – Overview of current evidence and mitigation.* Bristol: University of Bristol)

[19] Institute of Lighting Engineers/ Bat Conservation Trust. 2023. *Bats and Artificial Lighting at Night*; pers. comm. Dr Emma Stone, University of Bristol, 2009.

[20] Boyes, D. H, Evans, D. M., Fox, R., Parsons, M. S. and Pocock, M. J. O (2021). *Street Lighting has Detrimental Impacts on Local Insect Populations*. Science Advances 7 (35).

[21] Rowse, E.G., Harris, S. and Jones, G. (2016). *The Switch from Low-Pressure Sodium to Light Emitting Diodes Does Not Affect Bat Activity at Street Lights*. PLoS ONE 11(3): e0150884. https://doi.org/10.1371/journal.pone.015088. Stone, E. L., Jones, G. and Harris, S. (2012). *Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats.* Global Change Biology (2012) 18, 2458-2465.

B4.16 A development proposal will be expected to demonstrate *beyond reasonable scientific doubt* (as required by case law[22]) that bats will not be prevented from using features by the introduction of new lighting or a change in lighting levels. Lighting refers to both external and internal light sources. The following will be expected from applicants for schemes which pose a credible risk to functionally-linked foraging habitat, dispersal corridors and/or bat roosts for SAC bat populations:

- Baseline lighting survey, where there is existing light spill – if evidence is provided to demonstrate that baseline light levels will not be exceeded or only marginally altered in a manner which is unlikely to impact on SAC bat populations, mitigation will not be required.
- Evidence to demonstrate that considerations of site design, including building orientation; and the latest techniques in lighting design have been employed in order to, ideally, avoid light spill to retained and created bat habitats.
- A Lighting Strategy detailing the proposed light layout and parameters for external and internal light spill. This must include the type of lighting (ideally make and model) proposed, indicative locations and details of any measures to mitigate or reduce light spill e.g. motion sensitive or part-night lighting.
- A lux contour plan where it is unclear in the Lighting Strategy whether levels of light spill onto retained and created habitats for horseshoe bats will remain below 0.4 lux on the vertical plane or 0.2 lux on the horizontal plane.
- All lighting with potential impacts to be considered including street lighting, security lighting and internal light spill as a result of large expanses of glazing facing onto horseshoe bat habitat.
- Evidence for futureproofing via appropriate legal mechanisms may be required e.g. for installation of lighting within gardens by householders adjacent to horseshoe bat habitat, if avoidance measures have not been clearly demonstrated within site plans.
- Impact assessment must also take into consideration the effects from lighting outside the proposed development site, for example from installation of street lighting along previously unlit sections of highway but now required to illuminate an application site's entrance.
- A post-development monitoring strategy, detailing remedial measures if light spill exceeds the required low levels, may need to be submitted, especially for higher impact applications or applications in particularly sensitive areas e.g. Density Band A for either species.

Lighting information requirements must be proportional to the scale of the proposals. However, there is also a risk that small-scale applications very close to roosts could have disproportionate impacts. For minor schemes which are not in the immediate vicinity of known or suspected horseshoe bat roosts, but which are within Horseshoe Bat Consultation Zones, it is recommended that indicative locations and specifications for external lighting are provided on layout plans. If the proposals clearly demonstrate that there are no feasible impacts on habitat suitable for horseshoe bats as a result of the scheme design (rather than mitigation), the requirement for a Habitats Regulations Assessment may be avoided.

B4.17 Outline applications are not exempt; neither is Planning Permission in Principle where there is a risk of a significant adverse impact on a bat SAC (i.e. a 'Habitats Development'). This is because a HRA is undertaken at the point that the decision on the principle of development is made. At this point, applicants must demonstrate, for the competent authority to be sufficiently certain, that levels of light spill resulting from the development will not have adverse impacts on SAC bat habitat. Therefore, even for an Outline or Permission in Principle application, certainty about the potential light spill from the development is required. The use of parameter plans and with assumptions about window size, type of fitting etc. can be incorporated into a Lighting Assessment that demonstrates an acceptable lighting scheme can or could be achieved. The competent authority can undertake a HRA on that basis. A planning condition is then required so that the eventual design meets the levels of light spill shown in the Lighting Assessment, or better if possible. The Lighting Assessment must follow the guidance set out in ILP 2023 guidance[23] and model the combined effects of lighting from internal and external sources, including a worst case scenario i.e. all lights on at the same time and no curtains or blinds in use, and using a Maintenance Factor of 1 (meaning lights are at their brightest and most efficient). This evidence will then inform adequate and legally robust HRAs.

[22] For example, *Landelijke Vereniging Tot Behoud Van De Waddenzee v Staatsecretaris Van Landbouw* (C-127/02) [2005] 2 CMLR 31

[23] Institute of Lighting Professionals (2023). *Guidance Note 8: Bats and Artificial Lighting in the UK.*

B4.18 Models must be provided to include light from all luminaires, show the worst scale scenario (i.e., a maintenance factor or 1 with no dimming unless this is a clear and enforceable parameter) and include light levels on vertical features. The ILP 2023 guidance states '*Lux contours (and/or coloured numbers) for 0.2, 0.5, 1, 5, and 10 lux must be clearly shown as well as appropriate contours for values above these. Each illuminance/lux contour plan should be accompanied by a table showing their minimum and maximum lux values… The illuminance contour plots should be accompanied by an explanatory note from the lighting professional to list where, in their opinion, sources of glare acting upon the key habitats and features may occur and what has been done/can be done to reduce their impacts...*'[24]

B4.19 For planning applications, lux contour plans on the horizontal plane (at 0-2 m above ground level) will be required for all potentially-impacted horseshoe bat habitat due to the height at which horseshoe bats fly. The plan should include details of the lamps and any shields used to direct illumination. Solid structures such as close-boarded fencing or solid walls used to shield bat sensitive areas from lighting can be taken into consideration. Vegetated barriers are not normally an accepted solution in their own right due to seasonal variability in the density of foliage and management requirements. In addition, developers and ecologists need to be aware of street and other lighting causing illumination of the vertical surfaces of hedgerows, woodland edge and other structure used by commuting and hunting bats. Vertical calculation planes must be modelled and submitted with planning applications to demonstrate impacts wherever appropriate. Examples include along retained and created dispersal corridors, edges of retained or created foraging habitat or the façade of buildings containing roosts to show the illumination directly upon the vertical faces of the feature. Vertical planes can also show a cross-sectional view within open space.

B4.20 It is difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site despite efforts to reduce impacts as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night but are in line with research findings for the illuminance found at hedgerows used by Lesser Horseshoe Bats, a species well known for its light adverse behaviour.'[25]

B4.21 Consideration should also be given to impacts from intermittent or unpredictable illuminance from sources which cannot be modelled such as glare, reflections, and car headlights.

B4.22 It is advised that mitigation measures are designed in accordance with ILP 2023 guidance. A variety of techniques will be supported to facilitate development that will avoid, minimise and/or compensate for light spill such as:

- Only using lighting where absolutely essential for health and safety reasons on sensitive sites or in sensitive areas of sites;
- Avoiding or minimising use of floodlighting/indiscriminate streetlighting and considering use of wall-mounted and directional lighting instead;
- Careful positioning of streetlighting to avoid bat crossing points for key infrastructure such as roads – it should be noted that hop-overs have not been proven to be used by horseshoe bats at the date of publication;
- Use of building structure, design, location and orientation to avoid/minimise lighting impacts on retained habitat;
- Use of solid barriers to protect and/or create dark corridors on site;
- Use of landscape features such as dark underpasses or culverts suitable for bat passage for larger schemes, as horseshoe bats have been confirmed to use these features within North Somerset;

[24] Institute of Lighting Engineers/ Bat Conservation Trust. 2023. *Bats and Artificial Lighting at Night*; pers. comm. Dr Emma Stone, University of Bristol, 2009.
[25] Institute of Lighting Engineers/ Bat Conservation Trust. 2023. *Bats and Artificial Lighting at Night*; pers. comm. Dr Emma Stone, University of Bristol, 2009.

- Use of low transmittance glazing or measures such as light reducing coating where appropriate;
- Use of internal lighting design solutions to minimise light spill from places such as windows;
- Use of part-night lighting, dimming and motion sensors with short duration timers; and
- Use of lighting solutions such as automated blackout blinds, although these should only be used as a last resort where impacts cannot be avoided through appropriate design due to the challenge of enforcement.

Light colours should ideally be targeted 2700K or below to meet the ILP guidance. Note that the use of red lamps in street lights as mitigation, which had been shown to be effective for some bat species, is unlikely to work for horseshoe species and should not be used as mitigation.[26]

Proposed Developments with Minor Impacts

B4.23 Schemes likely to have minor impacts, and therefore, are likely to be exempt from survey requirements and HEP metric considerations are stated in Section A7.2. In circumstances of overall less potential impact, especially in Band C or outside of the Consultation Zones, mitigation may be put forward without the need for a full season's survey (See Annex 3: Survey Specification for Planning Applications). This approach will only be suitable where it can be clearly demonstrated that the impacts of a proposed development are proven to be minor and can be fully avoided or mitigated. In order to adopt this approach, it will be necessary for a suitably qualified ecologist to complete an Ecological Impact Assessment, referencing functionally-linked SAC bat habitat and setting out appropriate avoidance and mitigation measures associated with the proposed development for foraging and commuting habitats.

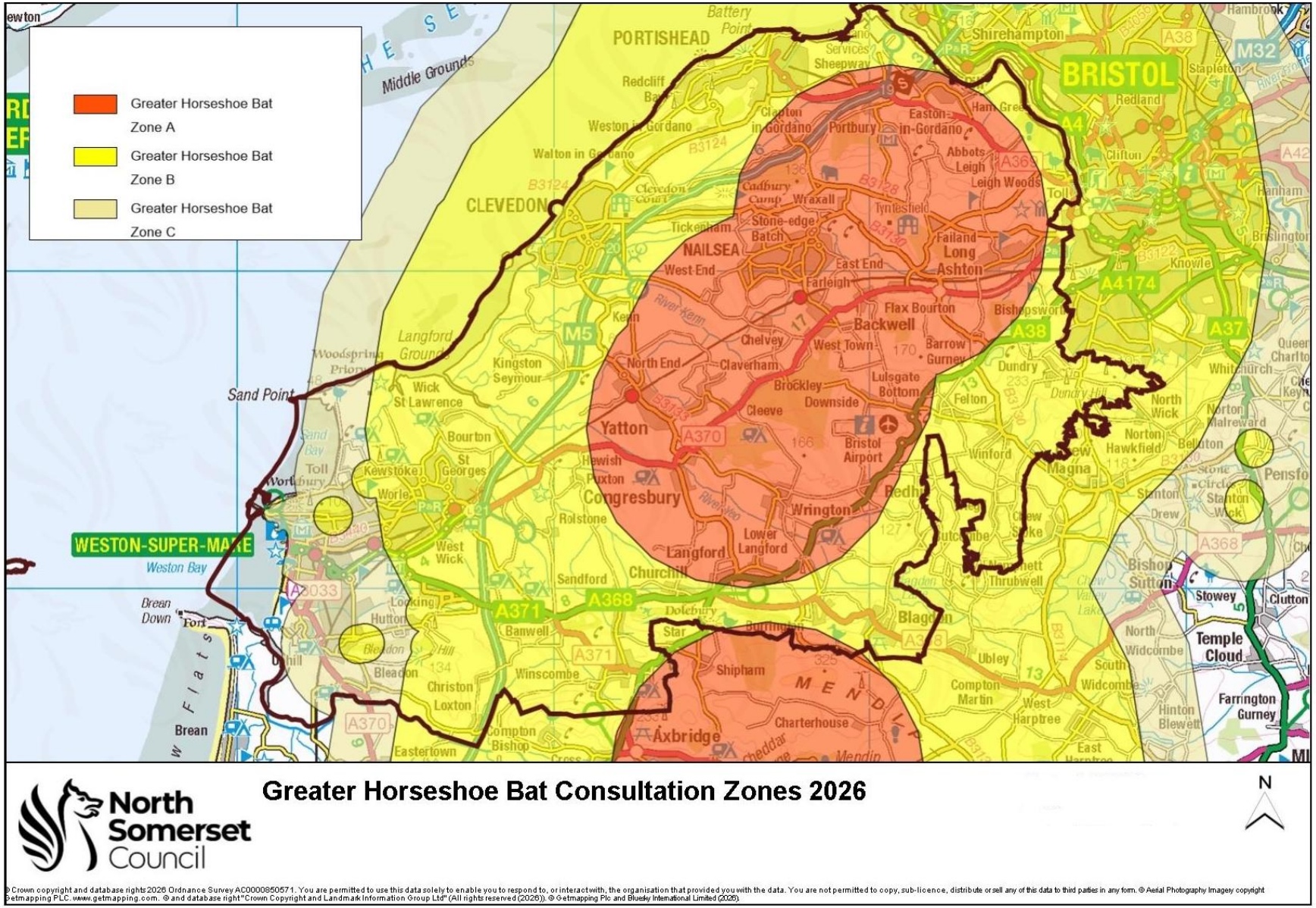
B4.24 In terms of impacts on SAC bats and habitat, it is important to bear in mind that small-scale developments may still have significant impacts on horseshoe (and other bat) roosts and result in indirect impacts such as light spill. Although some sites are exempt from the SPD approach, a case-by-case assessment must still be made in relation to potential impacts on the bat SAC, and whether appropriate, bespoke avoidance or mitigation measures are required.

