



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

**North Somerset and Mendip Bats Special Area of Conservation (SAC)
Site Code: UK0030052**



Greater horseshoe bats in limestone cave © Natural England/Michael Hammett

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to North Somerset and Mendip Bats SAC.

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

This advice replaces a draft version dated 21 January 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	North Somerset and Mendip Bats Special Area of Conservation (SAC)
Location	Somerset (England) and the Unitary Authorities of North Somerset and Bath & North East Somerset (England)
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	561.19 hectares
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)	Banwell Caves SSSI, Banwell Ochre Caves SSSI, Brockley Hall Stables SSSI, Compton Martin Ochre Mine SSSI, King's Wood and Urchin Wood SSSI, The Cheddar Complex SSSI, Wookey Hole SSSI. All of these SSSIs except for The Cheddar Complex are fully within the SAC. Approximately 85% of the Cheddar complex is SAC.
Relationship with other European or International Site designations	This SAC is functionally linked with the Mendip Limestone Grassland SAC , Mendip Woodlands SAC , Mells Valley SAC , Bath and Bradford on Avon Bats SAC with the bats moving between these sites.

Site background and geography

An archipelago site incorporating individual components located mainly in the [Mendip Hills National Character Area](#) but also beyond this into the [Bristol, Avon Valleys and Ridges National Character Area](#) in North Somerset. The component sites are highly variable including one of the largest areas of ancient woodland in the former county of Avon; Cheddar Gorge and surrounding sites; as well as caves, mines and buildings in the surrounding areas. The SAC as a whole supports 3% of the UK population of Greater horseshoe bats and internationally significant populations of lesser horseshoe bats. The site also contains internationally important ravine woodland and calcareous grassland interest as supporting features of the bats and also in their own right.

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:

- **H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia)**

The Cheddar complex and Wookey Hole areas support a wide range of semi-natural habitats including semi-natural dry grasslands. The principal community present is CG2 *Festuca ovina* – *Avenula pratensis* grassland which occurs on rock ledges and on steep slopes with shallow limestone soil, especially in the dry valleys and gorges and on the south-facing scarp of the Mendips. The site is also important for the large number of rare plants which are associated with Carboniferous limestone habitats. These include dwarf mouse-ear *Cerastium pumilum*, Cheddar pink *Dianthus gratianopolitanus* and rock stonecrop *Sedum forsterianum*, which occur on rocks, screes, cliffs and in open grassland. Transitions to and mosaics with limestone heath, calcareous screes, scrub and 9180 Tilio-Acerion forests are a particular feature of the Cheddar complex part of the site.

- **H9180 Tilio-Acerion forests of slopes, screes and ravines**

The main block of Tilio-Acerion forest at Kings and Urchin's Wood has developed over limestone which outcrops in parts of the site and forms a steep scarp to the south-east. Ash *Fraxinus excelsior* predominates in the canopy with small-leaved lime *Tilia cordata*, yew *Taxus baccata* and elm *Ulmus spp.*, mostly formerly coppiced, but including some pollard limes. There is a rich ground flora including lily-of-the-valley *Convallaria majalis*, columbine *Aquilegia vulgaris*, angular Solomon's-seal *Polygonatum odoratum* and purple gromwell *Lithospermum purpureocaeruleum*. There is also a small amount of Tilio-Acerion forest within The Cheddar Complex and as well as lime there are also rare whitebeams (*Sorbus spp.*).

- **H8310 Caves not open to the public**

Caves are formed by the erosion of soluble rocks, such as limestones. They typically form the subterranean components of a distinctive 'karst' landscape, and are associated with various topographic features, including gorges, dry valleys, 8240 Limestone pavements, and dolines (surface depressions and hollows). Caves not open to the public is interpreted as referring to natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species.

Caves lack natural illumination, and therefore support species which are adapted to living in the dark. Microclimatic conditions vary widely within and between caves, and this determines the composition of the fauna and flora. This site includes caves selected because they are important hibernation sites for bat species.

Only natural caves have been selected. Sites that are entirely artificial in origin, e.g. mines and tunnels, are excluded from the Annex I definition, even though in some cases the species present may be similar to those of more natural sites.

Caves within the Cheddar Complex and Wookey Hole SSSIs form some of the finest examples of deep phreatic (sub-water table) limestone caves in Britain. Badger Hole and Rhinoceros Hole are two dry caves on the slopes above the Wookey ravine near the Wookey Hole resurgence and contain *in situ* cave sediments laid down during the Ice Age. The sediments contain remains of fossil mammals and occasional human artefacts. This is the only site in the Mendips and one of the few in Britain at which a continuous sequence of sediments of this age can be examined.

