



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**Bath and Bradford-on-Avon Bats Special Area of Conservation (SAC)
Site Code: UK0012584**



Greater horseshoe bats at hibernation site © Natural England

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Bath and Bradford-on-Avon Bats SAC.

This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

This advice replaces a draft version dated February 2019 following the receipt of comments from the site's stakeholders.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email

HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Bath and Bradford-on-Avon Bats Special Area of Conservation (SAC)
Location	Bath and North East Somerset, Wiltshire
Site Map	The designated boundary of this site can be viewed here on the MAGIC website. There are 10 separate areas each with its own boundary. Some areas are very small and require zooming-in to be able to see them
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	107.16 ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Box Mine SSSI Brown's Folly SSSI Combe Down and Bathampton Down Mines SSSI Winsley Mines SSSI The SSSI boundaries and the SAC boundary are the same.
Relationship with other European or International Site designations	N/A

Site background and geography

The ten discrete areas of the SAC are distributed over a wide geographical area crossing the boundary between Bath and North East Somerset and Wiltshire, to the south and east of Bath in the triangle specifically between Bath and Corsham in the north and Winsley in the south. The SAC sits within [National Character Area 107: Cotswolds](#). The local landscape setting is one of steep scarp slopes of usually grazed pasture, with incised river valleys and thin, limey soils on bedrock; high open wold which is often cultivated as arable land with thin, brashy soils and fields divided by stone walls; and a long and rolling dip slope facing broadly towards the south-east with deeper, less lime-rich soils, hedgerows dividing the fields, and with more varied, mixed farming. These landforms have developed on the underlying oolitic Jurassic Limestone which stretches in a swathe from the Jurassic Coast of Dorset to Lincolnshire. The limestone is famed in the area as a building material for buildings and stone walls, and the mining of it has created the underground voids used by bats for hibernation. The SAC has three qualifying bat features: lesser horseshoe bat, greater horseshoe bat and Bechstein's bat.

The SAC is designated for the hibernating populations of three species of bat: lesser horseshoe, greater horseshoe and Bechstein's bat. The SAC sites are all abandoned limestone mines and some include areas of supporting habitat: broadleaved woodland and species rich calcareous grassland. The surrounding landscape provides feeding and commuting opportunities for the bats between the component sites of this SAC, between this and other bat SAC sites (the closest bat SAC sites are Mells Valley SAC, Chilmark Quarries SAC, and North Somerset and Mendip Bats SAC), and other

undesigned roosts, vital in supporting the bats throughout the different phases of their life cycle. There is known to be movement and interchange of greater horseshoe bats between Winsley Mines and undesigned roosts at Bradford-on-Avon 2.5km away, and a ringed greater horseshoe bat from Woodchester Park SSSI in Gloucestershire has been re-captured at Winsley Mines, nearly 40km away. Successful breeding, hibernation, swarming and dispersal are all critical in sustaining the bat populations; these rely on an interconnected landscape for ease of movement, and linked sites for mixing of genepools. Features of significance within the wider landscape are watercourses, woodland, grazed pasture, parkland, hay meadows, hedgerows, linear trees, scrub and individual feature trees.

In the past, caving groups and other interested parties would visit and explore the mines infrequently. Today, the mines and mine entrances are all in private ownership, and in view of their dangerous and collapsing states, are almost exclusively gridded to prevent unauthorised human access whilst still providing openings for bats to fly through. Many people and groups still try to access the mines and the risk of disturbance to the bats both inside the mines and immediately outside the entrances, is high. There is also a revival in mining some of the stone mines in the wider area, with the risk of reducing the number of sites available to bats.

The SAC as a whole supports 15% of the UK population of Greater Horseshoe bats.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying Habitats:

None.

Qualifying Species:

- **S1303. Lesser horseshoe bat *Rhinolophus hipposideros***

The lesser horseshoe bat is one of the smallest bats in the UK, found exclusively in Wales, the West Midlands and South West England. In winter they hibernate in caves, mines and other cave-like places, ideally selecting places where the temperature remains stable during the prolonged hibernation period. During the summer they form maternity colonies in old buildings and emerge to hunt in nearby woodland. The species prefers to hunt in sheltered valleys with extensive deciduous woods or dense scrub, along woodland edges and field margins, and over wetland, riparian habitats and pasture. Where habitat is fragmented, linear features such as hedgerows, tree lines and stone walls are important corridors between roosts and foraging areas. Summer and winter roosts are usually less than 5-10 km apart. The bats are vulnerable to the loss or disturbance of both summer and winter roost sites and the removal of linear habitat corridors.