Other Bat Species

B4.25 Whilst this guidance only focuses on horseshoe bats, overall mitigation and compensation requirements for development schemes will need to consider the requirements of all bat species. North Somerset has a high bat biodiversity with at least 16 of the 17 breeding UK bat species recorded. Of particular note, the habitats within the SAC and Horseshoe Bat Consultation Zones are known to support barbastelle *Barbastella barbastellus* and Bechstein's *Myotis bechsteinii* Bats, which are also Annex II species under the Conservation of Habitats and Species Regulations 2017 (as amended) (although the SAC is not currently designated for these species). As well as providing habitat for horseshoe bats, developments must also consider requirements for these species in key areas around woodland and dense, mature field boundaries, such as retaining, buffering and enhancing these habitats.

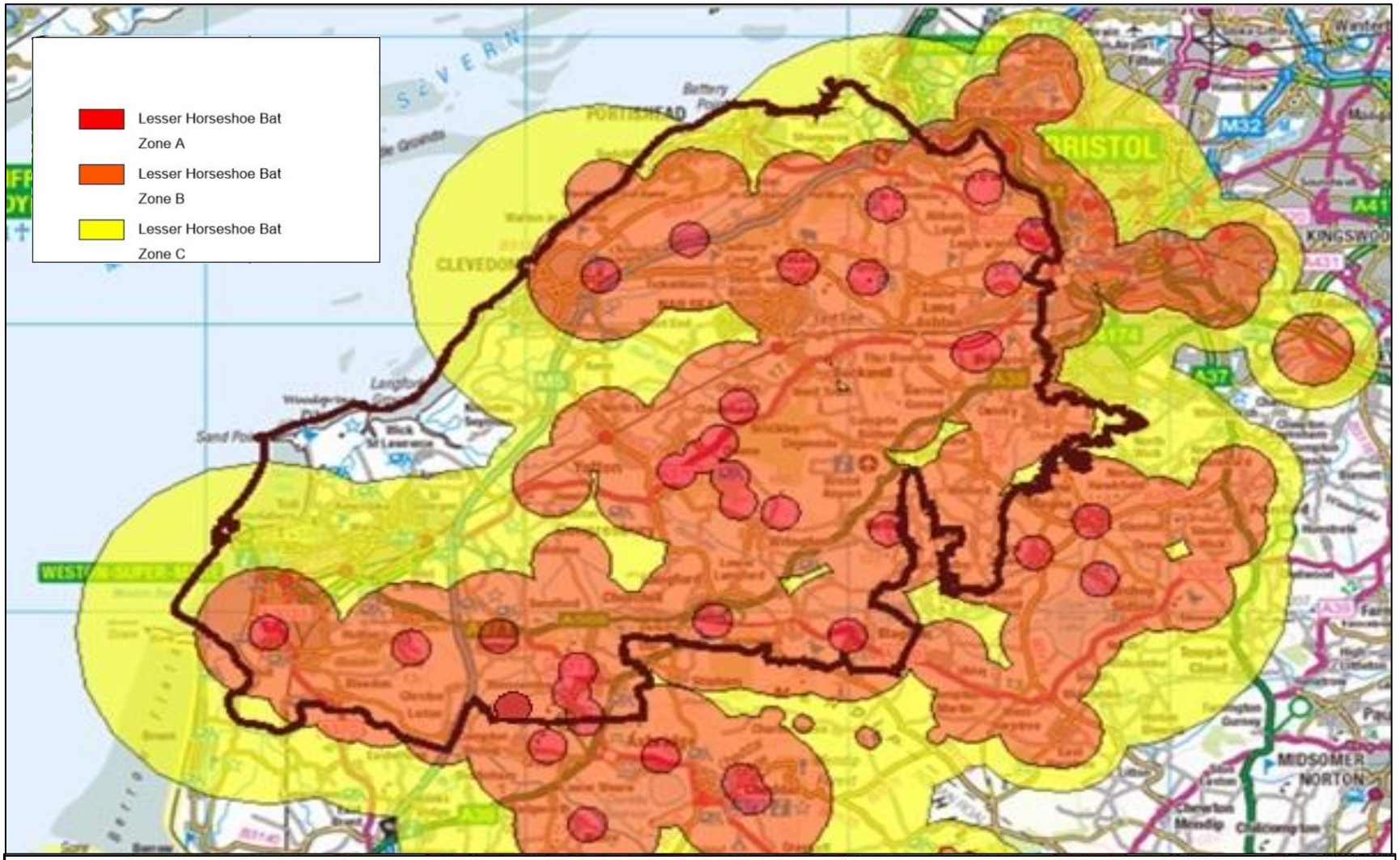
[26] Zeale, M. R. K., Stone, E. L., Zeale, E., Browne, W.J., Harris, S. & Jones, G. 2018. Experimentally manipulating light spectra reveals the importance of dark corridors for commuting bats. *Glob Chang Biol*. 2018 Dec;24(12):5909-5918.

Figure B1 Greater Horseshoe Bat Consultation Zones



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Figure B2 Lesser Horseshoe Bat Consultation Zones



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PART C: Annexes

Annex 1: Details of the North Somerset and Mendip Bats Special Area of Conservation

C1.1 The North Somerset and Mendip Bats SAC is made up of seven component Sites of Special Scientific Interest (SSSI):

- Compton Martin Ochre Mine SSSI (Bath &North East Somerset)
- Banwell Caves SSSI (North Somerset)
- Banwell Ochre Mine SSSI (North Somerset)
- Brockley Hall Stables SSSI (North Somerset)
- King's Wood and Urchin Wood SSSI (North Somerset)
- The Cheddar Complex SSSI (Somerset)
- Wookey Hole SSSI (Somerset)

C1.2 Further details of the SAC and the principles underpinning this document can be found in the Somerset Bat Guidance[27] and Version 1 of this SPD[28]. These documents, and the core SAC documents, justify why functionally-linked satellite and minor roosts, foraging habitats and dispersal corridors are protected by the Habitats Regulations along with the designated sites themselves.

C1.3 Recent radio-tracking studies[29] from the Brockley Hall Stables roost have shown that the North Somerset Greater Horseshoe maternity roost bats forage over the North Somerset Levels and Moors (particularly towards Tickenham, western edges of Nailsea, Kenn, Yatton and Congresbury/Puxton), woodlands on the ridges and pockets of woodland on the Moors and pasture particularly on the Moors as well as hillsides around Backwell, Wrington, Cleeve, Claverham and Nailsea. Several satellite day roosts were found including, surprisingly, one well-used roost in the urban centre of Clevedon. The bats are clearly using sub-optimal habitat in some circumstances, but foraging is focused within high quality habitats on urban fringes and in open countryside as found in previous studies.

C1.4 The populations of bats from the North Somerset and Mendips SAC are currently under particular stress from a number of factors, particularly the number of development applications and proposals on the urban edges of Yatton, Congresbury, Backwell, Banwell, Nailsea and Cheddar which risk fragmentation and reducing access to suitable foraging habitat. Both species are also vulnerable to changes in agricultural and livestock management, particularly relating to fewer herds of cattle in fields, conversion of pasture to arable and intensive hedgerow management, all of which reduce the abundance and diversity of invertebrate prey.

[27] See Habitat Regulations Assessment (somerset.gov.uk) and Habitat Evaluation Process (somerset.gov.uk)
[28] Available on North Somerset Council's website.
[29] Geckoella (2022). *North Somerset Council Greater Horseshoe Bat Radio-tracking 2022.* Geckoella Ltd on behalf of North Somerset Council, Weston-super-Mare.
Foxley, T. & Stone, E. 2023. *North Somerset Nature Parks Report* . Bristol: University of Bath Bat Conservation Research Lab.

Annex 2: Bat Consultation Zone

Greater Horseshoe Bats

C2.1 The Greater Horseshoe and Lesser Horseshoe Bat Consultation Zone density band widths vary between species depending on its characteristic use of their home ranges, as shown in Table B1. As both these species use a single focus for a population, a roost, they are likely to occur at a decreasing density in the landscape the further removed from roosts[30].

C2.2 Historic studies are detailed in Version 1 of the SPD and the Somerset Bat Guidance. Based on current knowledge, the North Somerset Greater Horseshoe Bat population is focused within several large roosts, all sited within 2.6km and so there is likely to be significant competition for prey resource. Although there are high quality woodland and pasture habitats, the area also has large and expanding urban areas close to the roosts, within increasing pressure from greenfield development and changes in livestock management. The population may therefore not demonstrate typical home ranges / maximum ranges and behaviours found in studies focused on rural populations with access to large, uninterrupted expanses of optimal habitat.

C2.3 The bands in Table B1 in Section B2.5 for a maternity roost of Greater Horseshoe bats are derived from four local radio-tracking studies which have been completed. The findings were as follows:

1) **Billington (2001)[31]** radio-tracked the maximum distance travelled by bats at Brockley Hall as 6.8km, discounting one bat which travelled 10.2km to Shipham and then subsequently day roosted in Cheddar Gorge. However, measuring the distances in GIS the furthest recorded bat fix was 7.8km ("as the crow flies"). Billington notes that there has been deterioration in habitat near to the Brockley Hall roost where hedgerows have been removed, poorly managed or neglected.
2) **Duvergé (1996)[32]** carried out radio-tracking studies in North Somerset where the summer foraging areas of adults were found to be located within 3 – 4 km of maternity roosts, and the mean adult range in one extensive study was 2.2km. About 75% of the foraging areas are located within the mean adult range.
3) **Geckoella Limited[33]** radio-tracked 20 adult and 4 juvenile bats from the Brockley Hall Stables roost in May, June and August 2021. The maximum foraging radius from the roost was 13.9km for adults and 4.9km for juveniles. This is much further than previously recorded, but the roost has increased significantly in size since the 1996 and 2001 studies.
4) **Foxley of the University of the West of England (UWE)[34]** radio-tracked 34 adult bats from the Brockley Hall Stables roost in August-September 2021 and August 2022. Bats were recording regularly foraging in habitats up to 12km from the roost. Habitat suitability and connectivity models have also been created, along with further modelling of likely juvenile range, confirming that a 5 km Juvenile Sustenance Zone is likely to apply.

In the two more recent studies, Greater Horseshoe bats were recorded across the Gordano Valley and as far west as Worlebury Hill on the edge of Weston-super-Mare. It should be noted that bats were not radio-tracked from the King's Wood roosts. Surprisingly, bats were also not recorded switching between the King's Wood and Brockley roosts, although this is assumed to occur given that they lie within 2.6 km. Roosts identified through additional studies, including

[30] Rainho, A. & Palmeirim, J. W. 2011. The Importance of Distance to Resources in the Spatial Modelling of Bat Foraging Habitat. *PLoS ONE, April 2011, 6, 4, e19227*; Rosenberg, D. K. & McKelvey, K. S. 1999. Estimation of Habitat Selection for Central-place Foraging Animals. *Journal of Wildlife Management 63 (3): 1028 -1038.*

[31] Billington, G. 2001. *Radio tracking study of Greater Horseshoe bats at Brockley Hall Stables Site of Special Scientific Interest, May – August 2001.* Peterborough: English Nature.

[32] Duvergé, L. 1996 quoted in Roger Ransome. 2009. *Bath Urban Surveys: Dusk Bat Surveys for horseshoe bats around south-western Bath. Assessments Summer 2008 & Spring 2009*. Bat Pro Ltd.

[33] Geckoella (2022). *North Somerset Council Greater Horseshoe Bat Radio-tracking 2022.* Geckoella Ltd on behalf of North Somerset Council, Weston-super-Mare.

[34]*. Foxley, T., Lintott, P., Stonehouse, S., Flannigan, J. and Stone, E.L. (2025) A high resolution spatial modelling framework for landscape-level, strategic conservation planning. Ecological Informatics. 91, p. 103363. https://doi.org/10.1016/j.ecoinf.2025.103363*

Greena Ecology's radiotelemetery studies for the Banwell Bypass scheme[35] have also been incorporated into the mapping.

C2.4 The Density Band widths in Table B2 for the non-breeding and winter roosts are derived from a radio-tracking study of non-breeding roosts of Greater Horseshoe bats in Dorset carried out by Flanders (2008).[36] A comparison of foraging ranges from various studies on Greater Horseshoe bats is given in Appendix 1 of the Somerset Bat Guidance / Version 1 of the SPD.