Some caves within the site are included because they support S1303 lesser horseshoe and S1304 Greater horseshoe bat features, but not the H8310 Caves not open to the public feature. Some caves in wider the area are famously exploited for tourism and are excluded from selection.

Qualifying Species:

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

The lesser horseshoe bat 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. The species prefers sheltered valleys with extensive deciduous woods or dense scrub, close to roost sites. Where habitat is fragmented, linear features such as hedgerows are important corridors between roosts and foraging areas. Ideally, roost sites offer a range of temperature conditions in different parts of a single site, allowing the bats to change location; otherwise breeding females are likely to change site during the summer. In winter they 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.

The lesser horseshoe bat is also 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, making it a 'European Protected Species'. A [Licence](#) may therefore be required for any activities likely to harm or disturb lesser horseshoe bat.

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

The greater horseshoe bat 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, 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. 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. 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 site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat *Rhinolophus ferrumequinum* population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills.

The greater horseshoe bat is also 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, making it a 'European Protected Species'. A [Licence](#) may therefore be required for any activities likely to harm or disturb greater horseshoe bat.

Site-specific seasonality of SAC features

The table below highlights in grey those months in which significant numbers of each 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. The presence of the features may vary depending on weather conditions.

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	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Greater horseshoe bat	Breeding													
Lesser horseshoe bat	Breeding													
Greater horseshoe bat	Hibernation													
Lesser horseshoe bat	Hibernation													

Table A: Presence of qualifying SAC features within component SSSIs

SSSI	SAC feature				
	H6210 Dry grasslands and scrublands on chalk or limestone	H8310 Caves not open to the public	H9180 Mixed woodland on base-rich soils associated with rocky slopes	S1303 <i>Rhinolophus hipposideros</i> ; Lesser horseshoe bat	S1304 <i>Rhinolophus ferrumequinum</i> ; Greater horseshoe bat
Banwell Caves		X		X	X
Banwell Ochre Caves		X		X	X
Brockley Hall Stables					X
Compton Martin Ochre Mine					X
King's Wood and Urchin Wood		X	X		X
The Cheddar Complex	X	X		X	X
Wookey Hole		X			X

Table 1: Supplementary Advice for Qualifying Features: H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia); Dry grasslands and scrublands on chalk or limestone