This complex of sites, straddling the boundary between Bath and North East Somerset and Wiltshire, supports a significant number of hibernating lesser horseshoe bats, totalling up to approximately 2% of the UK population. The bats also hibernate in lower numbers in many other disused mines in the area and rely on the surrounding extensive woodland and grazed pastures with good quality hedgerows for their flightlines and feeding grounds.

- **S1304. Greater horseshoe bat *Rhinolophus ferrumequinum***

The greater horseshoe bat is one of the largest bats in the UK, found in Wales and South West England. In winter they depend on caves, abandoned mines and other underground sites for undisturbed hibernation. A system or series of sites is required, offering a range of temperatures and air-flow patterns. During the summer, the bats form maternity colonies, generally in large old buildings, and forage in pasture, edges of mixed deciduous woodland and hedgerows. Such mixed land-use, especially on south-facing slopes, favours the beetles, moths and other insects on which the bats feed. Summer and winter roosts are usually less than 20-30 km apart. The bats are vulnerable to the loss of insect food supplies due to insecticide use, changing farming practices and the loss of broad-leaved tree-cover, and to the loss or disturbance of underground roost sites.

This complex of hibernation sites, juxtaposed between Bath and North East Somerset and Wiltshire in the central part of its range, supports up to 15% of the UK population. The SAC contains at least one maternity roost for these bats, but only the hibernating population is a qualifying feature of the SAC. A principal maternity roost is located at Iford Manor SSSI, several kilometres to the south of the site. The bats also hibernate in many of the other disused mines in the area that lie outside of the SAC and rely on the surrounding extensive woodland and grazed pastures with good quality hedgerows for their flightlines and feeding grounds.

- **S1323. Bechstein's bat *Myotis bechsteinii***

Bechstein's bat is one of the UK's rarest bats, found in central southern England and the southern Welsh borders. Its ecology is relatively poorly-known. Caves and abandoned mines may be used for hibernation, though it is possible that the bats also remain in woodland roosts during the winter.

Maternity roosts are typically in woodpecker nest holes, generally in old growth, ancient semi-natural, deciduous woodlands of at least 25 ha and ideally above 50 ha in size. This might equally well be composed of a network of well-connected smaller woodlands. Woods tend to have a closed canopy and a dense, “cluttered” understorey, ideal for foraging. They are particularly sensitive to intensive woodland management and woodland removal, and artificial light, seeking out dark corridors along which to commute.

In relation to this SAC site certain of the abandoned stone mines are known to be particularly important for swarming in late summer and autumn, but due to their crevice-dwelling nature and extremely quiet and difficult to differentiate echo-locating sound, Bechstein’s bats have not been recorded in large numbers hibernating within the SAC. Considerably more is known about the maternity roost sites (found for example to the south east of Trowbridge) than the specific attributes and locations of the bats’ hibernation sites, but these are not a qualifying feature of the SAC.

In general, all UK bat species and their roosts are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 as ‘European Protected Species’. A [Licence](#) may therefore be required for any activities likely to harm or disturb bats wherever they occur.

Site-specific seasonality of SAC features

The table below highlights in grey those months in which significant numbers of each mobile qualifying feature are most likely to be present at the SAC during a typical calendar year. This table is provided as a general guide only.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SAC outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information.

Feature	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lesser horseshoe bat, <i>Rhinolophus hipposideros</i>	Hibernation												
Greater horseshoe bat, <i>Rhinolophus ferrumequinum</i>	Hibernation												
Bechstein's bat, <i>Myotis bechsteini</i>	Hibernation												

**Table 1: Supplementary Advice for Qualifying Features: S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat
S1304. *Rhinolophus ferrumequinum*; Greater horseshoe bat
S1323. *Myotis bechsteinii*; Bechstein’s bat**