Lesser Horseshoe Bats

C2.5 The Band widths for Lesser Horseshoe bats are derived from the radio-tracking study carried out by Knight (2006)[37] for a lowland study area (as opposed to high quality and upland landscapes) which was located in North Somerset. The maximum distance travelled in this study was 4.1 km for an adult female and 4.5 km for a nulliparous female. The mean maximum range was 2.2 km. Bontadina et al (2002)[38], whose study found a similar maximum foraging range, recommended that conservation management should be concentrated within 2.5 km of the roost with special consideration within 600 m of the roost where the colony foraged half the time. The same result was found for the North Somerset study.

C2.6 The Band widths for the non-breeding roost are derived from England radio-tracking of Lesser Horseshoe bats carried out in the winter. This study revealed that they foraged on average to a maximum distance of 1.2 km from the hibernation site. One bat travelled to an absolute maximum distance of 2.1 km. The winter foraging range appears to be approximately half that of the distance covered in the summer months. (Bat Conservation Trust/BMT Cordah, 2005)[39] For the purposes of this study, the ranges are similarly halved. A comparison of foraging ranges is given in Appendix 1 of the Somerset Bat Guidance / Version 1 of the SPD.



Lesser Horseshoe Bat
(Photo: Frank Greenaway. Courtesy Vincent Wildlife Trust)

[35] Greena Ecological Consultancy (2021). Bat Survey of the Banwell Area for the Banwell Bypass scheme.
Greena Ecological Consultancy (2025). Bat Survey of the Banwell Area for the Banwell Bypass scheme.
[36] Flanders, J. R. 2008. Roost use, ranging behaviour and diet of the Greater Horseshoe bat *Rhinolophus ferrumequinum* in Dorset: in Flanders, J. R. 2008. *An integrated approach to bat conservation: applications of ecology, phylogeny and spatial modelling of bats on the Isle of Purbeck, Dorset*. PhD Thesis, University of Bristol.
[37] Knight, T. 2006. *The use of landscape features and habitats by the Lesser Horseshoe bat* (Rhinolophus hipposideros). PhD thesis. University of Bristol.
[38] Bontadina, F., Schofield, H. & Naef-Daenzer, B. 2002. Radio-tracking reveals that Lesser Horseshoe bats (Rhinolophus hipposideros) forage in woodland. *J. Zool. Lond. (2002) 258, 281-290*.
[39] Bat Conservation Trust / BMT Cordah. 2005. *A Review and Synthesis of Published Information and Practical Experience on Bat Conservation within a Fragmented Landscape*. Cardiff: The Three Welsh National Parks, Pembrokeshire County Council, Countryside Council for Wales

Annex 3: Survey Specification for Planning Applications

C3.1 Three types of survey are required to inform the impact of proposed development. These are:

- Bat Surveys
- Habitat Surveys
- Lighting Surveys

Bat Surveys

C3.2 The following sets out the survey requirements for development sites within the Bat Consultation Bands A and B, in part based on the guidance given by the Bat Conservation Trust (2023)[40] and on the advice of consultants experienced in surveying for horseshoe bats. Note that the objective is to detect commuting routes and foraging areas rather than roosts. Identifying roosts requires a bespoke set of survey requirements, tailored to the site, as guided by the Bat Conservation Trust survey guidelines, including the use of Night Vision Aids (NVAs).

C3.3 The following specification is recommended in relation to development proposals within Bands A and B of the Bat Consultation Zone. Horseshoe bat echolocation calls call be difficult to deter compared to most other British bat species due to the directionality and rapid attenuation of calls. This emphasises the requirement for greater surveying effort, use of the most sensitive equipment available and full spectrum recording is required. For complex sites, it is also recommended that the Council Ecologist be contacted with regard to survey effort as set out in Section B3. Detailed requirements include:

(i) Surveys should pay particular attention to linear landscape features such as watercourses, transport corridors (e.g., roads, sunken lanes railways), walls, and to features that form a linear feature such as hedgerows, coppice, woodland fringe, tree lines, ditches and rhynes and areas of scrub and pasture that may provide flight lines.

(ii) The main survey effort should be using automated detectors. Automatic bat detector systems need to be deployed at an appropriate location i.e., on a likely dispersal corridor or in high quality foraging habitat. Enough detectors must be deployed so that **each individual potential dispersal corridor** is monitored through the survey period in order that temporal comparisons can be made. Deployment should also include detectors in **high quality potential foraging habitat** i.e. scoring 4 or above on the HEP metric, where a suitable location can be found. In some circumstances, locating detectors in lower quality foraging habitat may also be important for comparisons to be made. Multiple detectors will need to be deployed to allow comparative analysis of the use and quality of habitats within a site. It is not acceptable to move detectors around between locations and then to attempt to compare activity between different locations, as this could solely be a product of deployment at different times or during different weather conditions. The period of deployment should be at least 40 nights between April to October (40 nights out of 214; ≈20%) and must include at least one working week in each of the months of May, June, July, August, September[41] and October for sites within Band A. For sites located between summer roosts and winter hibernation sites which may be key dispersal corridors, deployment will also need to include at least one working week in March and April and November and December (20 nights). For sites which may be used by winter foraging bats (i.e. up to 1.2 km from hibernation sites), the period of deployment should be at least 25 nights between November and March and to include at least one working week in each of these month (25 nights out of 151; ≈16%).

(iii) The number of automated detectors will vary in response to the number of linear landscape elements and foraging habitat types, the habitat structure, habitat quality and taking into

[40] Collins, J. (ed). 2023. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (4th Edition) London: Bat Conservation Trust

[41] Note that female Barbastelle bats are absent from the home woodland during September when they disperse to find male roosts.

account Horseshoe bat flight-altitude. Every site is different, but the objective would be to sample each habitat component equally.[42] Generally:

- With hedges, the number of detectors needed will depend on their height and width and presence of trees. Factors such as shelter in windy conditions will need to be considered in deployment locations.
- With grassland, the number depends on whether the site is grazed or not. If a site is grazed, a comparison of the fields with livestock and without livestock is required.
- In a woodland situation, a sample with three detectors is recommended: one on the woodland edge, two in the interior with one in the canopy and one at eye-level.
- Riparian corridors should have detectors deployed on both banks and vegetated edges.
- Open areas of a quarry should have two detectors reflecting the un-vegetated and vegetated cliffs so the two can be compared.

(iv) Recordings from automated detectors must be analysed to determine whether the site supports foraging or increased levels of activity as this affects the Band used in calculating the amount of replacement habitat required to mitigate losses to horseshoe bats.

(v) Night-time Bat Walkover (NBW) surveys[43] should be carried out on at least three separate evenings; with a minimum of one survey in spring (April/May), one in mid-summer (June for Lesser Horseshoe or July for Greater Horseshoe Bats) and one in autumn (September or October)[44], as the bats' movements vary through the year. For sites close to maternity roosts, an August survey to take account of potential juvenile foraging activity may also be beneficial. The static observation point at the start of the survey is likely to need to be up to an hour, with consideration given to the distance of the site from known or possible Horseshoe bat roosts. Surveys must continue for at least three hours after sunset (the upper limit of national guidelines) as horseshoe bats tend to emerge later after sunset than some other bat species. Transects must cover all habitats likely to be affected by the proposed development, including a proportion away from commuting features in the centre of fields. Moreover, manual surveys only give a snapshot of activity (3 nights out of 214; ≈1.5%) and less effective at detecting horseshoe bats; therefore, automated bat detector systems must also be deployed (see section (ii)). Increased transect activity (one per month) should be considered for particularly sensitive sites close to maternity roosts or large sites which may be particularly important for horseshoe bat populations. Depending on the location and type of roosts recorded nearby, manual surveys may be required as early as March and as late as November, although static monitoring is often more effective than transects during periods of lower activity. It is essential that a qualified ecological consultant with Horseshoe bat expertise is engaged at the earliest possible stage to advise on bespoke requirements, particular for large-scale or high impact schemes.

(vi) Surveys targeting summer activity should be carried out in sunset temperatures of at least 10°C with no strong winds or heavy rain. These are weather conditions that provide optimal conditions for foraging as insect activity is reduced at low temperatures or in moderate or high winds. Details of weather conditions during surveys must be included in reports.

(vii) It will be essential that data is analysed and considered as it is gathered to inform additional potential survey requirements. Backtracking surveys may also need to be considered where data indicates that horseshoe bat roosts, particularly those not previously identified or of unknown status, may be present nearby. Additional targeted surveys may also be required for potential crossing points or pinch-points, for example across potential barriers such as major roads.

[42] Pers. Comm. Henry Andrews, AEcol, 23/09/2016
[43] Collins, J. (ed). 2023. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (4th Edition) London: Bat Conservation Trust
[44] Note that transect surveys often do not record horseshoe bats whereas static detectors deployed on the same night do, especially at sites further away from a roost. The active bat season can vary e.g. shortened by prolonged cold winters and lengthened by warm 'Indian summers'

(viii) Advanced licence bat survey techniques (ALBST), including trapping and radio-tracking, will also need to be considered where there is a particular risk of a breach of Regulation 43 (2) of the Habitats Regulations, in relation to potential significant risks to the ability of Horseshoe bat species to breed, survive, reproduce nurture their young, hibernate or migrate. The considerations for these types of surveys are detailed in the Bat Conservation Trust's national survey guidelines. Non-invasive methods should be used wherever possible to minimise the impact on sensitive horseshoe bats, but invasive methods may be necessary to evidence decisions in exceptional circumstances. Decisions will need to be led by a suitably licensed and experienced ecologist (Natural England Bat Survey Class Licence Level 3 or Level 4).

(ix) Transect surveys should preferably be with most sensitive equipment available. Digital echolocation records of the survey should be made available on request with the final report, along with details of the type of the detector.

(x) Surveys must be carried out by suitably qualified and experienced persons. Numbers of personnel involved must be indicated in any report and be sufficient to thoroughly and comprehensively survey the size of site in question. Surveys should be designed to complete several repetitions of a transect route on one night i.e. large sites will need to be divided into small transect routes. The transect should start in a different location and/or direction on each visit to enable activity to be sampled at different times after sunset.

(xi) Surveys should also include desktop exercises in collating any records and past data relating to the site via Environmental Records Centres, local Bat Groups, etc. All larger sites (>0.5 ha) will be expected to have completed a Bristol Regional Environmental Record Centre (BRERC) or Somerset Environmental Record Centre (SERC) data search.

(xii) All bat activity must be clearly marked on maps and included within the report. Horseshoe bat activity should be reported as bat passes per hour as set out in Chapter 10 of the BCT survey guidelines.

(xiii) Basic details of records for the site must be passed to the appropriate Environmental Records Centre after determination of the application.

(xiv) Surveys must remain up-to-date to within 18 months to three years in accordance with the Chartered Institute of Ecological and Environmental Management's Advice Note (2019) *On the Lifespan of Ecological Reports and Surveys.*

C3.4 Survey effort in Band C is dependent on whether commuting habitats are present and the suitability of on-site and adjacent habitat to support prey species hunted by horseshoe bats. Nonetheless, surveys must be in accordance with Bat Conservation Trust guidelines. It must also be remembered that the national guidance applies to sites with potential to support all bat species, so transect surveys will be required for development sites of a certain size or habitat quality.

Habitat Surveys

C3.5 Integrated Habitat System or UK Habitat Classification surveys should be carried out for all land use developments within the Bat Consultation Zone. Where the surveys have been done using Phase 1 designations these should be converted to one of the other two systems for the purpose of assessing the value of the proposed site to bats (UK Habitat Classification is required for Biodiversity Net Gain assessments in any case). Surveys should also include information on the habitats on site for the five years previous to the current survey, which can be assessed using aerial photographs, previous site photographs, ecological or other reports, Google Streetview, etc.

C3.6 Surveys must be extended to include the management and use of each field, e.g., whether the field is grazed or used as grass ley, and the height, width and management of hedgerows, over the past five years in the period of bat activity, generally May to October. Information can be sought from the landowner and through examination of aerial photographs. If grazed, the type of stock and management regimes must be detailed. Habitat mapping must include

approximate hectarage of habitats to inform the methodology for calculating replacement habitat required.

C.3.7 Habitat surveying should be undertaken by a competent ecologist with suitable botanical experience. Full evidence of habitat quality, including the findings of sample quadrats for grassland, must be provided within ecological reports.

Lighting Surveys

C3.8 Surveys of existing baseline light levels on proposed development sites (where there is existing light spill) and proposed off-site locations for replacement horseshoe bat habitat should be undertaken and submitted with the planning application in accordance with guidance provided by the ILP in 2023, where light levels are likely to change significantly as a result of development.[45] This should cover the full moon and dark of the moon periods so that an assessment of comparative SAC bat activity on a proposed site can be ascertained.

C3.9 Baseline measurements should be taken systematically across the site or features in question. At each sample location, a reading should be taken at ground level on the horizontal plane (for illuminance hitting the ground) and vertical readings should also be taken at each sample location at 1.5m above ground level. The orientation for vertical readings should be perpendicular to the surface/edge of the habitat feature in question (such as a hedgerow) to produce a 'worst case' reading. Further measurements at other orientations may prove beneficial in capturing influence of all luminaires in proximity to the feature or principal directions of flight used by bats. This survey data should be used to inform detailed design.