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain and restore the total extent of the feature to approximately 151ha	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information.</p> <p>The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p> <p>Within the SAC, this feature is only found within The Cheddar Complex SSSI (137.57ha) and Wookey Hole SSSIs (14.2ha).</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>BURTON <i>et al.</i> 1983</p> <p>NATURAL ENGLAND. 2015b</p> <p>NATURE CONSERVANCY COUNCIL. 1988</p> <p>NATIONAL TRUST. 1995</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) 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. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Reference material as above.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>more isolated populations which are more vulnerable to extinction. These fragments also 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 some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>The area above Cheddar Gorge is a mosaic of habitats with some calcareous grassland and other patches of mesotrophic and acid grassland</p> <p>Acid grassland is found mainly at Blackrock, with small patches above the Gorge and the rest is mainly towards the eastern end of the Cheddar Complex. Lowland heath (c25ha) is found near Ulbey, Warren & Charterhouse. Calaminarian grassland (c2ha) is focused on spoil heaps at Blackmoor reserve, Charterhouse.</p>	
Structure and function (including its typical species)	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of natural 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 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 habitats/supporting habitats. This means</p>	NATURAL ENGLAND. 2015a Additional reference material as above.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. Structural connectivity refers to physical connections between habitat patches, often referred to as corridors, and functional connectivity is a measure of how easily species can move through the landscape and often relates to vegetation structure or management intensity. These connections can take the form of landscape features such as patches of habitat, hedges, watercourses and verges and will extend beyond the boundary of the designated sites. These features are critical for the migration, dispersal and genetic exchange of the species typically associated with the Annex 1 habitat features of the site.</p> <p>These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.</p>	SOMERSET WILDLIFE TRUST. 2016. Additional reference material as above.
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature</p> <ul style="list-style-type: none"> The constant and preferential plants of the CG2 grassland NVC community which form a key 	<p>Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;</p> <ul style="list-style-type: none"> Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). 	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Monitoring reports available from Natural England including surveys by:</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>component of a H6210 SAC habitat present on this site.</p> <ul style="list-style-type: none"> Vascular plant assemblage (see explanatory notes for further information) Variety of whitebeam trees <i>Sorbus</i> sp, including species which are endemic to the Gorge. <p>These include but may not be limited to: <i>Sorbus aria</i>; <i>Sorbus anglica</i>; <i>Sorbus eminens</i>, <i>Sorbus porrigentiformis</i>; <i>Sorbus cheddarensis</i>; <i>Sorbus eminentoides</i>; <i>Sorbus rupicoloides</i>.</p>	<ul style="list-style-type: none"> Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p> <p>Vascular plant assemblage includes: Cheddar Pink (<i>Dianthus gratianopolitanus</i>); Slender Bedstraw (<i>Galium pumilum</i>); Little Robin (<i>Geranium purpureum</i>); Spring Cinquefoil (<i>Potentilla neumanniana</i>). Dwarf mouse-ear (<i>Cerastium pumilum</i>); Soft-leaved sedge (<i>Carex montata</i>); Rock stonecrop (<i>Sedum forsteranium</i>); Limestone Fern (<i>Gymnocarpium robertianum</i>); Spring sandwort (<i>Minuartia verna</i>); Slender Tare (<i>Vicia parviflora</i>); Bitter Wood-vetch (<i>Vicia orobus</i>); Narrow-lipped Helleborine (<i>Epipactis muelleri</i> ssp. <i>leptochila</i>);</p>	<p>ALDER ECOLOGY Ltd. 2010 HOUSTON. 2006</p> <p>HOUSTON. 2012</p> <p>McDONNELL. 1997</p> <p>WESSEX ECOLOGICAL CONSULTANTS. 2004</p> <p>CROUCH. 2016</p>
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes	Additional reference material as above.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			associated with this Annex I feature.	
Structure and function (including its typical species)	Supporting off-site habitat	Maintain or where necessary restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	<p>This recognises that sites do not exist in isolation. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which are outside the designated site boundary and changes in surrounding land-use may adversely (directly or indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.</p> <p>Recent ecological network mapping provides a useful picture of the potential high-quality habitats in and around The Cheddar Complex and Wookey Hole some of which support high quality calcareous grassland habitats. Many of the sites covered by The Mendip Limestone Grassland SAC along with various other key SSSIs including King and Middle Down SSSI (Somerset Wildlife Trust), Bubwith Acres / Bradley Cross (Somerset Wildlife Trust), Draycott Sleigh SSSI, The Perch SSSI, Axbridge and Frys Hill.</p> <p>The CORE toolbox developed by Forest Research and Somerset Wildlife Trust allows ecological network maps to be assessed for coherence and resilience. This method highlights where ecological networks are fragmented and where creation or restoration work could link up habitats such as species rich grassland and woodland.</p>	SOMERSET WILDLIFE TRUST. 2016.
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type</p> <p>CG2 - <i>Festuca ovina-Avenula</i></p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from Natural</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<i>pratensis</i> grassland	vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	England on request.
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation zonations/transitions	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.	Additional reference material as above.
Structure and function (including its typical species)	Vegetation: proportion of herbs (including <i>Carex</i> spp)	Maintain the proportion of herbaceous species within the range 40%-90%	A high cover of characteristic herbs, including sedges (<i>Carex</i> species) is typical of the structure of this habitat type.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation: undesirable species	<p>Restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread;</p> <p>No species/taxa more than occasional throughout the sward or singly or together more than 5% cover</p> <p>No more than 10% cover of Tor –grass (<i>Brachypodium pinnatum</i>) and Upright brome (<i>Bromopsis erecta</i>), in period</p>	<p>There will be a range of undesirable or uncharacteristic species which, if allowed to colonise and spread, are likely to have an adverse effect on the feature's structure and function, including its more desirable typical species. These may include invasive non-natives such as <i>Cotoneaster</i> spp, or coarse and aggressive native species which may uncharacteristically dominate the composition of the feature.</p> <p>Target set to Restore because invasive non-natives are widespread on the site. They include <i>Cotoneaster</i> spp. (<i>Cotoneaster</i>); Common lilac (<i>Syringa vulgaris</i>); Rose-of-Sharon (<i>Hypericum calycinum</i>); Turkey oak (<i>Quercus cerris</i>). Control measures have been put in place but further works are required to eradicate them from the SAC</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from Natural England on request</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>May-July</p> <p>No more than 5% cover of tree and scrub cover</p> <p>Invasive non-native species should be absent.</p>		
Supporting processes (on which the feature relies)	Air quality	<p>Restore the 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 Pollution Information System (www.apis.ac.uk).</p>	<p>This habitat type 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 and causing the loss of sensitive typical species associated with it.</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.</p> <p>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 set to Restore because current levels of nitrogen deposition (APIS accessed on 10 December 2018) are exceeding the critical load for H6210 grassland.</p>	<p>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 (www.apis.ac.uk).</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature 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	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.	Additional reference material as above. ENGLISH NATURE, 2005a. ENGLISH NATURE, 2005b.
<p>Version Control Advice last updated: 19 February 2019 following stakeholder comments. 'Functional connectivity with wider landscape' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes. More detail added to "Supporting off site habitat" to clarify attribute in supporting and explanatory notes including explanation of CORE toolbox designed by Somerset Wildlife Trust and Forest Research.</p>				
<p>Variations from national feature-framework of integrity-guidance: The targets for some attributes listed above include both 'maintain' or 'restore' objectives. This is because this SPA is an extensive complex of geographically-separate component sites which are currently in different states of condition. Overall, both objectives will be applicable to the SPA but these will differ between each component site depending on its particular circumstances. Natural England will able to provide further specific advice on request."</p>				

