



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

Beer Quarry and Caves Special Area of Conservation (SAC)
Site code: UK0012585



Greater Horseshoe bats hibernating in Beer Quarry Cave
(© D.Wills, February 2004)

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Beer Quarry and Caves 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	Beer Quarry and Caves Special Area of Conservation (SAC)
Location	Devon
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	31.10 ha
Designation Changes	Not applicable
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)	Beer Quarry and Caves SSSI The boundaries of the SAC and SSSI are the same.
Relationship with other European or International Site designations	Not applicable

Site background and geography

Beer Quarry and Caves are located close to the coastal village of Beer in East Devon. The site is within the [Blackdowns National Character Area \(NCA 147\)](#) and is within the East Devon Area of Outstanding Natural Beauty (AONB). The site is important for its population of hibernating bats.

The southern part of the site comprises an extensive series of caves which have been formed by many years of mining for Beer Stone. The earliest underground sections on the site date from Roman times and the stone-mining continued through the Norman and Medieval periods, with stone from the site being used in many of the great cathedrals of the country including Exeter, Winchester and St. Paul's Cathedral and Westminster Abbey. Quarrying at the site continued through the Victorian era and ceased in the early 20th Century when a new quarry was opened nearby. Beer Quarry Caves are open to the public for guided underground tours from April to October, the caves are closed to the general public in the winter.

Regular recording of bats began in 1951 and in recent years there have been large numbers of an unusually wide range of bat species. These include the very rare Bechstein's bat *Myotis bechsteinii*, the Greater Horseshoe bat *Rhinolophus ferrumequinum* and Lesser Horseshoe bat *R. hipposideros*, which are the qualifying species of the SAC.

The northern part of the site is an actively worked quarry and the old tunnels there are also used by bats.

The designated area of the SAC is relatively discrete and comprises the areas immediately surrounding the quarry and caves, however, the bat populations are dependent upon a much wider area outside the

SAC boundary, which provides foraging habitat and commuting routes and supports nearby summer maternity roosts (which are undesignated). Features of importance in the wider landscape include woodland and scrub, grazed pasture, hedgerows, linear trees, water-courses, wetland habitats and certain key buildings used as maternity roosts or night roosts.

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 *Rhinolophus hipposideros* is one of the smallest bats in the UK. During the summer they form maternity colonies in old buildings and emerge to hunt in nearby woodland and in wooded riparian corridors. The species prefers sheltered valleys with extensive deciduous woods or dense scrub, close to roost sites. Where habitat is fragmented, linear features such as mature tree-lines and hedgerows are important corridors between roosts and foraging areas. Semi or unimproved wet pasture bounded by hedgerows has been found to be a key foraging habitat used by lesser horseshoes in a large roost in North Wales. In summer most foraging activity takes place within 2.5km radius of the day roost (Bontadina *et al.*, 2002) and within 1.2km of the hibernaculum in winter (Williams, 2001).

In wooded habitats, lesser horseshoe bats feed within or below the tree canopy, taking small flying insects including *Diptera* (flies including midges, gnats and dung flies), *Tipulids* (crane flies) and *Lepidoptera* (moths).

In winter lesser horseshoe bats hibernate in caves, mines and other cave-like places. 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.

Beer Quarry and Caves are used for hibernation during the winter by a large number of lesser horseshoe bats. Outside of the hibernation period, it is rare to find bats day-roosting in the caves but netting and radio-tracking surveys (Mathews 2009) found that the site is used by night-roosting greater and lesser horseshoe bats.

The lesser horseshoe bat is a widespread but rare species in central and southern Europe, extending as far eastwards as the Middle East. It has suffered widespread population declines, especially in the more northern parts of its range. The UK supports one of the largest populations of this species in western Europe.

The lesser horseshoe bat has a total population of approximately 50,000 individuals in the UK. Historic population declines means it is now restricted in its distribution to Wales, the West Midlands and South West England.