C3.10 Lighting surveys should also include an off-site assessment of the illumination of the vertical faces of structures, such as hedgerows and existing buildings in order that the proposed development site can be assessed in the context of the wider locale.

C3.11 Surveys should also consider lighting, and the absence of such where a road would be subsequently street lit post development, outside the red line boundary of the proposed development site. This particularly applies to schemes which may require additional off-site infrastructure, such as lit pedestrian footways.

C3.12 As detailed in Section B.14 to B.22, this information will then be used to inform lux contour modelling and lighting mitigation, as input into the Lighting Strategy for sites.

[45] *Guidance Note 08/23 Bats and Artificial Lighting at Night* (Institute of Lighting Engineers/ Bat Conservation Trust, 2023

Annex 4: Habitat Requirements of Horseshoe Bats

C4.1 Detailed analysis of habitat requirements are set out in Annex 4 of the Somerset Bat Guidance and Version 1 of the SPD. Replacement habitat creation proposed must be based on the evidence as a set out in these documents.

Greater Horseshoe Bats

C4.2 As a key finding, the top five feeding areas for Greater Horseshoe bats over the active period in North Somerset include:

- pasture with cattle as single stock or part of mixed stock (38.6%);
- ancient semi natural woodland (16.6%);
- pastures with stock other than cattle (10.3%);
- meadows grazed by cattle in the autumn (9.4%); and
- other meadows and broadleaved woodland (4.9%).[46]

Billington (2000)[47] identified that there were four principal habitat types: scrub, meadow, deciduous woodland and grazed pasture. Mature, tall and wide hedgerows are also important habitats for dispersal and, in some cases, foraging. Ditches and rhynes are also used as flight corridors to access foraging areas locally.

C4.3 Within suitable habitat, a range of three roosts types must be present for a colony to exist. A single maternity roost, with many surrounding day and night roosts nearby (usually up to 4 km, but exceptionally up to 14 km), and a range of suitable hibernacula within a 60 km radius.

C4.4 Habitats which are of little use to Greater Horseshoe bats include most urban areas, arable land and amenity areas such as playing fields. Lights, such as street lights or security lamps, are strong deterrents to Greater Horseshoe bats, both when they emerge from roosts, and when they forage. However, radio tracking shows that bats regularly commute through urban areas of Cheddar and roost within Clevedon and will fly along hedgerows adjoining arable areas to reach hunting grounds. It is suspected that they will fly through (but not along) a line of street lights, probably at the darker points between lamps, as evidenced by radio tracking. In North Somerset, they have been recorded within urban areas, including Clevedon and Nailsea, but here lights are switched off after midnight or dimmer in many places. More detail on North Somerset lighting reduction schemes is available at North Somerset Council's Lighting Map.

C4.5 During the winter period, Greater Horseshoe bats are likely to forage closer to roost sites than during the summer and in areas sheltered from the wind, and on south and southwest facing slopes.[48]

Lesser Horseshoe Bats

C4.6 '*The primary foraging habitat for Lesser Horseshoe bats is broadleaf woodland where they often hunt high in the canopy. However, they will also forage along hedgerows, tree-lines and well-wooded riverbanks*.'[49] Lesser Horseshoe bats are primarily a woodland feeding bat using deciduous woodland or mixed coniferous woodland and hedgerows. It has been found that landscapes that were most important contained a high proportion of woodland, parkland and grazed pasture, linked with linear features, such as overgrown hedgerows. Wetland habitats are also important due to the invertebrate assemblages they support. Woodland associated with wetland habitat is particularly favoured by foraging Lesser Horseshoe bats[50].

[46] Duvergė, P. L. & Jones, G. 1994. Greater Horseshoe bats - Activity, foraging behaviour and habitat use. *British Wildlife Vol. 6 No 2*

[47] Billington, G. 2000. *Radio tracking study of Greater Horseshoe bats at Mells, Near Frome, Somerset*. Peterborough: English Nature

[48] Ransome, R. D. 2002. *Winter feeding studies on Greater Horseshoe bats*: English Nature Research Reports Number 449. Peterborough: English Nature.

[49] Schofield, H. W. 2008. *The Lesser Horseshoe Bat Conservation Handbook*. Ledbury: The Vincent Wildlife Trust.

[50] Barataud, M., Faggio, G., Pinasseau, E. & Roué, S. G. 2000. *Protection et restauration des habitatas de chasse du Petit rhinolophe (*Rhinolophus hipposideros*) Année 2000*. Paris : Ministère de l'Environnement – Direction de la Nature et des Paysages

C4.7 Commuting corridors, such as tall bushy hedgerows, are important features for Lesser Horseshoe bats as they avoid crossing open areas and are vulnerable to the loss of these corridors.

Annex 5: Methodology for Calculating Replacement Foraging Habitat

Introduction

C5.1 The method used to calculate the amount of habitat required to replace that lost to Horseshoe Bat populations due to development is based on the requirements for habitat to support their viability in the long term. It uses an approach similar to the Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service (1980) to provide '…*for mitigation and compensation that can allow fair use of the land and maintain healthy habitats for affected species'.* HEP is structured around the calculation of Habitat Units (HU), which are the product of a Habitat Suitability Index (quality) and the total area of habitat (quantity) affected or required[51].

C5.2 A key assumption is that habitat type, amount and distribution influence the distribution of associated animal species. It is also important to recognise that Habitat Suitability Index (HSI) models predict habitat suitability, not actual occurrence or abundance of species populations.[52] The values are a proxy for suitability and are based on the best available scientific information and locally specific-professional practice i.e. surveys for planning applications, radiotracking data and modelling.

C5.3 Habitat descriptions are derived from the Integrated Habitat System (IHS), developed by Somerset Environmental Records Centre[53], and the UKHab habitat classifications described below. The HEP requires a Habitat Suitability Index for the species scored on IHS and or UKHab descriptions.

C5.4 The HEP process is necessary to obtain an objective quantitative assessment that provides improved confidence in agreed mitigation being likely to be adequate. The methods help to ascertain beyond reasonable scientific doubt that a development will not significantly reduce the quantity or quality of habitat available to a SAC bat population, whereas qualitative ecological impact assessments are often based on subjective interpretations. As set out in Section A7, qualitative assessments may be acceptable for smaller scale proposals where a **significant** adverse impact is not anticipated.

C5.5 In Somerset, the methodology has been used since 2009 to inform the adequacy of replacement bat habitat provided by the developer. The methodology has been reviewed and further developed with the Bat Conservation Trust in 2014 and has been scrutinised through planning inquiries including for a Nationally Significant Infrastructure Project. The methodology in Version 2 has been updated to ensure some consistencies with Biodiversity Net Gain approaches and recent scientific evidence from additional radio-tracking and modelling studies.

Habitat Suitability Index Calculation

C5.6 The methodology values each polygon area of habitat, or line in the case of hedgerows and other linear features, for its value to bats in terms of habitat suitability. Each IHS 'Habitat' or UKHab 'Primary Habitat' category is scored for each species on a scale of 0 to 8 (as defined below) according to the suitability of that habitat for the species.

UK Habitat Classification (UKHab)

C5.7 Since the UKHab classification was introduced in 2018, it has become increasingly used to record habitats during field surveys to inform ecological assessments. UKHab classification forms the basis of the Defra Biodiversity Net Gain metric.[54] UKHab classification has two main parts, a hierarchical Primary Habitat system and a list of Secondary Codes[55], which give

[51] U. S. Fish and Wildlife Service. 1980. *Habitat Evaluation Procedures ESM102*. Washington, D. C.: Department of the Interior.
[52] Dijak, W. D. & Rittenhouse, C. D. 2009. Development and Application of Habitat Suitability Models to Large Landscapes: in Millspaugh, J. J. & Thompson, F. R. 2009. *Models for Planning Wildlife Conservation in Large Landscapes*. London: Academic Press.
[53] www.somerc.com.
[54] Defra 2024. *The Statutory Biodiversity Metric: User Guide*. Defra, London.
[55] Butcher, B., Varey, P., Edmonds, R., Norton, I., & Treweek, J. 2022. *The UK Habitat Classification User Manual Version 2.0* at http://www.ukhab.org/

information about the management, environment of the habitat. UK Hab Classification methodology has been accommodated into the HEP metric for Version 2.

Integrated Habitat System (IHS)

C5.8 The Integrated Habitat System coding is used as a basis for describing habitats and their management, to create a Habitat Suitability Index score. The IHS[56] classification comprises over 400 habitats together with descriptions and information such as management. IHS Habitat Codes are hierarchical with the numbers in the code increasing to provide further description as the habitat becomes more specific. Descriptions of habitats can be found in IHS Definitions (Somerset Environmental Records Centre)[57].

Bat Habitat Suitability Indices

Introduction

C5.9 HSI have been used to predict replacement habitat creation required to maintain species' populations. The process assumes that the suitability of habitat for a species can be quantified.

Description

C5.10 The index scores are applied to each Habitat, and Secondary Codes in UKHab and/or Matrix, Formation and Land Use/Management codes in IHS based on analysis of the ecological requirements, from existing literature and professional judgement, for each species assessed or mapped. A mixture of UK Habitat Classification and IHS can be used where this is helps provide more specific information about habitat conditions and management. For example, if a native hedgerow (h2a) is overgrown with standard trees, LM31 can be used as the management code (see below), even if the baseline survey has been categorised using UK Habitat Classification codes. Both horseshoe bat species have different, if overlapping, habitat requirements, and so a HSI has been created for each species. The approach can be used where detailed habitat surveys have not been provided e.g. for strategic planning purposes.

C5.11 Each IHS 'Habitat' category is scored on a scale of 0 to 8 (as defined below) using a potential or precautionary approach as a starting point, e.g., Broadleaved, mixed and yew woodland is assumed to be the Annex 1 broadleaved woodland habitat unless it is demonstrated otherwise. The full range of scoring is used before the modifiers - the UKHab secondary Codes or the IHS Formation and Management codes - are applied. It is recognised that not all habitat patches of the same type have equal value in terms of resource to a species[58]. However, in scoring the overall HSI, a higher value is given as a precaution. Where surveys have been completed, the aim should be to categorised habitats and their management as accurately as possible, taking a precautionary approach by defaulting to higher scoring categories where there is uncertainty or variations in habitat condition. For example, if habitat has been grazed by cattle alternated or on rotation with a hay cut, the management should be categorised as cattle grazed (see below on Management Codes). The highest scoring habitat and management over the past five years needs to be included as set out in Sections 3.5 and 3.6.

C5.12 The Habitat Code scoring is considered in combination with the IHS Matrix codes[59]. These are either added or subtracted from the Habitat code, e.g., grassland scoring 4 + scattered scrub scoring 1 would equal a HSI of 5. In this example, the metric is weighted to acknowledge that grassland with a matrix of scattered scrub may marginally improve the quality and range of the invertebrate prey of horseshoe bats.[60] Habitat Codes have a range of 0 to 8 but when considered in combination must not exceed a score of 8 or fall below a score of 0. Where there is no effect

[56] Integrated Habitat System (IHS) - Somerset Environmental Records Centre (somerc.com)

[57] Phase 1 (JNCC, 1993) habitat mapping can be converted to UKHab to IHS by using the software provided by Somerset Environmental Records Centre http://www.somerc.com

[58] For example, Dennis, R.L.H. 2010. *A Resource-Based Habitat View for Conservation. Butterflies in the British Landscape.* Chichester: Wiley-Blackwell.

[59] IHS considers that patches of scrub and single trees are Matrix habitat acting in combination with main habitat types rather than separate habitats in their own right. It is possible that further sub codes be added to the grassland habitat codes, e.g., calcareous grassland with scattered scrub, etc. but this would lead to a proliferation of coding and current IHS GIS mapping would need amending to take this into account. By providing a positive multiplier, the needs of species which require a mosaic of grassland and scrub is taken into account. There are no Matrix type codes within UKHab.

[60] IHS considers that patches of scrub and single trees are Matrix habitat acting in combination with main habitat types rather than separate habitats in their own right.

from a Matrix type, then a default score of 0 is used and where there is no effect from a formation or management factor as default of 1 is used. An example demonstrating how Habitat and supplementary codes work is provided in Table C1.

Table C1: Example of HSI Calculation for Greater Horseshoe Bat

	Habitat Code	Matrix Code	Formation Code	Land Use / Management Code	HSI Score
IHS Code	**GI0**	**SC2**	**-**	**GM12**	
UKHab Code	**g4**	**10**	**-**	**60**	
Description	**Improved Grassland**	**Scattered Scrub**	**-**	**Sheep Grazed**	
HSI Score	**3**	**1**	**1**	**1.2**	**4.8**

C5.13 All UK Hab Secondary Codes and Formation and Land Use/Management Codes are scored between 0 and 1 and are multipliers. Where there is no effect from a UK Hab Secondary Code or an IHS Formation or Management Code, then a default score of 1 is used. Formation codes relate to the structure and function of a habitat. Management codes relate to management interventions such as the type of grazing or mechanical approaches.