Table 2: Supplementary Advice for Qualifying Features: H8310. Caves not open to the public

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature	<p>See explanatory notes for this attribute in Table 1.</p> <p>2200m passages mentioned in the Geological Conservation Review for The Cheddar Complex SSSI, but this is known to not include significant areas of the interest.</p> <p>Plans showing the passages and their connectivity are available within the Geological Conservation Review which constitutes the best easily available indication of extent.</p>	<p>WALTHAM <i>et al.</i> 1997.</p> <p>JNCC SAC standard data form</p> <p>Anecdotal evidence, B Corns, T Lane 2018</p>
Structure and function (including its typical species)	Naturalness	Maintain the natural structure of the cave feature and ensure it can continue to evolve naturally.	<p>This should be interpreted as referring to natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species.</p> <p>Several notable caves outside of the SAC are already exploited for tourism, these areas should not be extended into areas with cave decoration (such as stalactites and stalagmites) or bats unless adequate measures are in place to protect them, and this would have to be agreed in advance with Natural England.</p>	
Structure and function (including its typical species)	Sedimentation	Old cave sediments are undisturbed and maintained in an unmodified form, and increased sediment loadings from alterations of inflowing watercourses are avoided.	<p>The Cheddar Complex represents a nationally important example of dated sediments in limestone caves.</p> <p>Elsewhere, sediment loading from ingress to the cave systems can damage interest features either directly or through the process of necessary removal/cleaning and should be reduced.</p>	WALTHAM <i>et al.</i> 1997.
Supporting processes (on which the feature relies)	Cave water quality	Avoid or reduce any metal-ion contamination into interstitial and cave waters	Though little data exists, there is some evidence which points to major impacts on the characteristic subterranean fauna from metal contamination. Impacts on the biofilms may be significant.	
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary, Maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the feature.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		site	<p>This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Important to maintain natural geomorphological processes and to provide supporting habitat for cave flora and fauna; use of groundwater monitoring may be used as a partial proxy for cave water quality.</p> <p>There is potential for hydraulic fracturing in this area.</p>	
Supporting processes (on which the feature relies)	Illumination	Maintain naturally-occurring light levels within the cave body, whilst minimising any artificial light.	Caves lack natural illumination, and therefore support species which have evolved or are adapted to living in the dark. Microclimatic conditions vary widely within and between caves, and this determines the composition of the fauna and flora at each site. Disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology.	
Supporting processes (on which the feature relies)	Water quality	<p>Where the feature 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> <p>Where the feature is not dependent on surface water and/or groundwater, water quality and quantity should still be maintained to a level at which existing natural features should not be damaged and features that would be expected to develop naturally are not unreasonably inhibited</p>	<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. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC. Although nutrients are critical to the fauna associated with this feature as effectively the only significant Nitrogen source, high initial inputs deplete the fauna, and whilst it subsequently recovers (and thrives) it raises the possibility of seriously damaging rare genotype</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			populations in the first nutrient wave. See notes regarding sedimentation.	
<p>Version Control Advice last updated: 19 February 2019 Additional text added within 'Hydrology' attribute to identify potential of hydraulic fracturing within the geology following stakeholder feedback.</p>				
<p>Variations from national feature-framework of integrity-guidance: The site is not known to support any significant cave fauna or flora (anecdotal evidence, B Corns 2018) therefore the relevant typical species attribute has been removed. Similarly there is no known interest relating to woody debris, indeed there is a greater likelihood that woody debris would have caused a negative impact in increasing sedimentation, impeding monitoring/restoration, and increasing CO₂ levels from decomposition so the woody debris attribute has similarly been removed.</p>				

Table 3: Supplementary Advice for Qualifying Features: H9180. Tilio-Acerion forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes *