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the features)	Population abundance - hibernation site	<p>Maintain the abundance of the populations above their baseline population-size, whilst avoiding deterioration from current levels.</p> <p>Baseline population levels are not currently available for any of the qualifying bat species across the whole site (see ‘Supporting and Explanatory Notes’ section).</p>	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population’s size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site’s population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>The population size or presence will be that measured using standard methods, such as peak mean counts at component sites where entry to the mines/roost spaces is feasible. At sites where entry to roost spaces is not possible, other recording methods will need to be developed, that are likely to be less</p>	<p>NATURAL ENGLAND, March 2009. <i>Box Mine SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Winsley Mines SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>STEBBINGS, R.E., 1992. <i>The Greywell Tunnel: An Internationally Important Haven for Bats</i>. Peterborough. English Nature.</p> <p>Monitoring data held by Natural England.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>accurate. Any population size value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise whether the figures stated are the best available.</p> <p>Monitoring visits can only provide an indication of abundance. The overall number of bats using the SAC will be higher. Only selected areas of the extensive mine systems are surveyed. For example, at Box Mine prior to 1997 the whole system was surveyed for bats; from 1997 onwards only 10-15% of the mine system was surveyed along specific transects which were selected as representative because they incorporated the highest densities of bats. At Winsley Mines the whole system is surveyed, but the survey coverage has expanded over time as new parts of the mine were rediscovered. Numbers of bats seen on a particular visit will depend on many factors including weather conditions at the time. In-hand identification is required to confirm Bechstein's from other <i>Myotis</i>/crevice-dwelling species, further limiting the coverage of cave surveys. In addition, for underground stone mines it is estimated as few as 5-8% of crevice-using bats might be seen, while the remainder are hidden (Stebbing, 1992).</p> <p>Baseline population levels are not currently available for any of the qualifying bat species due to the extensive nature of the SAC and the considerable logistical difficulties of surveying the sites. Baselines will be developed once suitable survey data becomes available. Robust surveys are available for some of the component sites and these are summarised below.</p> <p><u>Lesser horseshoe bat</u></p> <p>Box Mine SSSI:</p> <ul style="list-style-type: none"> • 1983-1985: Mean peak count = 3, Highest count = 10 (Dec 1983) • 1997-2014: Mean peak count = 197, Highest count = 452 (Jan 2014) <p>Winsley Mine SSSI:</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<ul style="list-style-type: none"> 1977-1988: Mean peak count = 1-2, Highest count = 6 (Dec 1984) <p>Greater horseshoe bat Box mine SSSI:</p> <ul style="list-style-type: none"> 1983-1985: Mean peak count = 79, Highest count = 125 (Dec 1984) 1997-2014: Mean peak count = 145, Highest count = 281 (winter 2006/2007) <p>Winsley Mines SSSI:</p> <ul style="list-style-type: none"> 1977-1988: Mean peak count = 38 (1977-1988), Highest count = 56 (April 1985) <p>Bechstein's bat Numbers of hibernating Bechstein's recorded are low. The species has not been recorded at every component site (records are from Box Mine and Brown's Folly), nor during every survey, but this does not necessarily mean it was not present. Bechstein's have regularly been recorded during autumn swarming surveys at Box Mine and Brown's Folly further suggesting the importance of these sites for hibernation irrespective of the low numbers physically recorded.</p>	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitats which support the features.	<p>In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.</p> <p>The total area of the SAC is 106.45 ha comprising above-ground land containing the mine entrances at each site and most (but not all) of the underground extent. The habitats which support the feature are proportioned approximately as follows:</p> <ul style="list-style-type: none"> Broadleaved deciduous woodland: 44 ha Mines: 59 ha 	<p>NATURAL ENGLAND, March 2009. <i>Box Mine SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Brown's Folly SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Combe Down and Bathampton Down Mines SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<ul style="list-style-type: none"> Semi-natural grassland and scrub mosaic: 4 ha 	NATURAL ENGLAND, March 2009. <i>Winsley Mines SSSI Favourable Condition Tables</i> . Available from Natural England on request.
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the features and their supporting habitats, including where applicable the component vegetation types and associated transitional vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.	