C5.14 A precautionary approach, based on best available knowledge, has been taken in developing the scoring, with multipliers used to fine tune values. For example, as grassland is most valuable to juvenile horseshoe bats when grazed, all grassland is awarded the maximum score of 8 in the HSI. The management modifier for grazing would then maintain the habitat score at this high level by a multiplier of 1. If the management does not involve grazing, a decimal multiplier is applied to reduce the value of the habitat. Only one IHS management code is allowed.

C5.15 No allowance for seasonal variations, i.e., due to the availability of prey species at different times of year, has been made in developing the HSI. A habitat valued at 8 which is of high seasonal value will remain at a value of 8. This is to recognise that the habitat is necessary to support the target species when other prey or other resources may not be readily available.

C5.16 The worksheet (see Appendix 8) is available in the form of an online spreadsheet on the North Somerset Council website. There are drop-down tabs for habitats and supplementary codes. There is also a drop-down to confirm whether the spreadsheet is for Greater Horseshoe Bat or Lesser Horseshoe Bat. Values are also detailed within the worksheet. This has been updated since Version 1 of this SPD; HEP value tables are now included within the published spreadsheet rather than within this document. It should be noted that HEP values may change based on future research which will be published within the spreadsheet.

Lighting

C5.17 The value of a habitat for horseshoe bats may be reduced by lighting, either from street lighting or other sources such as security or flood lights. Baseline lighting surveys may demonstrate that areas are sufficiently well-lit that use by horseshoe bats is unlikely (although subject to caution as horseshoe bats have been occasionally found using brightly lit areas if no other habitat is available). Post-development modelling may also show that habitat is likely to be inaccessible or unsuitable for use by Horseshoe bats as a result of predicted light spill. These findings can be accounted for by reducing the HSI for the habitat to low or zero score according

to use. If this reduction is applied, a note must made in the Excel spreadsheet used in calculating the habitat amount, and full evidence provided in any accompanying ecological report. Note the requirements for lighting information as set out in B4.14-B4.22 and C3.7-C3.11.

Validation

C5.18 An HSI model can be reviewed against occurrence data held by the biological or environmental records centre. Habitat mapping can be produced and matched with species data at the biological records centre and the model refined to fit the records with a view to errors of omission and commission. The validation should be seen as a continuous refinement process and HSI scoring should be reviewed from time to time and updated. A full review of field records and HSI scoring has been undertaken as part of the Version 2 update and will be periodically undertaken in future. However, the scores are likely to be varied through additional reviews, further research findings or to reflect local conditions based on survey. If varied by consultants, the revised values must be agreed with the Council's Ecologist, and the reason for the variation must be given and fully supported by evidence. It is recommended that any proposed variations in values are included in pre-application discussions for agreement with Natural England and North Somerset Council's ecologist, particularly where a proposed reduction of HSI values applies.

Density Bandings and Field Survey Results

C5.19 The HSI score is multiplied by the location of the proposed site in relation to that of the horseshoe bat roost. The Consultation Zone (CZ) is divided into three Density Bands. The three Bands are, 'A' closest to the record, 'B' and 'C' furthest from the record valued at 3, 2 and 1 respectively. When two Bands occur within one field or one parcel of habitat, the higher value needs to be taken as the score.

C5.20 Density bandings can be assessed accurately using the Greater Horseshoe and Lesser Horseshoe Consultation Zone layers at North Somerset's Planning constraints portal. The Density Banding adjustment is based on the modelled layers as mapped in the Planning Constraints Portal, as well as survey findings.

C5.21 Following ecological surveys for horseshoe bats carried out for the proposed development the Density Band score may be modified up depending on whether feeding activity was recorded or not or whether absence is recorded. This reflects uneven use of a home range and refines the value of the habitat for a species (e.g. see Bontadina & Naef-Daenzer, 2002[61]). Surveys need to be completed in accordance with the methodology in Annex 3, to ensure a high level of confidence in the survey findings. The 'Density Band' column takes into account whether horseshoe bats are present and whether feeding or commuting activity is recorded. Confirmation of foraging or commuting activity is applied to the whole site rather than to individual fields. The following criteria are used to modify the Band following the results of site surveys:

- Not present – Where potential habitat is present reduce the Band score down by 0.5, e.g. at A from 3 to 2.5; at B from 2 to 1.5; except at C where it reduced to 0.
- Commuting only – score remains the same;
- Commuting and Foraging – increase the band score by 0.5 e.g. at C from 1 to 1.5; at B from 2 to 2.5; A stays as it is.

For particularly large schemes, where numerous parcels will be involved where it is not scientifically-valid to consider a blanket foraging or commuting score for the whole site (for example, due to habitat variability), the ecological consultant may make an evidenced-based assessment for separate parcels based on habitat type, bat survey data and context or constraints. The assessment must be evidenced-based and apply the precautionary principle, whenever there are uncertainties.

[61] Bontadina, F. & Naef-Daenzer, B. 2002. Analysing spatial data of different accuracy: the case of Greater Horseshoe bats foraging: in Bontadina, F. 2002. Conservation Ecology in Horseshoe Bats. PhD thesis. Universität Bern.

C5.22 Classification of 'foraging' (i.e., a higher level of activity) for bat species is defined as either:

a) The criteria for foraging for horseshoe bat species, which have low intensity calls, makes use of an adapted version of Miller's (2001) Activity Index, with a lower bar set given the challenges in recording horseshoe bats.[62] Call sequences with a negative minute on either side (i.e., a minute in which the species was not recorded) are judged to be commuting contacts, whereas contacts in two consecutive minutes or more are judged to be foraging contacts.
b) Observed hunting behaviour in the field.
c) Judgement by a professional ecologist in determining whether foraging or commuting activity is present. In addition or instead of consecutive minutes of recordings or observed behaviour, the time at which bat passes are recorded, frequency of passes, seasonal considerations, constraints and other information, such as known nearby roosts of significance should be a consideration.

C5.23 **Consultant ecologists must submit detailed automated detector data for SAC bats in order that the type of contact can be assessed by North Somerset Council's ecologist to ensure the correct assessment is made** (as defined in Section B3.6)**.** The preferred format is for the time and date of horseshoe bat passes to be provided, along with sunset and sunrise times for these days. The method of analysis (i.e. manual analysis or type of software confirmed) must be provided. In some cases, original sonograms may be requested, although this is not a routine requirement.

C5.24 Where data is absent or deficient, for example due to insufficient coverage by automated detectors, foraging activity must be assumed and the highest score applied to the whole site. In these circumstances, it is also possible for important sites such as large sites within Band A, that a lack of data may lead to an inability to complete an evidenced-based Habitats Regulations Assessment. The application may subsequently be refused or may need to be withdrawn until sufficient survey data is available.

Calculating the Species Unit Value

C5.25 The value of the proposed site to Horseshoe bat species is calculated by using the HSI Score, Density Bandings, use by the Horseshoe bat species and area of habitat (See Table C3 below). The outcome of the Species Units used in the HEP is on a scale of 0 to 24[63].

C5.26 Unlike the Defra Biodiversity Net Gain Metric, hedgerows and linear features are measured by area and not length. A default width of 3 m is used where the width of a linear feature is unknown, and multiplied by the length to give an area in hectares. These values are usually small and do not significantly affect the overall area of a site, and for simplicity's sake and considering their value to wildlife are not deducted from the area of bordering fields, compartments or mapping polygons. Alternatively, hedgerows can be manually mapped as areas with GIS systems.

C5.27 Although assigned a value in the calculations, it must be remembered that the HEP is based on quantifying **foraging** habitat. Hedgerow and other dispersal corridors have a functional role, which must be considered separately to their foraging suitability. All suitable linear dispersal corridors must be maintained or replaced, retaining suitable conditions such as minimal light spill, to maintain connectivity for bats across a proposed development site in accordance with the specifications set out in B4.12 and B4.13.

C5.28 **The Habitat Evaluation Procedure calculations for development sites is calculated on the basis that the total site area would be lost to a species and would therefore produce a maximum replacement requirement to develop the site.** If habitat will be retained, this should remain outside of the red line boundary, unless there is a reason (such as additional habitat creation or Biodiversity Net Gain enhancements) for this area to be included. Unlike Biodiversity Net Gain calculations, temporary removal of habitat during construction must be considered as habitat loss, even if it is subsequently replaced within several years. Once

[62] Miller, B. 2001. *A method for determining relative activity of free flying bats using a new activity index for acoustic monitoring. Acta Chiropterologica* 3 (1): 93 – 105.
[63] This range is in line with that used for the habitat metric used by Defra in its pilot projects 2012 -2014.

horseshoe bats are displaced from habitat, they may not return for a long period of time. The latest Excel workbook available from North Somerset and Somerset Council's websites accounts for retained habitats, which need to be inputted back into the habitat creation tab. These are automatically assigned a difficulty/temporal multiplier of 1.

C5.29 The habitat replacement value required is calculated by multiplying the score by the hectarage of the habitat affected (hectares x [HSI x Band]) giving figure in **Habitat Units** as shown in Table C2. For example, an HSI x Band score of 12 for an area of 1.50 hectares would give a value of 18 Habitat Units. The resultant total of Habitat Units for the whole proposed development site can then be divided by 24 (8 [HSI] x 3 [Band]) to arrive at the minimum area in hectares of accessible replacement habitat required to develop the proposed site.

Table C2: Matrix Combining Habitat Suitability Score and Density Band

		Habitat Suitability Score				
		Poor 1	**Marginal 2**	**Average 4**	**Good 6**	**Excellent 8**
Band	**A (3)**	3	6	12	18	24
	B (2)	2	4	8	12	16
	C (1)	1	2	3	6	8

Metric Summary

C5.30 For each habitat type affected within a proposed development site:

- **The Habitat Suitability Index = Habitat Code (Range 0 to 8) + or – Matrix Code (Range 0 to 1, Default 0) x Formation Code (Range 0 to 1, Default 1) x Management Code (Range 0 to 1.3, Default 1)**
- **HSI x Density Banding/Field Survey Modifier = Species Habitat Units required.**
- **Species Habitat Units divided by 24 = equivalent hectares required**

C5.31 A dedicated spreadsheet in which figures used to the calculate the amount of replacement horseshoe bat habitat required as mitigation for a proposed development is available on North Somerset Council website. This also contains linked spreadsheets to calculate the value of the replacement habitat provided on- or off-site and a further spreadsheet to calculate the baseline HSI value for an off-site receptor site.

Replacement Habitat

C5.32 Requirements for replacement foraging habitat will need to be fully integrated into the design process for a development and considered at the earliest possible stage. It must be ensured that replacement habitat fully mitigates the loss and is accessible to the bat population affected (including remaining sufficient dark to ensure use by Horseshoe bats). Replacement habitat must provide at least no net loss of habitat to improve the situation for horseshoe bats and must clearly demonstrate in a scientific manner that the integrity of the SAC will not be adversely impacted. Location and habitat considerations are key to ensuring provision delivers.

C5.33 To check whether the proposed development site provides enough replacement horseshoe bat foraging habitat, a second Excel worksheet is provided within the workbook. The scores for post-development habitats are entered following the same scoring protocol as used for the baseline assessment. Whether the habitat is retained, enhanced or created needs to be stated. It will be need to be demonstrated that any retained habitats will be protected during the construction process. Any habitats subject to disturbance and then reinstatement should be categorised as 'created'. This is because even temporary removal or indirect impacts such as

disturbance and construction lighting onto habitats can essentially make these temporarily unusable for foraging or dispersing horseshoe bats. Habitat enhancement only applies to habitats which are retained in structure and form, and enhanced through additional planting, over-seeding or management changes. Habitat creation must be aimed at providing optimal foraging habitat for horseshoe bats. Feasibility of delivering suitable long-term management (e.g. grazing), future-proofing and creation of sufficient prey diversity must all be fully considered and evidenced.

C5.34 Retained and enhanced habitat areas must be accessible to horseshoe bats and careful consideration given to the maintenance of connectivity into and through the site. Measures detailed in Section B4.13 in relation to creation of habitat corridors must be demonstrated. The landscape context and impact on any proposed or potential nearby development (e.g. allocated sites in the Local Plan) must be fully considered. Sufficient evidence will be required with any application (including Outline applications) to demonstrate that replacement habitat will be suitable and accessible.

C5.35 Outline applications present a particular challenge for calculating on-site replacement habitat as often detailed landscaping plans are not available at planning submission stage. Evidence beyond reasonable scientific doubt is still required for Outline applications for Habitats Regulations Assessments to be completed. There is provision under Regulation 70 of the Conservation of Habitats and Species Regulations 2017 (as amended) for parameters or a framework to be agreed and secured by condition, with full details to be secured under the Reserved Matters application or other appropriate detailed design stage. For Outline applications, it is therefore advised that HEP calculations are completed based on Precautionary assumptions about habitat (i.e. using highest reasonable baseline values and lowest reasonable post-development values) to inform whether on-site or off-site replacement habitat (or a combination of both) is required, based on the parameters and zoning of a development site. An updated HEP and/or compliance statement will be required with the Reserved Matters application.