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	<p>Maintain the total extent of the features to approximately 158ha hectares</p> <p>King's Woods & Urchin Wood SSSI 128ha (combined W8 & W10) The Cheddar Complex SSSI 30ha</p>	<p>See explanatory notes for this attribute in Table 1</p> <p>For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil.</p> <p>Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.</p> <p>In the absence of specific site surveys tailored to identifying extents of Tilio-Acerion habitat, NVC community W8 has been used as a proxy to the Annex I habitat. This, in part, explains the discrepancy between the JNCC standard data form and the individual FCT figures (given the figure for King's Wood and Urchin Wood SSSI combining W8 & W10). Further survey effort is needed to determine the proper extent of the Annex 1 habitat (and/or its proxy community W8 as no NVC maps are known to exist) since there are specific areas known to exhibit features such as slopes, screes and ravines, but these are as yet unmapped and undefined</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from Natural England on request.</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	<p>Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site</p>	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) 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</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also 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 some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>See also notes for 'Extent' attribute.</p> <p>Restore the woodland by reducing the number of Sycamore.</p>	<p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England.</p> <p>NATURAL ENGLAND. 2015b</p>
Structure and function (including its typical species)	Adaptation and resilience	Maintain the resilience of the feature by ensuring a diversity of site-native trees (at least 4 site native tree species) e.g. ash/ small-leaved lime/ aspen/ alder/ sycamore/ rowan/ bird cherry/ birch) is present across the site.	<p>See explanatory notes for this attribute in Table 1</p> <p>Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) is a concern for this site and may in the future result in changes to the vegetation composition.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available from Natural England on request.</p>
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy, etc), and tree seedlings and sapling common in gaps.	<p>Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment.</p> <p>Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), Available on request from Natural England.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, barkstripping and a heavily grazed sward.</p> <p>Feral goats are present in the Cheddar Complex SSSI which are highly beneficial in controlling scrub growth on grassland but could damage other interest features such as the woodland.</p>	
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	<p>Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature</p> <p>At least 95% of canopy cover in any one layer of site-native or acceptable naturalised species.</p> <p>Death, destruction or replacement of native woodland species through effects of introduced fauna or other external unnatural factors not more than 10% by number or area in a five year period.</p>	<p>Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species.</p> <p>Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Such species can include Holm Oak, Turkey Oak, Laurel, Rhododendrons, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.</p> <p>The consideration of what is 'introduced non-native' has become more complex in the light of the likely impacts of Chalara ash dieback. It is likely that species such as Sycamore and Beech, whilst not usually considered a native component of ancient woodland in this area, may have to move to an accepted naturalised status to retain a broad enough mix of acceptable species and spread the risk of possible future diseases. A continuing watching brief should be the default on the status of Chalara and the possible impacts of these substitute species on individual sites. Other non-native spp. like Holm oak, Turkey oak, Rhododendron and Laurel are or could become an issue within the woodlands and work should be</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England.</p> <p>SAC Site Improvement Plan (SIP), available from https://designatedsites.naturalengland.org.uk/</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			completed to control and where possible eradicate them.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature:</p> <p>Ash (<i>Fraxinus excelsior</i>) predominates in the canopy with small-leaved lime (<i>Tilia cordata</i>), yew (<i>Taxus baccata</i>) and elm (<i>Ulmus</i> spp.), mostly formerly coppiced, but including some pollard limes.</p> <p>Variety of whitebeam trees <i>Sorbus</i> sp, including species which are endemic to the Gorge.</p> <p>These include but may not be limited to: <i>Sorbus aria</i>; <i>Sorbus anglica</i>; <i>Sorbus eminens</i>, <i>Sorbus porrigentiformis</i>; <i>Sorbus cheddarensis</i>; <i>Sorbus eminentoides</i>; <i>Sorbus rupicoloides</i>.</p> <p>Greater Horseshoe bats <i>Rhinolophus ferrumequinum</i></p> <p>Common Dormouse <i>Muscardinus avellanarius</i></p>	<p>See explanatory notes for this attribute in Table 1.</p> <p>Both the Cheddar Complex and to a lesser extent King's Wood & Urchin Wood are known to support various species of whitebeam trees some of which are endemic to Cheddar Gorge.</p> <p>Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) is a concern for this site and may in the future result in changes to the species composition.</p>	<p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p> <p>CROUCH, H. 2016</p> <p>WESSEX ECOLOGICAL CONSULTANTS. 2004.</p>
Structure and function (including its typical species)	Regeneration potential	<p>Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings -</p>	<p>The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate	levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from the pollarding of veteran trees should be included where this is happening.	Favourable Condition Tables (FCT). Available on request from Natural England.
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type: <i>W8 – Fraxinus excelsior – Acer campestre – Mercurialis perennis</i> woodland	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) is a concern for this site and may in the future result in changes to the vegetation composition.	This attribute will be periodically monitored as part of Natural England's site condition assessments . Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's site condition assessments . Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the feature, between 30-90% of the stand.	<p>Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil.</p> <p>Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m ³ per hectare of standing or fallen timber or ≥3 fallen trees >20cm per hectare, and ≥4 standing dead trees per hectare	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 10% of the feature at any one time) and the assemblages of veteran and ancient trees (typically 5-10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			should be a priority.	
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature at $\geq 10\%$ of area	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - shrub layer	Maintain an understorey of shrubs (2-5m) cover $\geq 20\%$ of the stand area (this will vary with light levels and site objectives)	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from https://designatedsites.naturalengland.org.uk/</p>
Structure and function (including its typical species)	Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	<p>Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations.</p> <p>Grasslands / arable fields managed with high doses of agro-</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment <i>etc</i>).	
Supporting processes (on which the feature relies)	Air quality	Restore the 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 Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1 Target set to Restore because current levels of nitrogen and acid deposition (APIS accessed on 11/12/2018) are exceeding the critical load for H9180 woodland.	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 (www.apis.ac.uk). NATURAL ENGLAND. 2015. North Somerset and Mendip Bats SAC Site Improvement Plan (SIP)
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. Structural connectivity refers to physical connections between habitat patches, often referred to as corridors, and functional connectivity is a measure of how easily species can move through the landscape and often relates to vegetation structure or management intensity. These connections can take the form of landscape features such as patches of habitat, hedges, watercourses and verges and will extend beyond the boundary of the designated sites. These features are critical for the migration, dispersal and genetic exchange of the species typically associated with the Annex 1 habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	WEST OF ENGLAND PARTNERSHIP (WENP). 2013 SOMERSET WILDLIFE TRUST. 2016.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Numerous exercises have been undertaken recently to map existing and prospective ecological networks.</p> <p>Land surrounding the sites, if managed sensitively, will buffer the site from damaging impacts and can provide other benefits such as providing species with places to feed, roost and spread into over time.</p>	
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary, Maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. This is included as disruption/ damage to hydrological processes could be caused by activities at some distance from the site boundary. E.g. through extraction of ground or surface waters; diverting or damming river channels; pollution of water source; channel alignment that disrupts natural geomorphological processes; tunnelling <i>etc.</i>	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is Maintained at a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	<p>Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.</p> <p>Potential for significant impact on bat populations supported by the woodland and its environs.</p>	
Version Control				
Advice last updated:				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>19 February 2019 following stakeholder comments. 'Functional connectivity with wider landscape' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes including how the sensitive management of surrounding sites can offer some buffer to future impacts. Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) mentioned throughout in the supporting and explanatory notes as currently impacting vegetation composition within the site.</p>			
<p>Variations from national feature-framework of integrity-guidance: N/A</p>			