Supporting habitat: structure/function	External condition of underground site - hibernation	<p>Maintain the structural integrity of the entrances, with no recent collapses/falls or signs of geological instability.</p> <p>Maintain the external condition of the site, with vegetation (where present) close to entrances, but not obstructing them. No artificial lights shining on entrances.</p>	<p>Changes in air flow conditions at the entrances are likely to have a negative effect on the temperature and humidity of the roost within the underground part of the site, and increases in light levels at the entrances may affect bat usage, and/or cause disturbance to bats roosting within.</p> <p>There should be no recent collapses/falls or new signs of geological instability at roost entrances, as collapses could obstruct bat access, and alter air flows into the mines</p> <p>Vegetation is required close to the entrances to enable bats to feel secure enough to leave at dusk rather than delaying until fully dark. Any lights shining on the entrances are likely to deter the bats from leaving.</p> <p>Vegetation (grassland/scrub/woodland) directly surrounding the entrances is important for the maintenance of optimal humidity conditions inside the mine systems and also as foraging areas. The structure of surrounding woodland should be maintained.</p>	<p>CHALKHILL ENVIRONMENTAL CONSULTANTS, 2001. <i>Box Mine SSSI: baseline assessment of underground bat roost SSSI entrances</i>. Report for English Nature. Available from Natural England on request.</p> <p>CHALKHILL ENVIRONMENTAL CONSULTANTS, 2001. <i>Winsley Mines SSSI: baseline assessment of underground bat roost SSSI entrances</i>. Report for English Nature. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Box Mine SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Brown's Folly SSSI</i></p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p><i>Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Combe Down and Bathampton Down Mines SSSI Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Winsley Mines SSSI Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Supporting habitat: structure/function	Internal condition of underground site - hibernation	<p>Maintain appropriate light levels, humidity, temperature and ventilation.</p> <p>Maintain the structural integrity of the roost space.</p>	<p><u>Lesser horseshoe bat</u> The preferred temperature of lesser horseshoe hibernation sites is a stable 6-7°C, with humidity approaching 100% (Schofield, 2008).</p> <p><u>Greater horseshoe bat, Bechstein's bat</u> There is currently insufficient information available in the academic press to provide specific targets on humidity, temperature, light levels and ventilation preferred by the species during the hibernation period. Maintain stable cool and dark conditions.</p>	<p>NATURAL ENGLAND, March 2009. <i>Box Mine SSSI Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Brown's Folly SSSI Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Combe Down and Bathampton Down Mines SSSI Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Winsley Mines SSSI</i></p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p><i>Favourable Condition Tables.</i> Available from Natural England on request.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook.</i> Vincent Wildlife Trust.</p>
Supporting habitat: structure/function	Roost access	Maintain the number of access points to the roosts, at an optimal size and in an unlit and unobstructed state, with surrounding vegetation providing sheltered flyways without obstructing accesses	<p>This will prevent any negative internal climatic changes within the roost and maintain the ability of bats to freely enter and leave the roost as necessary. Normal minima dimensions:</p> <ul style="list-style-type: none"> • lesser horseshoe bats: 300 x 200mm • greater horseshoe bats: 400 x 300mm 	<p>Access point locations are held by Natural England. This information is sensitive and requirements for it must be discussed with NE. Surveys are carried out by licenced persons.</p> <p>CHALKHILL ENVIRONMENTAL CONSULTANTS, 2001. <i>Box Mine SSSI: baseline assessment of underground bat roost SSSI entrances.</i> Report for English Nature. Available from Natural England on request.</p> <p>CHALKHILL ENVIRONMENTAL CONSULTANTS, 2001. <i>Winsley Mines SSSI: baseline assessment of underground bat roost SSSI entrances.</i> Report for English Nature. Available from Natural England on request.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Supporting habitat: structure/function	Supporting off-site habitat (flightlines)	Maintain the presence, structure and quality of any linear landscape features which function as flightlines. Flightlines should remain unlit, functioning as dark corridors.	<p>Flightlines will extend beyond the designated site boundary into the wider local landscape, and are also important for the commute between summer and winter roost sites.</p> <p><u>Lesser horseshoe bat</u> Lesser horseshoes tend to forage within 2.5km of their roost,</p>	<p>DIETZ, C., VON HELVERSEN, O. & NILL, D. 2009. <i>Handbook of the Bats of Europe and northwest Africa.</i> A & C Black.</p> <p>PARK K.J., JONES G. &</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>though they can travel up to 4km from their roosts to suitable foraging grounds (Schofield, 2008).</p> <p>Lesser horseshoes commute and forage along linear features over wet grassland and woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species.