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

The greater horseshoe bat *Rhinolophus ferrumequinum* is one of the largest bats in the UK. During the summer, they form maternity colonies, generally in large old buildings, and forage in pasture and parkland, edges of mixed deciduous woodland and hedgerows. Cockchafers and dung beetles form a high proportion of the diet in the summer and are especially important for juvenile bats, therefore, the greater horseshoe bat is highly dependent on pasture grazed by livestock (cattle grazing is especially important) (Ransome, 1996). *Lepidoptera* (moths), *Tipulids* (craneflies), *Trochoptera* (caddis flies) and other flies are an important part of the bats' diet at other times of the year. Juvenile bats initially hunt within a 1 km radius of the maternity roost and the foraging distance gradually increases with age. Adult greater horseshoe bats have been recorded foraging within 3 to 7 km from the roost (Billington & Jones

1999, Billington 2000 & 2001). A good feeding area or “sustenance zone” within a radius of about 4 km of the maternity roosts is considered critical to the long-term survival of the population.

In winter greater horseshoe bats 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. 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.

Beer Quarry and Caves are used in winter by a large number of hibernating Greater Horseshoe bats, most of which are found in a small proportion of the quarry, often in large clusters hanging from electrical cables and wires. Outside of the hibernation period, it is rare to find bats day-roosting in the caves but netting and radio-tracking surveys (Mathews 2009) found that the site is used by night-roosting greater and lesser horseshoe bats.

The greater horseshoe bat occurs throughout central and southern Europe and extends eastwards across Asia as far as Japan. However, it is a rare species in Europe, and has suffered a considerable decline in central Europe.

In the UK the population of greater horseshoe bats are close to the climatic limits for the species. The UK greater horseshoe bat population suffered a dramatic decline in its range during the 20th century. The species is now limited to south-west England and south Wales. Populations are localised and fragmented. A study on its population trends in the UK between 1997 and 2012 has revealed a significant recovery in numbers although it remains one of the UK’s rarest bats. The latest total population size estimate for greater horseshoe bat in UK is approximately 12,900 individuals (Mathews *et al.*, 2018).

- **S1323 Bechstein’s bat *Myotis bechsteinii***

Bechstein’s bat is a medium-sized species, with very long ears and a long, pointed, bare, pink face. It has shaggy light-to reddish-brown fur on its back and contrasting greyish white-tipped fur on its underside.

The Bechstein’s bat forages primarily in and around broad-leaved woodland and also along large hedgerows and wooded riparian corridors and can roost in individual trees in these environments. Bechstein’s bat has a diet rich in *Lepidoptera* (moths) and woodland associated *Diptera* (flies); *Planipennia* (particularly Lacewings) and *Coleoptera* (beetles), *Chilopoda* (centipedes), *Dermaptera* (earwigs) and *Arachnida* (harvestmen) are also taken.

Maternity roosts are usually in trees, most commonly in old woodpecker holes or rot holes. In some woodlands bat boxes are also used. Maternity colonies may move between suitable crevices within a small area of woodland. The species is believed to hibernate in hollow trees and also in underground localities.

Beer Quarry Caves are used for hibernation by a small number of Bechstein’s bats during the winter. The site is also of importance as a swarming site for this species (and other *Myotis* species) during the autumn. The precise function of swarming sites is unknown but they are likely to be linked with mating activity, so are extremely important for the conservation of the species (Parsons *et al.*, 2003).

Bechstein’s bat is one of the rarest bats in western Europe, and is regarded as endangered in several countries. A population decrease has been reported over most of its European range. The species occurs from the Iberian peninsula east to the Ukraine and Moldova. Local populations in southern England, Wales, southern Sweden and Bornholm mark the northern border of the range.

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.

Site-specific seasonality of SAC feature

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. Additional site-based surveys may be required.

Feature	Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lesser horseshoe	Hibernation												
Greater horseshoe	Hibernation												
Bechstein`s bat	Hibernation												
Bechstein`s bat	Autumn swarming												