Table 4: Supplementary Advice for Qualifying Features: S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance - hibernation site	Maintain the abundance of the population at a level of above 75 bats, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<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.</p> <p>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 or breeding surveys. This value is also provided recognising there will be inherent variability as a result of</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Monitoring information is held by the Natural England local area team. This information is sensitive and requests for it should be discussed with Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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 that the figures stated are the best available.</p> <p>There are no counts for the SAC as a whole at a certain point in time. However, the following data has been collated:</p> <p>The hibernating population has been assessed over the years 2017 and 2018 at Cheddar Complex SSSI and are as follows: January 2017 – 133 March 2017 – 88 January 2018 – 53 March 2018 – 122</p> <p>The following SSSIs are part of the North Somerset and Mendip Bats SAC but do not have Lesser Horseshoe bats as a SSSI notified feature. They are however part of the North Somerset Bat assemblage:</p> <p>Banwell Caves SSSI – 20 (peak count) Banwell Ochre Mines SSSI – 88 (peak count)</p>	
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.	<p>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 can also fragment habitats within a site and disrupt the ability of the feature to move around the site and to occupy and use habitat patches. Fragmentation of habitats typically results in smaller and more isolated populations which are more vulnerable to extinction. This could undermine the ability of the feature to adapt to future environmental changes</p> <p>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</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			may affect its viability.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitats which support the feature at/to: 446ha (Cheddar Caves Complex SSSI)	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.	This attribute will be periodically monitored as part of Natural England's site condition assessments . Natural England component Cheddar Caves Complex SSSI Favourable Condition Tables (FCT). Available on request from Natural England
Supporting habitat: structure/function	Condition of underground site hibernation	Maintain the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability.	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	
Supporting habitat: structure/function	Flightlines from roost into surrounding habitat and foraging areas	Maintain the presence, structure and quality of any linear landscape features which function as flightlines. Flightlines should remain unlit, functioning as dark corridors.	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. The provision of rich feeding areas around a roost, and the commuting routes (or flight-lines) to them, will be an important element in sustaining the SAC population. Lesser horseshoes tend to forage 2-3km of their roost, though they can travel up to 4km from their roosts to suitable foraging grounds. Lesser horseshoes commute and forage along linear features over grassland and woodland. They feed on flies (mainly midges), small moths, caddis flies, lacewings, beetles, small wasps and spiders. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species (English Nature, 2003). Flightlines will extend beyond the designated site boundary into the wider local landscape. Flightlines should remain unlit, functioning as dark corridors.	WILLIAMS <i>et al.</i> 2011
Supporting	Supporting	Maintain any core areas of	This recognises that sites do not exist in isolation. The structure	BAT CONSERVATION TRUST.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
habitat: structure/function	off-site habitat (foraging areas)	feeding habitat outside of the SAC boundary that are critical to Lesser Horseshoe bats during their [breeding OR hibernation] period	<p>and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which are outside the designated site boundary and changes in surrounding land-use may adversely (directly or indirectly) affect the functioning of the feature and its component species.</p> <p>This supporting habitat may be critical to the feature to support, for example, their ability to feed, breed, roost and their population dynamics ('metapopulations'). Surrounding areas can also prevent, reduce or absorb damaging impacts from adjacent land uses such as pesticide drift.</p> <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 flight-lines) between them, will be an important element of sustaining the SAC population.</p> <p>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. Flight-lines should remain as unlit, dark corridors.</p> <p>Flightlines will extend beyond the designated site boundary into the wider local landscape.</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. Feeding areas used by SAC bats may be outside of the SAC</p>	<p>2016</p> <p>NORTH SOMERSET COUNCIL <i>et al.</i> 2017</p> <p>SCHOFIELD. 2008</p> <p>SOMERSET WILDLIFE TRUST. 2016.</p> <p>WILLIAMS <i>et al.</i> 2011</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>boundary but be critical to successful hibernation (these undesignated areas are sometimes referred to as 'sustenance zones' or 'functionally-linked land').</p> <p>Hibernating bats need a water source close to the hibernation site. Freshwater is largely supplied by ponds and small streams. Measures to improve water retention, e.g. ponds, re-wetting bogs and slowing the flow of water from the land to the main rivers will help to maintain a fresh water supply for the bats.</p> <p>North Somerset Council <i>et al.</i> (2017) have published a guidance document for developers who are planning to build near to the SAC. This identifies zones around the SAC and bands within the zone reflect the likely importance of the habitat for bats and proximity to the maternity and other roost sites. Any development activity taking place within these zones may have the potential to impact on the SAC. Special consideration is also given to habitat within 600m of the roost site, within the juvenile Sustenance Zone. Feeding areas within this 600m zone are vitally important during spring and summer months for pregnant and lactating females, as well as their young, with bats spending about half their peak activity time within this zone.</p>	