</p> <p><u>Greater horseshoe bat</u> Non-breeding greater horseshoe adults can forage up to 4km from roost sites. For juveniles, the distance tends to be roughly half this i.e. 2km.</p> <p>During the winter greater horseshoe bats emerge every couple of weeks for food and water, therefore habitat within the immediate vicinity of hibernation sites is important (Park, Jones & Ransome 2000).</p> <p>Greater horseshoes commute and forage along linear features, over grazed pasture and in woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species.</p> <p><u>Bechstein's bat</u> Bechstein's bats don't tend to range far from their roosts, generally up to a maximum distance of 1-2.5km, usually closer to 1km (Dietz <i>et al.</i> 2009). Generally forages within deciduous woodlands which contain water bodies, occasionally feeding along woodland edge, treelines and hedgerows. Bechstein's bat generally commutes along linear landscape features such as woodland edge and hedgerows, however, they will cross open fields to reach roost sites and foraging areas.</p>	<p>RANSOME R.D. 2000. <i>Torpor, arousal and activity of hibernating Greater Horseshoe Bats (Rhinolophus ferrumequinum)</i>. Functional Ecology 14: 580-588.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook</i>. Vincent Wildlife Trust.</p> <p>NATURAL ENGLAND (2014). Unpublished bat survey, assessment and management plan: land to the east of, and including, Box Quarry Wood, Wadswick. Available from Natural England on request</p>
Supporting habitat: structure/function	Supporting off-site habitat (foraging areas)	Maintain any core areas of feeding habitat outside of the SAC boundary that are critical to the bat features during their hibernation period	<p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. Key feeding areas around a roost, and the commuting routes (or flightlines) between them, will be an important element of sustaining the SAC population.</p> <p>Feeding areas used by SAC bats may be outside of the SAC boundary but be critical to successful hibernation (these undesignated areas are sometimes referred to as 'sustenance</p>	<p>DIETZ, C., VON HELVERSEN, O. & NILL, D. 2009. <i>Handbook of the Bats of Europe and northwest Africa</i>. A & C Black.</p> <p>PARK K.J., JONES G. & RANSOME R.D. 2000. <i>Torpor, arousal and activity of hibernating Greater Horseshoe Bats</i></p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>zones' or 'functionally-linked land').</p> <p><u>Lesser horseshoe bat</u> Within the winter a mean foraging radius of 1.2 km around hibernation sites is reported. Lesser horseshoes commute and forage along linear features over wet grassland and woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species.</p> <p>During the winter, lesser horseshoes emerge from hibernacula about once every two weeks for water / food, therefore condition of habitat in the immediate vicinity of hibernacula is very important. Winter prey (e.g. crane-flies, winter gnats, midges, dung flies) is often associated with damp woodland with decaying wood, and grazed pasture with abundant dung.</p> <p><u>Greater horseshoe bat</u> Non-breeding greater horseshoe adults can forage up to 4km from roost sites. For juveniles, the distance tends to be roughly half this i.e. 2km.</p> <p>During the winter greater horseshoe bats emerge every couple of weeks for food and water, therefore habitat within the immediate vicinity of hibernation sites is important (Park, Jones & Ransome 2000).</p> <p>Greater horseshoes commute and forage along linear features, over grazed pasture and in woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species.</p> <p><u>Bechstein's bat</u> Bechstein's bats don't tend to range far from their roosts, generally up to a maximum distance of 1-2.5km, usually closer to 1km (Dietz <i>et al.</i> 2009). Generally forages within deciduous woodlands which contain water bodies, occasionally feeding along woodland edge, treelines and hedgerows.</p>	<p>(<i>Rhinolophus ferrumequinum</i>). Functional Ecology 14: 580-588.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook</i>. Vincent Wildlife Trust.</p>
Supporting processes (on which the	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider	This recognises the increasing likelihood of supporting habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological	NATURAL ENGLAND. 2015. <i>Climate Change Theme Plan and supporting National Biodiversity</i>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature and/or its supporting habitat relies)		environmental change, either within or external to the site	<p>system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of its supporting habitats. This means that this site is considered to be vulnerable overall but is a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>Increasing winter temperatures may result in less time in torpor/hibernation e.g. more frequent awakening or earlier spring emergence, requiring more frequent winter feeding and food to be available earlier in the year.</p> <p>Climate change resilience will be aided by the protection and maintenance of quality feeding habitat close to the roosts.</p> <p>Increase in the number and spread of tree diseases may lead to a widespread death of trees and/or decline in quality of woodland habitats e.g. ash dieback, acute oak decline, requiring potential replacement of trees both within the SAC and across the SAC landscape.</p>	<p><i>Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England.</i> Available at: http://publications.naturalengland.org.uk/publication/4954594591375360</p> <p>SHERWIN, H.A., MONTGOMERY, W.I. & LUNDY, M.G. 2013. <i>The Impact and Implications of Climate Change for Bats.</i> Mammal Review 43: 171-182.</p> <p>VOIGT, C.C., SCHNEEBERGER, K., VOIGT-HEUCKE, S. & LEWANZIK, D. 2011. <i>Rain Increases the Energy Cost of Bat Flight.</i> Biology Letters 7: 793-795.</p>