C5.36 Full details would then be secured by condition, to be discharged at Reserved Matters stage. Reserved Matters applications would need to be refused if they do not meet the requirements for replacement habitat as set out in the approved approach for the Outline application. Habitats Regulations Assessments would also need to be updated accordingly for the Reserved Matters application if there have been any significant changes, similar to BNG requirements.

C5.37 Light spill must be taken into account for all applications (including Outline applications), as this can act as a barrier to horseshoe bat species accessing replacement habitat. Requirements for lighting information are set out in B4.14-B4.22. This may need to include, for example, a Lighting Strategy with lux contour plans. If it is not demonstrated beyond reasonable scientific doubt that replacement habitat will be suitable and accessible, it must be awarded a value of 0 in the calculations.

C5.38 In delivering replacement habitat, there may also be a risk with delivering a functional offset and the timing of the impact. This particularly true for difficult to create habitats or management elements which may be difficult to enforce e.g. specified grazing regimes. There could potentially be a risk to maintaining a species population whilst a habitat is establishing or management is rectified, even though it may recover in time. Therefore, it is important that functioning replacement habitat is in place before development commences on site wherever feasible. A lead-in period for replacement habitat creation is advised as functionality may not be achieved until several years after creation. Frontloading habitat creation also allows time for alternatives or remedial measures to be delivered if habitat creation fails due to the difficulty in recreating or restoring habitats. Fraction Multipliers are used to account for these possibilities. These are applied to the calculation for the value of the replacement habitat proposed.

Delivery Risk

C5.39 Habitats vary in levels of difficulty and risk in creation or restoration. Risk multipliers are detailed in the latest version of the HEP spreadsheet available on the North Somerset Council website. The values are consistent with Biodiversity Net Gain metric multipliers. Factors such as substrate, nutrient levels, state of existing habitat, etc. will have an impact on the actual risk

factor, which may need to be taken into account. The value of multipliers used for the HEP, as based on the Defra metric, are shown in Table C3.

Table C3: Delivery Risk Multipliers

Difficulty of recreation/restoration	Multiplier
Very High	0.1
High	0.33
Medium	0.67
Low	1

Temporal Risk

C5.40 There may be a difference in timing between the implementation of the development and the functionality and maturity of the replacement habitat in terms of providing a resource for horseshoe bats. This time lag would be minimised by implementation of the habitat creation and/or restoration in consultation with the local authority and other nature conservation organisations in advance of planning approval or development commencing. However, unlike Biodiversity Net Gain, habitat banking or habitat creation decades in advance is challenging in relation to horseshoe bat mitigation and off-setting. It is challenging to ring-fence replacement habitat from a long-term increase in carrying capacity and prey availability across the bats home range, so a pragmatic and proportional approach needs to be taken and justified. In some cases, the replacement habitat may be planted or managed concurrently with that of the site development.

C5.41 Where a time lag will occur, a multiplier will be applied to take account of the risk involved to the 'no net loss' objective. This will require more habitat to be provided to compensate for the risk. The temporal multiplier values are set out in Table C4 below. Temporal risk multipliers are detailed within the latest HEP spreadsheet, consistent with Defra Biodiversity Net Gain guidance. The multiplier used needs to be judged on a case-by-case basis, and can be varied providing sufficient justification and evidence is submitted with a planning application.

C5.42 It is considered that some priority habitats cannot be recreated due to the length of time that they have evolved and the irreplaceability of some constituent organisms, at least in the short and medium terms. In the medium and longer terms, the management of any replacement habitat may be uncertain. Table C4 has been constrained to a maximum period of 30 years. In some cases, the time lag for the development of a habitat to support a population may be too long to be acceptable and alternative, deliverable options for habitat creation provided. For Horseshoe bats, there are a number of options which are deliverable over a 30 year time frame.

Table C4: Temporal Risk Multipliers

Time to Target Condition			
Time (years)	**Multiplier**	**Time (years)**	**Multiplier**
0	1.000	16	0.566
1	0.965	17	0.546
2	0.931	18	0.527
3	0.899	19	0.508
4	0.867	20	0.490
5	0.837	21	0.490
6	0.808	22	0.490
7	0.770	23	0.490
8	0.752	24	0.490
9	0.726	25	0.490
10	0.700	26	0.490
11	0.676	27	0.490
12	0.652	28	0.490
13	0.629	29	0.490

14	0.607	30	0.490
15	0.586		

Spatial Risk

C5.43 A factor is added for spatial risk to cover instances where the replacement habitat is provided off-site and where to site of the replacement habitat is located in another Density Band than that of the development site, for example the development occurred in Band B and the off-site replacement habitat is located in Band A.

C5.44 In all cases, the creation of replacement habitat in a lower band, i.e. Band C for a development occurring in Band B must be avoided, as set out in Section A8.3. Habitat lost within Band A must be replaced within Band A and, unless full justification is provided and evidenced, at a more accessible location (i.e. closer to known roosts) for the SAC population

Off-Site Replacement Habitat

C5.45 Where the replacement habitat cannot be created on-site within the red line boundary, the baseline value of the existing habitat on the intended off-site location for replacement habitat creation site needs to be calculated. This is to account for off-site habitat which will be lost or altered in value as a result of replacement habitat creation. As set out in Section A8.3 and A8.4, selection of suitable off-site locations will also need to be informed by bat surveys and considerations regarding accessibility to the target bat species.

C5.46 Off-site habitat creation is completed in the ‘Habitat Creation’ worksheet in the proforma spreadsheet alongside on-site created and risks are applied in the same manner as detailed above.

Annex 6: Habitat Creation Prescriptions

C6.1 Detailed prescriptions, and full justification, is provided in the Somerset Bat Guidance and Version 1 of this SPD. Prescriptions are summarised below. All score at least 6 in the Habitat Suitability Indices.

Greater Horseshoe Bats[64]

Pasture

C6.2 Ideally, existing pasture should be enhanced or new grazed pasture created for Greater Horseshoe Bats. It is unlikely that a grazing regime could continue within a development site, unless a sizeable, dedicated area without public access is created. This has been achieved for some sites (for example, Cobthorn Way in Congresbury) so should not be totally ruled out. Grazing cannot be considered as mitigation in isolation on off-site mitigation sites. There are inherent issues in using third parties to create new pasture as replacement habitat in perpetuity in terms of reasonableness and enforceability. These were highlighted in the Churston Golf Club planning appeal which was refused as grazing could not be sustained.[65] If grazing management is proposed, this needs to be accompanied by changes in quantity and type of habitat to ensure that any replacement habitat will deliver for Horseshoe bats in the long-term. Robust legal agreements such as Conservation Covenants will need to be in place. Organic grazing, without use of antiparasitic drugs which target the invertebrate prey of horseshoe bats, should be implemented.

Grassland

C6.3 The creation of species-rich grassland is the more feasible option in response to providing replacement habitat to mitigate the impacts of a development. This will need to be managed to produce a long sward to support an abundance of Noctuid moths, one of the main prey items hunted by Greater Horseshoe Bats. Invertebrate diversity should be encouraged through consideration of the seed mix and planting of select shrubs. The grassland should be divided into parcels and cut in rotation once a year in October and the cuttings removed. Where grassland is established as a field margin, this should be at least 6 m or 10 m wide.

Woodland

C6.4 The replacement of coniferous woodland with broadleaved woodland would benefit Greater Horseshoe Bats, provided the woodland is accessible to the species. The replacement of coniferous woodland should be carried out gradually over a period of time to avoid extensive clear-felling. Macro-moth abundance is higher at the edge of woodland than in the interior. All woodlands should be permeated by grassy rides and contain grassy glades. Woodlands must be managed without insecticide treatments. Glades ideally need to be at least 10 - 15 m across before they will be used for feeding. When creating woodland for horseshoe bats, the target species must be considered as the specification will be different (see Lesser Horseshoe Bats below).

Hedgerow

C6.5 Hedgerow acts as a commuting structure and provides feeding perches for Greater Horseshoe Bats. New hedge lines could be planted within a biodiversity enhancement area or off-site to divide large grazed fields into smaller units and link them to blocks of woodland. Hedgerows should be 3 to 6 m wide and 3 m high with standard trees planted frequently along their length. The provision of trees increases moth abundance. Cutting should be restricted to the minimum needed to ensure visibility or retain hedgerow structure. Hedgerows are best cut every 2-3 years, working on rotation on only one part or side at any time.

[64] Derived from Ransome, R. D. 1996. The management of feeding areas for greater horseshoe bats. English Nature research report No.174. Peterborough: English Nature; Fuentes-Montemayor, E., Goulson, D.,Cavin, L., Wallace, J. M. & Park, K. J. 2012. Factors influencing moth assemblages in woodland fragments on farmland: Implications for woodland management and creation schemes. *Biological Conservation* 153 (2012) 265–275; Merckx, T. & Macdonald, D. W. 2015. Landscape-scale conservation of farmland moths: in Macdonald, D. W. & Feber, R. E. (eds) 2015. *Wildlife Conservation on Farmland. Managing for Nature on Lowland Farms*. Oxford: Oxford University Press; Fuentes-Montemayor, E., Goulsion, D.& Park, K. J. 2010, The effectiveness of agri-environment schemes for the conservation of farmland moths: assessing the importance of a landscape-scale management approach. *Journal of Applied Ecology* 48, 532-542

[65] Paragraphs 41 to 50 of Appeal Ref: APP/X1165/A/13/2205208 Land at Churston Golf Club, Churston, Devon, TQ5 0LA.

C6.6 A species-rich grass strip, a minimum of 6 m wide, with a long sward, managed as described above, should accompany hedgerow creation as this will enhance moth abundance.[66]

Lesser Horseshoe Bats[67]

Woodland with Water

C6.7 Barataud et al (2000) found the woodland associated with water was the most preferred habitat by Lesser Horseshoe Bats so creation of this habitat should be prioritised.

C6.8 Micro-moth abundance is positively related to the relative abundance of native trees[68] and, unlike macro-moths, the percentage cover of understory in a woodland patch. Micro-moth abundance was higher within the woodland interior than at the edge. The shape of the woodland patch was important particularly for woodland micro-moth species, indicating that patches of compact shapes (with proportionally less edge exposed to the surrounding matrix) sustain a larger number and larger populations of woodland species of micro-moths. This highlights the importance of designing patches of compact shapes, especially when the patch to be created is small. Brown lacewings, a key prey item, can be found amongst conifers.

C6.9 Woodland trees and shrubs should be planted in naturalistic non-linear patterns. Scalloped edges and bays will provide sheltered areas with higher insect concentrations. Providing a variety of types of vegetation from trees to shrubs and rough grass will also benefit Lesser Horseshoe bats. Overhanging branches and bushy shrubs should be left to provide cover.

Ponds

A6.10 The incorporation of ponds in association with the woodland habitat is likely to increase their value to Lesser Horseshoe Bats. Ponds with permanent water should be created. It is possible that these could form attenuation features as part of the surface water mitigation for a development. They should be designed so that water is maintained within them throughout the year.

C6.11 Variation on the banks of ponds favours high insect and structural diversity. Design in as many natural features as possible, including varied depths, diverse aquatic and bankside vegetation, and overhanging trees. Grassy margins, scrub and overhanging vegetation provide excellent conditions for insects. Habitat diversity can often be achieved simply through allowing growth of taller vegetation. Where bank management is necessary, restrict it to a small area and work on one bank at a time. Carry out management sensitively, aiming to enhance variation in vegetation. Use fencing to prevent livestock from causing excessive damage to water margins.

Grassland

C6.12 Long sward grassland is also of benefit to Lesser Horseshoe Bats as that described above for Greater Horseshoe bats. The management of grassland should be as that for Great Horseshoe Bats. Rough grassland and scrub are an important predictor of micro moth abundance.

[66] Merckx, T. & Macdonald, D. W. 2015. Landscape-scale conservation of farmland moths: in Macdonald, D. W. & Feber, R. E. 2015. *Wildlife Conservation on Farmland. Managing for Nature on Lowland Farms*. Oxford: Oxford University Press.

[67] Derived from Barataud, M., Faggio, G., Pinasseau, E. & Roué, S. G. 2000. *Protection et restauration des habitatas de chasse du Petit rhinolophe (*Rhinolophus hipposideros*) Année 2000*. Paris : Ministère de l'Environnement – Direction de la Nature et des Paysages ; Fuentes-Montemayor,E., Goulson, D.,Cavin, L., Wallace, J. M. & Park, K. J. 2012. Factors influencing moth assemblages in woodland fragments on farmland: Implications for woodland management and creation schemes. *Biological Conservation* 153 (2012) 265–275; Chinery, M. 2007. *Insects of Britain and Western Europe*. London: A & C Black; Fuentes-Montemayor, E., Goulsion, D.& Park, K. J. 2010, The effectiveness of agri-environment schemes for the conservation of farmland moths: assessing the importance of a landscape-scale management approach. *Journal of Applied Ecology* 48, 532-542; Entwistle, A. C., Harris, S., Hutson, A. M., Racey, P. A., Walsh, A., Gibson, S. D., Hepburn, I. & Johnston, J. 2001. *Habitat management for bats: A guide for land managers, land owners and their advisors*. Peterborough: Joint Nature Conservation Committee.