Supporting habitat: structure/function	Internal condition of underground site - maternity and hibernation	Maintain or as necessary restore appropriate light levels, humidity, temperature and ventilation.	Greater and lesser horseshoe bats roost mainly in underground sites during winter, often communally. The preferred temperature of lesser horseshoe bat hibernation sites is a stable 6-7°C, with humidity approaching 100%. Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost. There should be no recent collapses/falls or signs of geological instability.	
Supporting habitat: structure/function	Roost access	Maintain 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	<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.</p> <p>Normal minima dimensions for horseshoe access points; lesser horseshoes 300 x 200mm.</p>	Surveys are carried out by licenced persons and organisations for Natural England – This information is sensitive and requests for it should be discussed with Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		obstructing access points.	<p>Vegetation is required close to the entrance to enable bats to feel secure enough to leave at dusk rather than delaying until fully dark. Any lights shining on the entrance are likely to deter the bats from leaving (Downs <i>et al.</i> 2003).</p> <p>No artificial lights should be shining on the entrance to the hibernation site.</p>	<p>DOWNS <i>et al.</i> 2003</p> <p>JNCC. 2004</p> <p>STONE <i>et al.</i> 2009</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.	<p>See explanatory notes for this attribute in Table 1</p> <p>The Lesser Horseshoe bat in England is at the northern edge of its European range. With climate change it is expected that their range may move further north.</p> <p>In terms of lesser horseshoe bat response to climate change, increasing winter temperatures may result in less time in torpor/hibernation e.g. more frequent awakening or earlier spring emergence. This would require more frequent winter feeding and food to be available earlier in the year. The availability of both food and water may change. Water availability is particularly important for lactating females.</p> <p>Temperature regulation within roost/hibernation sites or the availability of roosts with a variety of temperature and humidity regimes is important to ensure the continued availability of suitable roosts. There may be a decrease in hunting ability with an increase in wet weather as bats avoid hunting in heavy rain due to increased energy costs.</p> <p>Changing vegetation around caves/mines may affect humidity of the hibernation site and the availability of food during winter emergence. Wider landscape changes in vegetation may also affect food availability and flightlines between foraging areas. Climate change resilience will be aided by the protection and maintenance/restoration of quality feeding habitat close to the roosts and the identification and protection of satellite roosts and their surrounding habitat to enable sufficient feeding to occur during sub-optimal weather conditions.</p>	<p>SHERWIN <i>et al.</i> 2013</p> <p>VOIGT <i>et al.</i> 2011.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature and/or its supporting habitat relies)	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 Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1 Target set to Restore because current levels of nitrogen and acid deposition (APIS accessed on 12/12/2018) are exceeding the critical loads for woodland supporting habitat.	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 (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/or its supporting habitats.	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. Management for this site includes maintaining grills to hibernation entrances, maintaining appropriate wooded cover around entrances, maintaining and restoring flight-lines and feeding grounds and protecting swarming sites associated with the SAC bat population.	Component SSSI Favourable Condition Tables (FCT). Available from Natural England on request. NATURAL ENGLAND. 2015. North Somerset and Mendip Bats SAC Site Improvement Plan (SIP) , DAVIDSON & THOMAS. 2017
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise unauthorised public 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.	
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	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. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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>The SSSIs within the North Somerset Levels have water quality standards which are more stringent than the WFD standards.</p> <p>Bats in North Somerset are known to use the rhynes or ditches to navigate by and also as a place to forage. Good water quality ensures there is a good mix of plants with different structures, in turn providing a rich habitat for invertebrates as prey for the bats.</p> <p>Water availability is particularly important for lactating females. Hibernating bats also need a water source close to the hibernation site.</p>	