Supporting processes (on which the feature and/or its supporting	Air quality	Restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air	The supporting habitat of this feature is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition (including food-plants) and reducing	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
habitat relies)		Pollution Information System (www.apis.ac.uk).	<p>supporting habitat quality and population viability of this feature.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development.</p> <p>The current levels of nitrogen deposition on the SAC (min. 28.1 kg/ha/yr; max. 35.3 kg/ha/yr; average 29.3 kg/ha/yr, APIS accessed 15 January 2019) exceeds the Critical Load range of 10-20 kg/ha/yr for the supporting habitat (broadleaved deciduous woodland), indicating that restoration is necessary.</p> <p>It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p>	(www.apis.ac.uk).
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and its supporting habitats.	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>Management for this site includes installing/maintaining grilles at hibernation roost entrances, preventing disturbance, maintaining appropriate internal conditions including temperature, humidity and airflow, maintaining appropriate vegetation cover around entrances, and ensuring supporting woodland and nearby foraging areas are optimised.</p>	<p>NATURAL ENGLAND, 2015. Bath and Bradford-on-Avon Bats SAC Site Improvement Plan (SIP). Available at: http://publications.naturalengland.org.uk/publication/4564119772463104</p> <p>ENGLISH NATURE, 2004. <i>A statement of English Nature's views about the management of Box Mine Site of Special Scientific Interest (SSSI)</i>. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>005600.pdf</p> <p>ENGLISH NATURE, 2005. <i>A statement of English Nature's views about the management of Brown's Folly Site of Special Scientific Interest (SSSI)</i>. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1002510.pdf</p> <p>ENGLISH NATURE, 2004. <i>A statement of English Nature's views about the management of Combe Down and Bathampton Down Mines SSSI Site of Special Scientific Interest (SSSI)</i>. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1005602.pdf</p> <p>ENGLISH NATURE, 2004. <i>A statement of English Nature's views about the management of Winsley Mines Site of Special Scientific Interest (SSSI)</i>. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1005675.pdf</p>
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise human access to roost sites.	Site should be secured against unauthorised access, which can result in disturbance to bats at critical times of year and which can affect their population viability and use of the site. Grilles on site access points should be maintained where present and additional grilles should be installed where necessary.	<p>NATURAL ENGLAND, March 2009. <i>Box Mine SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Brown's Folly SSSI Favourable Condition Tables</i>. Available from Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Combe Down and Bathampton Down Mines SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, March 2009. <i>Winsley Mines SSSI Favourable Condition Tables</i>. Available from Natural England on request.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Version Control

Advice last updated: **20 March 2019**: Following stakeholder comments. Small changes to text in various attributes to improve clarity.

Variations from national feature-framework of integrity-guidance:

- 1) Attribute: 'External condition of building - maternity colony' – removed as not a maternity colony.
- 2) Attribute: 'External condition of building - hibernation site' – removed as hibernation site is not a building.
- 3) Attribute: 'Internal condition of building or underground roost – hibernation' – the internal condition attributes and targets are relevant but added the word “underground” and deleted the words “building” and “maternity”. Under Supporting and Explanatory Notes, deleted section referring to maternity roosts as not relevant.
- 4) Attribute: 'External condition of underground site - maternity and hibernation' – deleted “maternity” as not relevant. Under Target changed “roost spaces” for “entrances” because these are relevant to the external part of the site whereas roost spaces are relevant to the attribute 'Internal condition of underground site'. Also added target relating to habitat/vegetation directly surrounding the entrances.
- 5) Attribute: 'Population abundance – maternity colony' – deleted as the SAC is designated for hibernating bats.
- 6) Attribute: 'Soils, substrate and nutrient cycling' – removed as not directly relevant to this bat site.
- 7) Attribute: 'Water quantity/quality' – removed as not directly relevant to this bat site.