[68] Fuentes-Montemayor, E., Goulson, D.,Cavin, L., Wallace, J. M. & Park, K. J. 2012. Factors influencing moth assemblages in woodland fragments on farmland: Implications for woodland management and creation schemes. *Biological Conservation* 153 (2012) 265–275]; Entwistle, A. C., Harris, S., Hutson, A. M., Racey, P. A., Walsh, A., Gibson, S. D., Hepburn, I. & Johnston, J. 2001. *Habitat management for bats: A guide for land managers, land owners and their advisors*. Peterborough: Joint Nature Conservation Committee.

Hedgerow

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Annex 7: Application of the Habitats Regulations

C7.1 The Habitats Regulations protect identified *sites* by designation as Special Areas of Conservation (SACs). However, the Habitats Regulations also protects *habitat* (Functionally Linked Land) which is important for the Favourable Conservation Status of the cited species.[69]

C7.2 Achieving Favourable Conservation Status of a site's features "… *will rely largely on maintaining, or indeed restoring where it is necessary, the critical components or elements which underpin the integrity of an individual site. These will comprise the extent and distribution of the qualifying features within the site and the underlying structure, functions and supporting physical, chemical or biological processes associated with that site and which help to support and sustain its qualifying features.*"[70]

C7.3 Regulation 63 of the Habitats Regulations states that:

A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

(a) is likely to have a significant effect on a European Site … (either alone or in combination with other plans or projects), and
(b) is not directly connected with or necessary to the management of that site must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.

C7.4 An assessment to meet Regulation 63 requires a two-stage procedure: (Stage 1) a screening stage where the "competent authority" has grounds to conclude whether a plan or project is likely to have a significant effect on a European site **without mitigation**, and (Stage 2) the Appropriate Assessment stage if it concludes that a significant effect is likely, including consideration of the impacts of mitigation.

C7.5 In accordance with Regulation 63, information submitted with a planning application will be used by North Somerset Council to determine whether the proposal is likely to have a significant effect on the SAC. Planning authorities carry out a Habitats Regulations Assessment for proposals which involve or may involve:

- Loss or disturbance to bat roosts, including undesignated roosts, used by SAC bat populations (outside of the scope of this SPD);
- Loss of foraging habitat for SAC bats;
- Removal or fragmentation of commuting habitat for SAC bats;
- Increase in luminance in close proximity to a roost and/or increase in luminance to foraging or commuting habitat causing displacement of SAC bat populations; and/or
- Any other form of disturbance which could displace horseshoe bats from foraging habitat or dispersal corridors.

C7.6 The Court of Justice of the European Union clarified what is required in that there is a '…. *need to identify and examine the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of the site. Provided those implications are liable to affect the conservation objectives of the site'*.[71]

C7.7 When considering whether a project is likely to have a significant effect on a SAC, the competent authority in Stage 1 of the Habitats Regulations Assessment, does not take account

[69] See European Site Conservation Objectives for North Somerset and Mendip Bats Special Area of Conservation at Part B, paragraph 1.4
[70] Natural England Standard: Conservation Objectives for European Sites in England Standard 01.02.2014 V1.0 http://publications.naturalengland.org.uk/publication/6734992977690624
[71] Court of Justice of the European Union (Holohan, Guifoyle, Guifoyle & Donegan v An Bord Pleanála. Case C-461 /17)

of mitigation measures for effects on the features of the European site.[72] Where mitigation measures are required, a Stage 2 Appropriate Assessment must be completed in accordance with the Sweetman / People over Wind judgement.

C7.8 Mitigation measures are measures which are designed to *avoid* or *reduce* adverse effects on a SAC. Where compensatory measures are required (i.e., for impacts within the designated site), these will not be taken into account in the Appropriate Assessment (Stage 2). It is important to distinguish mitigation from compensatory measures which are designed to compensate for unavoidable adverse effects on a European site and follow the "Three Tests".[73]

C7.9 The precautionary principle underpins the Habitats Directive[74] and hence the Habitats Regulations and must be applied by the Council as the Competent Authority as a matter of law.[75] The decision as to whether or not an appropriate assessment is necessary must be made on a precautionary basis.[76] In addition, the Waddenzee judgement[77] requires a very high level of certainty when it comes to assessing whether a plan or project will adversely affect the integrity of a European site. The judgement states that the competent authority must be sure, certain, convinced that the scheme will not adversely affect the integrity of the site. It goes on to state that that there can be no reasonable scientific doubt remaining as to the absence of adverse effects on the integrity of the site.

C7.10 For planning authorities to be able to conclude with enough certainty that a proposed project or development will not have a significant effect on the SAC, the proposal or project must therefore be supported by adequate evidence and bespoke, reasoned mitigation. It is the duty of the applicant, supported by technical experts they may engage to assist, to provide sufficient information to inform an assessment. If sufficient information is not submitted, impacts cannot be assessed. Schemes should not be approved, in accordance with the law, if there is insufficient information to complete a Habitats Regulations Assessment (HRA), following the Precautionary Principle. A Shadow HRA may be requested from the applicant for sites where there are any complexities in survey information and mitigation which need to be analysed and presented clearly. Shadow HRAs are highly likely to be required for major schemes, but may also be requested for smaller schemes where there is a particular risk of significant adverse effects. A proportional approach will be taken based on the location of the site, scale of the proposals and details of habitats present. A shadow HRA template for North Somerset is included in Figure C7.1 below. An editable version can be provided on request from North Somerset Council. Shadow HRAs are likely to be required for the following developments:

- Major schemes within Band A and Band B for either Horseshoe bat species;
- Major schemes in Band C or for particularly significant schemes outside of the Horseshoe Bat Consultation Zones where these have a credible risk of significant adverse impacts on the SAC;
- Minor schemes within Band A and Band B which will result in removal of or significant adverse impacts on foraging habitat for Horseshoe bats; and
- Any scheme where important dispersal corridors for horseshoe bats are likely to be removed, damaged, fragmented or where displacement of bats may occur as a result of light spill or disturbance;
- Minor schemes and householder schemes immediately adjacent to designated SAC units;
- Any maternity or hibernation roosts anywhere within North Somerset; and

[72] A decision by the Court of Justice of the European Union (*People Over Wind and Sweetman v Coillte Teoranta* (C-323/17)) means that mitigation (avoidance and reduction) measures may no longer be taken into account by competent authorities at the HRA "screening stage" i.e., when judging whether a proposed project is likely to have a significant effect on a European site.
[73] See ODPM circular 06/2005
[74] Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (known as the 'Habitats Directive')
[75] *Assessing Projects under the Habitats Directive: Guidance for Competent Authorities* 2011, CCW p.15
[76] ODPM Circular 06/2005 para13
[77] ECJ judgement: C-127/02 [2004] ECR-I

- Day roosts used by multiple Horseshoe bats within the Horseshoe Bat Consultation Zones.

When Shadow HRAs are completed, the Council will complete their own assessment based on full scrutiny for legal purposes, cross-referencing the Shadow HRA. Further information may be requested to fully evidence HRAs. It is the applicant's duty to provide any reasonable information to inform HRAs as set out under Regulation 63, and applications are likely to be refused if sufficiently detailed evidence is not submitted. A balance should be struck between providing sufficient evidence to inform the HRA beyond reasonable scientific doubt and excess evidence being requested. For example, a full-scale population impact assessment is usually not necessary for impacts on smaller scale roosts. Pragmatism and proportionality should be used when completing the HRA template, keeping documents as simple as possible, but with clearly evidenced statements, and linking directly to other documents which full detail evidence with a scientific basis e.g. light modelling, ecological survey reports, etc. Aside from the triggers for Shadow HRAs detailed above, the Council may need to complete its own HRA screening assessment, or Appropriate Assessments, for smaller schemes or sites without anticipated significant impacts. A Shadow assessment is not always necessary in these instances, as will be decided on a case-by-case basis by the Council's Ecologists.

C7.11 Once impacts have been assessed and an acceptable approach to mitigation provided and evidenced *beyond reasonable scientific doubt,* an Ecological Management Plan including monitoring during and / or post development, will need to be secured through either planning conditions or a S106 agreement or both. Where appropriate (i.e. where there are specific mitigation measures), a long-term (80 year) monitoring plan will be expected to assess whether the bat populations have responded favourably to the mitigation, with an approach set out as to how remedial measures will be considered and applied. It is important that consistent monitoring methods are used pre- and post-development, to facilitate the interpretation of monitoring data. Data from monitoring will be used by the planning authorities to determine how the bat populations have responded to mitigation, to increase the evidence base and ensure management of sites are revised toward supporting the bat populations affected.

C7.12 A cumulative impact assessment needs to be completed based on best available information, including Local Plan allocated sites, a search of the North Somerset Planning Map and planning portal and discussions with landowners/applications. The Council will fully review Shadow HRAs and ensure that in-combination effects are scrutinised. In-combination impacts as a result of cumulative loss of habitat within a locality and fragmentation and accessibility by horseshoe bats will need to be fully considered.

Figure C7.1 North Somerset Shadow HRA Template

ASSESSMENT OF LIKELY SIGNIFICANT EFFECT ON A EUROPEAN SITE Conservation of Habitats and Species Regulations 2017 (as amended)	SHADOW DOCUMENT SUPPLIED BY THE APPLICANT FOR POTENTIAL ADOPTION BY NORTH SOMERSET COUNCIL Ecologist: Company: Date:

HABITATS REGULATIONS ASSESSMENT (HRA)

App ref No:	
Site Address:	
Proposal:	
DC Case Officer:	

This application has been considered in light of the assessment requirements of Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) by North Somerset Council which is the Competent Authority responsible for authorising the project.

Habitats Regulations Assessment (HRA) process

Consideration of the potential impacts of a development proposal pursuant to Regulation 63 Habitats Regulations is a two-stage process:

63 (1) A Competent Authority before deciding to undertake or give any consent, permission or other authorisation for a plan or project which –

a) Is likely to have a significant effect on a European Site or a European offshore marine site (either alone or in combination with other plans or projects), and

b) is not directly connected with or necessary to the management of that site,

Must make an appropriate assessment of the implications for that site in view of that site's conservation objectives

63 (5) in the light of the conclusions of the assessment, and subject to regulation 64 (considerations of overriding public interest), the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site or the European off shore marine site (as the case may be).

Assessment pursuant to the Habitats Regulations therefore involves: a Screening stage (which, since the People over Wind[78] decision must exclude measures intended to avoid or reduce potential harmful effects on a European site), followed by an Appropriate Assessment if potential harmful effects on a European site cannot be quickly ruled out. The Competent Authority has a duty to have regard to any potential impacts that a project may have.

[78] People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

Name of European Site:

North Somerset and Mendip Bats Special Area of Conservation (SAC)

Component SSSI/s:

Within North Somerset: Banwell Caves SSSI, Banwell Ochre Caves SSSI, Brockley Hall Stables SSSI, King's Wood and Urchin Wood SSSI

Outside of North Somerset (but connected populations):The Cheddar Complex SSSI, Wookey Hole SSSI, Compton Martin Ochre Mine SSSI

Reasons for Designation:

Site description: The limestone caves and mines of the Mendips and the North Somerset hills provide a range of important breeding and hibernation sites for lesser horseshoe bat *Rhinolophus hipposideros* and greater horseshoe bat *Rhinolophus ferrumequinum*. King's Wood and Urchin Wood also comprises semi-natural ancient woodland over limestone with a diverse shrub layer and ground flora including ferns and mosses. Outside of North Somerset, the Cheddar complex and Wookey Hole component units also support a wide range of habitats including semi-natural dry grasslands and grassland on shallow limestone soils which also provide feeding grounds for bats.