**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 feature)	Population abundance - hibernation site	<p><u>Lesser horseshoe bat</u> Maintain the abundance of the population at a level which is above 107 individuals, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p><u>Greater horseshoe bat</u> Maintain the abundance of the hibernating population at a level which is above 146 individuals, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p><u>Bechstein’s bat</u> Maintain the presence of hibernating Bechstein’s bat at the site, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</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 or presence 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>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and</p>	<p>BAT CONSERVATION TRUST, 2005 – 2015. <i>National Bat Monitoring Programme Data: Beer Quarry and Caves 2005 - 2015</i>. Data held by Bat Conservation Trust and Natural England. Available from Natural England on request.</p> <p>NATURAL ENGLAND, (1951 – 2006). <i>Beer Quarry and Caves hibernating bat counts, 1951 – 2006</i>. Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>. Report for Natural England. 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>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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 on the date of the visit. The overall number of bats using the SAC is likely to be higher because, different individuals may move in and out of the site over the course of the season and numbers seen on a particular day will depend on many factors including weather around the time of visit. In addition, for underground stone mines it is estimated that as few as 5-8% of crevice-using bats might be seen on a survey visit, while the remainder are hidden (Stebbing, 1992).</p> <p><u>Lesser horseshoe bat</u> The baseline value is derived from the mean of the annual peak hibernation counts submitted to the National Bat Monitoring Programme over the 6 year period 2010 - 2015 (mean 107 individuals). Numbers of lesser horseshoe bats hibernating in the site have fluctuated from year to year over this period, range: 68 (in 2012) – 150 (in 2015).</p> <p><u>Greater horseshoe bat</u> The baseline value is derived from the mean of the annual peak hibernation counts submitted to the National Bat Monitoring Programme over the 6 year period 2010 – 2015 (mean 146 individuals). Numbers of greater horseshoe bats hibernating in the site have consistently increased year on year over this period, range: 118 (in 2011) – 181 (in 2015). This upwards trend in numbers has continued since then and the latest peak count made in January 2019 recorded 246 greater horseshoe bats.</p> <p><u>Bechstein's bat</u> Numbers of Bechstein's bat recorded during hibernation counts have always been very low (e.g. 1 or 2 individuals, occasionally 3) and in some years none have been seen, although that does not necessarily mean that they have not been present. The presence of hibernating Bechstein's bat should be maintained over a 6 year reporting cycle.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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 31.10 ha, which comprises all the land area encompassing the quarry and mine entrances to the south side of the road and the majority but not all of the quarry area to the north side of the road. Most but possibly not all of the underground extent is included in the designated area.</p> <p>The total extent of the numerous underground roost spaces and key entrances (as mapped or described in documents held by Natural England) should be maintained.</p> <p>The designated area of the SAC is relatively discrete and comprises the areas immediately surrounding the quarry and caves, however, the bat populations are dependent upon a much wider area outside the SAC boundary, which provides foraging habitat and commuting routes and supports nearby summer maternity roosts and night roosts. Features of importance in the wider landscape include woodland and scrub, grazed pasture, hedgerows, linear trees, water-courses, wetland habitats and certain key buildings used as maternity roosts or night roosts.</p>	<p>ARC SOUTHERN (undated map). <i>Beer Mine</i> (Unpublished map of underground passages within area of active quarry annotated with locations of roosting bats recorded during survey 06/10/1998). Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>. Report for Natural England. Available from Natural England on request.</p>
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, across the site.	<p>A contraction in the range, or geographic spread, of the feature across the site 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.</p>	<p>ARC SOUTHERN (undated map). <i>Beer Mine</i> (Unpublished map of underground passages within area of active quarry annotated with locations of roosting bats recorded 06/10/1998). Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The distribution of the numerous underground roost spaces and key entrances and their continuity (as mapped or described in documents held by Natural England) should be maintained.	Report for Natural England. Available from Natural England on request.
Supporting habitat: structure / function	External condition of underground site - hibernation	Restore the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability.	<p>Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.</p> <p>Target set to 'Restore' for the northern part of the site because some sections in this part of the site are considered sub-optimal for bats as some parts of the tunnel system have been filled with spoil/collapsed and some parts are draughty and exposed. There are opportunities to improve the tunnels in this area as hibernacula by carrying out work to reduce the draught e.g. by reducing the number of entrances, providing new grilles to protect the entrances and providing internal links to roosting areas. The condition of the entrances and tunnels on the south side of the site should be maintained.</p>	<p>NATURAL ENGLAND, 2010 <i>Favourable Condition Tables Beer Quarry and Caves SSSI</i>. Available from Natural England on request.</p> <p>WILLS, D. 2005. <i>Enhancement proposals Beer Quarry Caves – Hansen</i>. Report for Natural England. Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>. Report for Natural England. Available from Natural England on request.</p>