Qualifying habitats: The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Tilio-Acerion forests of slopes, screes and ravines (mixed woodland on base-rich soils associated with rocky slopes)
- Caves not open to the public
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (dry grasslands and scrublands on chalk or limestone)

Qualifying species: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Greater horseshoe bat *Rhinolophus ferrumequinum*
- Lesser horseshoe bat *Rhinolophus hipposideros*

Conservation Objectives and Qualifying Sensitive Interest Features:

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and the habitats of qualifying species
- The structure and function of the habitats of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Qualifying Features:

H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

H8310. Caves not open to the public

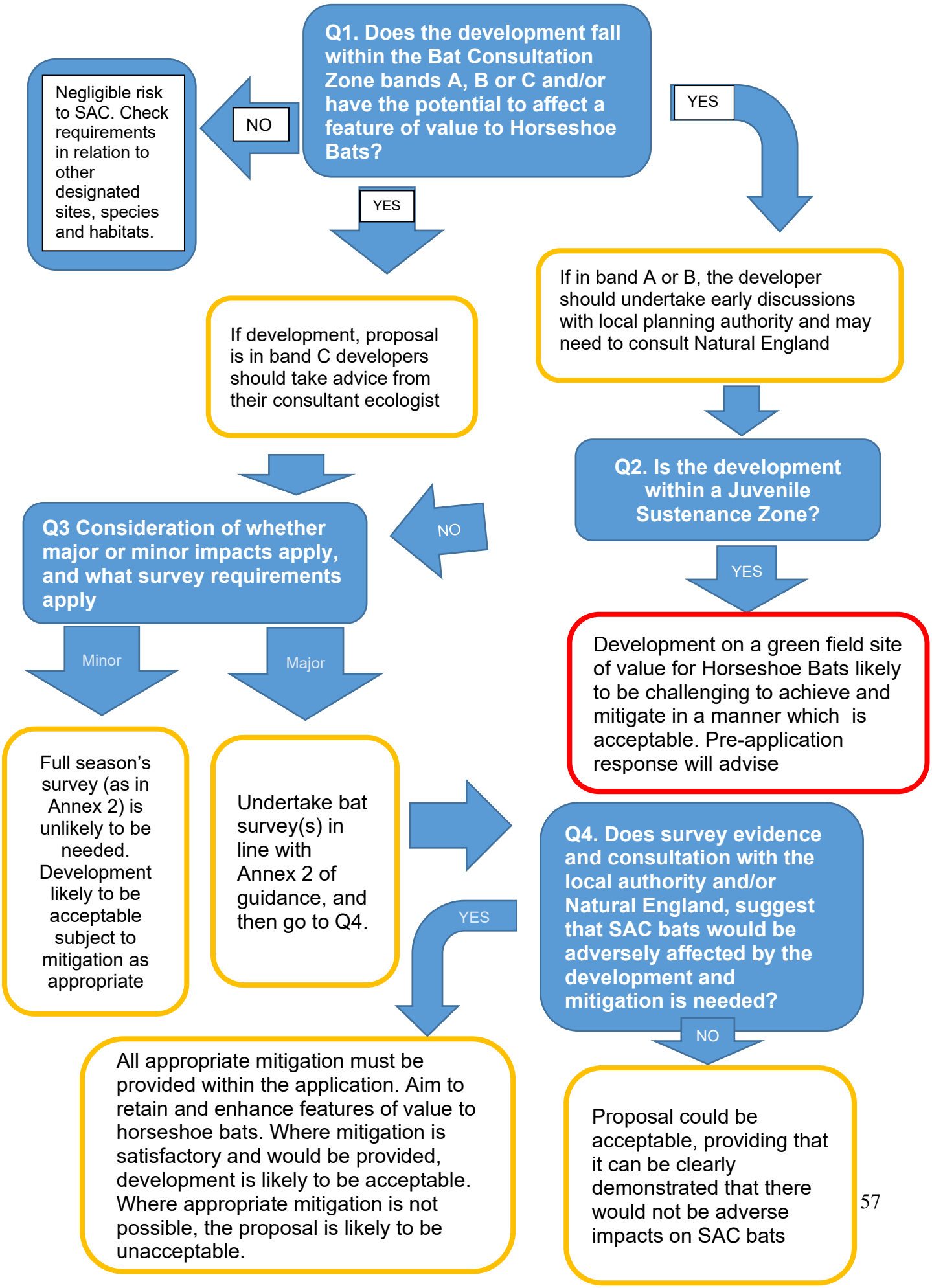
H9180. *Tilio-Acerion* forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes

S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat

S1304. *Rhinolophus ferrumequinum*; Greater horseshoe bat

Development Site location in relation to SAC/s:	
1. Screening stage	
Is the project likely to have a significant effect on a European site when considered on its own?	
[*Detail impacts on Horseshoe bat roosts, foraging habitat and commuting habitat without mitigation]*	
Is the project directly connected to the management of the SAC?	**Yes/No**
A risk of a "likely significant effect" on the SAC can/cannot be ruled out without relying on mitigation measures. **Proceed to stage 2.**	
2. Appropriate Assessment	
Consider mitigation measures	*[Detail impacts on Horseshoe bat roosts, foraging habitat and commuting habitat with mitigation, fully referencing mitigation proposals e.g. supplementary drawings]*
Consider the possibility of in-combination effects	[*Consider any schemes within sphere of influence and detail whether any in-combination effects may occur*] Therefore, there will / will not be any significant adverse effects as a result of in-combination impacts.
CONCLUSION	Following an Appropriate Assessment in accordance with the Regulations, the competent authority has ascertained that the project would / would not have an adverse effect on the North Somerset and Mendip Bats SAC either alone or in combination with other plans or projects providing mitigation is delivered as outlined.
North Somerset Council Comments	
Date:	
Name:	**[ecologist]** **North Somerset Council**
3. Consultation with Natural England	
Natural England opinion:	
Date	
Name:	**TBC** **Natural England**

Annex 8: Horseshoe Bat Survey and Mitigation Flow Chart

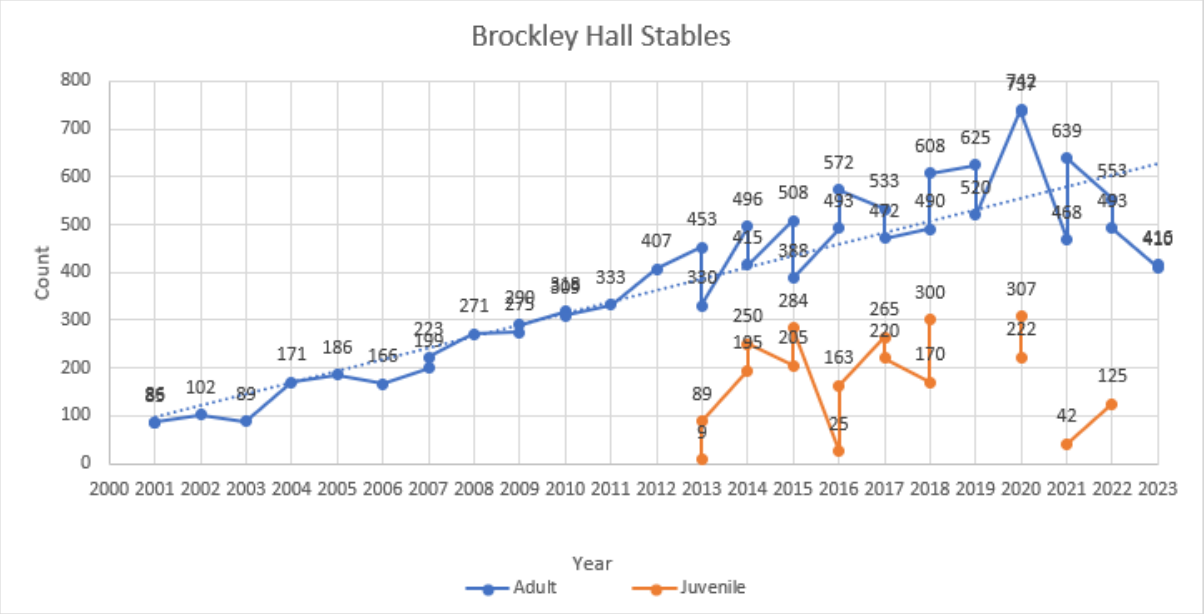


APPENDICES

Appendix 1: Supporting Information and Research

Only new information obtained since 2018 is included. For the previous evidence base, which this data adds to rather than replaces, Version 1 of the SPD and the Somerset Bat Guidance must be reviewed.

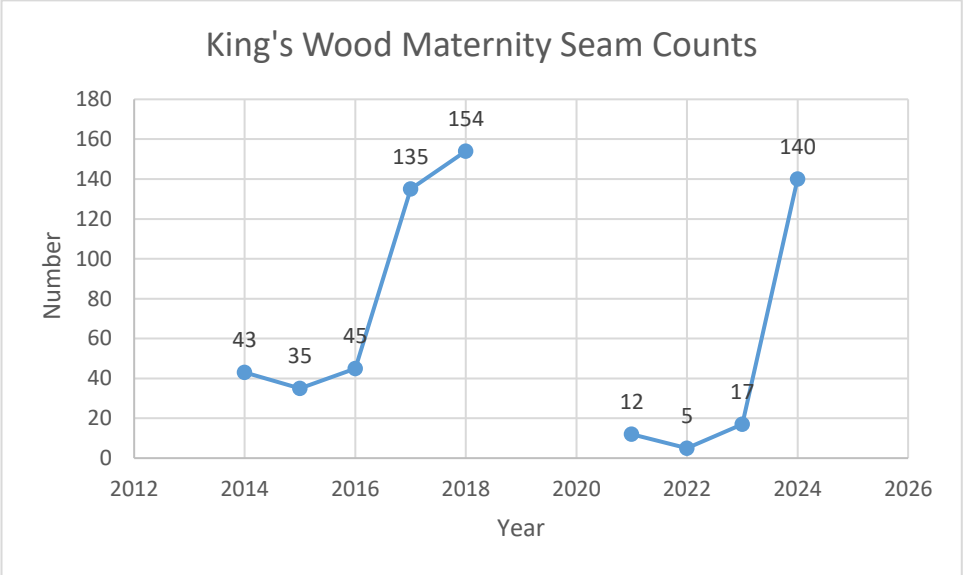
Figure 6.1 Brockley Hall Stables Greater Horseshoe Maternity Roost Counts



Data source: Vincent Wildlife Trust

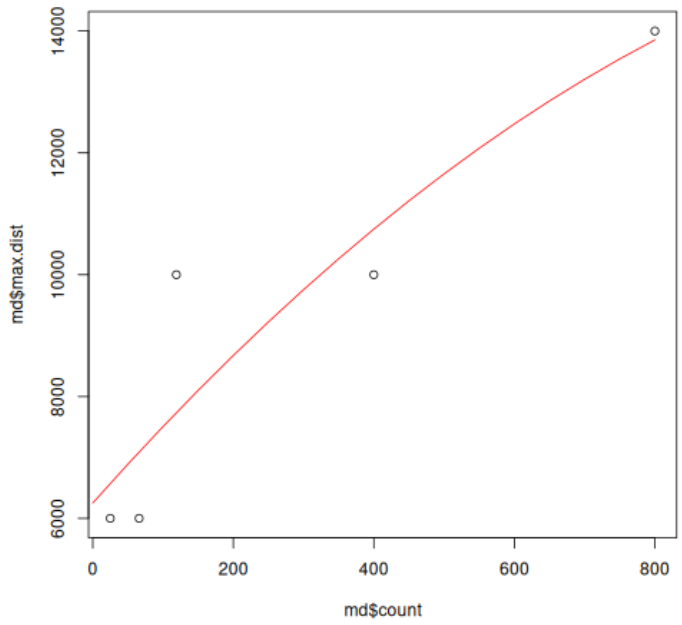
The 2024 and 2025 counts recorded a maximum of approximately 180 emerging adults, confirming a significant and concerning recent decline of this roost.

Figure 6.2 King's Wood Greater Horseshoe Maternity Roost Counts



Data source: Avondale Ecology, Avon Wildlife Trust and Yatton and Congresbury Wildlife Action Group
NB – Due to a comprehensive and co-ordinated survey of the mines in summer 2024 as part of the North Somerset Woodlands – Species Recovery Fund project (funded by Natural England and delivered by Avon Bat Group), it was discovered that there are two main maternity roost clusters for Greater Horseshoe Bat. All counts pre-2024 relate only to one maternity cluster. The 2024 results relate to both maternity clusters. It appears that the maternity clusters are used in a dynamic manner. The King's Wood population appears likely to be stable overall. The numbers recorded do not account for the recent declines in the Brockley Hall Stables roost.

Figure 6.3 Roost Size vs Maximum Foraging Distance (Foxley, 2024)



Data Source: Foxley, T. University of the West of England, 2024.

A Habitat Index (HI) and Connectivity Index (CI) has also been developed for Greater Horseshoe Bats within North Somerset using GPS telemetry data, habitat suitability and landscape connectivity models[79] as part of the same research project. The HI shows areas of importance to *R. ferrumequinum* with values between 0 (likely to be of no or little use to the species) and 6 (likely to be of high importance in supporting the population) as shown above.

In future, there are ambitions to do the same for Lesser Horseshoe Bat. As this has not been completed at the time of publication, it would not be appropriate for the HEP calculations to be adapted to include consideration of the indices. It is hoped that this will be possible in future to refine the modelling to be more location and habitat-specific (as opposed to distance-based Density Bands).

The most recent version of the data is available at North Somerset Nature Parks | North Somerset Council.

79 Foxley, T., Lintott, P., Stonehouse, S., Flannigan, J. and Stone, E.L. (2025) A high resolution spatial modelling framework for landscape-level, strategic conservation planning. Ecological Informatics. 91, p. 103363. https://doi.org/10.1016/j.ecoinf.2025.103363



Roosting Lesser Horseshoe Bats (Photo Jim Mullholland)