Supporting habitat: structure / function	Internal condition of underground site - hibernation	Restore appropriate light levels, humidity, temperature and ventilation.	<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>Target set to 'Restore' for the northern part of the site because some sections in this part of the site are considered sub-optimal for bats as some parts of the tunnel system have been filled with spoil/collapsed and some parts are draughty and exposed. There are opportunities to restore appropriate levels of humidity, temperature and ventilation in tunnels in this area so that they are more suitable as hibernacula by carrying out work to reduce the draught e.g. by reducing the number of</p>	<p>NATURAL ENGLAND, 2010 <i>Favourable Condition Tables Beer Quarry and Caves SSSI</i>. Available from Natural England on request.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook</i>. Vincent Wildlife Trust.</p> <p>WILLS, D. 2005. <i>Enhancement proposals Beer Quarry Caves – Hansen</i>. Report for Natural England. Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>. Report for Natural England.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			entrances, providing new grilles to protect the entrances and providing internal links to roosting areas. The condition of the entrances and tunnels on the south side of the site should be maintained.	Available from Natural England on request.
Supporting habitat: structure / function	Roost access	Restore the number of access points to the roost 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 minimum dimensions:</p> <ul style="list-style-type: none"> • lesser horseshoe bats: 300 x 200mm • greater horseshoe bats: 400 x 300mm <p>Target set to 'Restore' for the northern part of the site because it is considered that improvements could be made around some of the entrances to reduce the draughty nature of some of the tunnels. In addition, some areas require regular scrub management to control scrub around the mine/cave entrances so that it does not impede the bat flightpaths when accessing the site – a scrub management plan needs to be agreed and implemented. The condition of the entrances and tunnels on the south side of the site should be maintained.</p>	<p>NATURAL ENGLAND, 2010 <i>Favourable Condition Tables Beer Quarry and Caves SSSI</i>. Available from Natural England on request.</p> <p>NATURAL ENGLAND, 2015. <i>Beer Quarry and Caves SAC Site Improvement Plan</i>. Available at: http://publications.naturalengland.org.uk/publication/6028043134959616?category=5755515191689216</p> <p>WILLS, D. 2005. <i>Enhancement proposals Beer Quarry Caves – Hansen</i>. Report for Natural England. Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>. Report for Natural England. Available from Natural England on request.</p>
Supporting habitat: structure / function	Supporting off-site habitat (flightlines)	Restore 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.</p> <p>Lesser horseshoe bat Lesser horseshoes tend to forage within 2.5km of their roost, though they can travel up to 4km from their roosts to suitable foraging grounds (Schofield, 2008). 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>DIETZ, C., VON HELVERSEN, O. & NILL, D. 2009. <i>Handbook of the Bats of Europe and northwest Africa</i>. A & C Black.</p> <p>MATHEWS, F. 2009. <i>Radiotracking Study of Greater Horseshoe Bats from Beer and Branscombe 2009 for the East Devon Area of Outstanding Beauty Partnership</i>. Note: this report contains</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Greater horseshoe bat Non-breeding greater horseshoe adults can forage up to 4km from roost sites. For breeding females and juveniles, the distance tends to be roughly half this i.e. 2km. 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>Bechstein's bat 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). Though, a few breeding females may choose to roost in hedgerow trees, which have connections to the main woodland habitat. Generally forages within deciduous woodland 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, hedgerows, however, they will cross open fields to reach roost sites and foraging areas. Flightlines will extend beyond the designated site boundary into the wider local landscape.</p> <p>Target is set to 'Restore' because parts of the plateau area to the west and north of the site outside of the SAC boundary are considered to be suboptimal for horseshoe bats and flightlines need be enhanced through tree-planting or hedge restoration/recreation. Influencing sympathetic management adjacent to the site is likely to help support the designated features of the SAC. This could be achieved through the use of agri-environment schemes, through the Local Plan policies or possibly through biodiversity net gain.</p>	<p>sensitive information and requirements for it must be discussed with NE.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook</i>. Vincent Wildlife Trust.</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> Lesser horseshoes tend to forage within 2.5km of their summer roost, though they can travel up to 4km from these roosts to suitable foraging grounds (Schofield, 2008). Within the winter, their foraging range is reduced, with a mean foraging radius of 1.2 km around hibernation sites 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> 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><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 woodland 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>(<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 feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	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 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	NATURAL ENGLAND. 2015. <i>Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England</i> .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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>Climate change could lead to increased fluctuations in winter temperature and increases in spells of “unseasonal” mild weather leading to more frequent awakening from torpor 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 maintenance and restoration of quality feeding habitats close to the site and throughout the surrounding “sustenance zone”.</p> <p>Increase in number and spread of tree diseases may lead to loss of trees in the wider landscape (e.g. Ash die-back could lead to a loss of many hedgerow trees) and a decline in quality of woodland habitats. This may require action to provide potential replacement hedgerow trees <i>etc</i> within the SAC and the wider landscape.</p>	<p>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. 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. 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> <p>Target is set to 'Restore' because current levels of nitrogen deposition (APIS accessed on 16/01/2019) exceed the minimum critical load for the supporting broad habitat: Broad-leaved, mixed and yew woodland.</p>	(www.apis.ac.uk).
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to Restore the structure, functions and supporting processes associated with the feature and/or 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:</p> <ul style="list-style-type: none"> • Preventing disturbance to bats by installing grilles or appropriate fencing to control access to the mine entrances. • Improving appropriate internal conditions, including temperature, humidity and airflow by taking measures to address draughtiness of some sections. • Restoring appropriate levels of vegetation cover around 	<p>ENGLISH NATURE, 2005. <i>A statement of English Nature's views about the management of Beer Quarry and Caves Site of Special Scientific Interest (SSSI)</i>. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1001396.pdf</p> <p>NATURAL ENGLAND, 2015. <i>Beer Quarry and Caves SAC Site Improvement Plan</i>. Available at: http://publications.naturalengland.org.uk/publication/6028043134959616?category=5755515191689216</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>the entrances.</p> <ul style="list-style-type: none"> Maintaining and restoring flightpaths and foraging habitats, within and connecting to the SAC. 	
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise human access to roost sites	<p>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.</p> <p>Entrances in northern part of the site are not secure and are subject to unauthorised access and bats in these areas are vulnerable to disturbance – this issue should be addressed through the use of suitable grilles where these can be fitted or palisade fencing erected at a suitable distance that allows the bats unrestricted flight into the mine entrances but still provides the necessary security to the entrances.</p> <p>Entrances in the southern part of the site are fitted with secure grilles.</p>	<p>NATURAL ENGLAND, 2010 <i>Favourable Condition Tables Beer Quarry and Caves SSSI</i>. Available from Natural England on request.</p> <p>WILLS, D. 2005. <i>Enhancement proposals Beer Quarry Caves – Hansen</i>. Report for Natural England. Available from Natural England on request.</p> <p>WILLS, D. 2009. <i>Condition Assessment Beer Quarry Caves</i>. Report for Natural England. Available from Natural England on request.</p>
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, Maintain water quality and quantity to a standard which provides the necessary conditions to support the feature.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p><u>Bechstein's bat</u> Bechstein's bats are strongly associated with broad-leaved woodland containing small streams. The species also forages along wooded riparian corridors. These riparian/ wet woodland</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			habitats are present in the off-site supporting habitat within the sustenance zone likely to be used by foraging Bechstein's bats outside the SAC boundary. There is a possibility that these habitats could be impacted by water abstractions.	
Version Control				
Advice last updated: 22/03/2019 . Following stakeholder feedback. Population abundance attribute - baseline population targets updated using most recent data due to a sustained increase in the greater horseshoe bat population.				
Variations from national feature-framework of integrity-guidance:				
<ol style="list-style-type: none"> 1) Attribute: 'External condition of building - maternity colony' – removed as not 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. 5) Attribute: 'Population abundance - maternity colony' – deleted as the SAC is designated for hibernating bats. 6) Attribute: Distribution of supporting habitat - deleted the words “including where applicable its component vegetation types and associated transitional vegetation types,” 7) Attribute: 'Soils, substrate and nutrient cycling' – removed as not directly relevant to this bat site. 8) Attribute: 'Supporting habitat: structure / function – woodland site – maternity colony' (Bechstein's bat) – section deleted as not relevant. 				

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