Version Control

Advice last updated:

28 February 2019 following stakeholder comments. '**Population abundance – hibernation**' attribute, Banwell Caves SSSI peak count updated with more recent survey data within supporting and explanatory notes. '**Distribution of supporting habitats**' and '**Supporting off-site habitats (foraging areas)**' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes. Additional information added about the bat guidance for planning in North Somerset.

Variations from national feature-framework of integrity-guidance: The following attributes have been removed as they are considered not to be relevant the Lesser Horseshoe bat hibernation site at Cheddar: **Soils, substrate and nutrient recycling; External condition of the building – maternity colony; external condition of the building – hibernation site; Population abundance – maternity colony.**

Table 5: Supplementary Advice for Qualifying Features: S1304. *Rhinolophus ferrumequinum*; Greater horseshoe bat

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance - hibernation site	<p>Maintain the abundance of the hibernating population at a level which is above 200 which is the known population at present.</p> <p>Avoid deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>See explanatory notes for the Population Abundance attribute in Table 4.</p> <p>Numbers recorded at the March 2018 hibernation count at Cheddar Complex SSSI were 621.</p> <p>Wookey Hole 2010 – 60</p> <p>Banwell Caves SSSI peak counts were 32 in 2017</p> <p>Banwell Ochre Mines SSSI peak counts were 244 in 2017 with numbers increasing steadily from 58 in 2005</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Monitoring data held by Natural England's Local Area Team This information is sensitive and requests for it should be discussed with Natural England</p>
Population (of the feature)	Population abundance - maternity colony	<p>Maintain the abundance of the breeding population at a level which is above 350</p> <p>Avoid deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>See explanatory notes for the Population Abundance attribute in Table 4.</p> <p>Cheddar Complex SSSI: A maternity roost is recorded in Gough's Caves. Numbers unknown</p> <p>The peak emergence count at King's Wood and Urchinwood SSSI in 2006 was 52. Monitoring ceased due to health and safety reasons but re-started in 2017 when a peak emergence count was 135.</p> <p>Brockley Hall Stables peak count in 2018 was approximately 500 adults and 250 young.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>English Nature, 1999. Radio Tracking study of Greater Horseshoe bats at Cheddar, North Somerset. Unpublished report</p>
Supporting habitat: extent and distribution	Distribution of supporting habitat	<p>Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.</p>	<p>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</p>	<p>NATURAL ENGLAND. 2015b</p> <p>WEST OF ENGLAND PARTNERSHIP (WENP). 2013</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>its interior. These conditions may not be suitable for this feature and this may affect its viability.</p> <p>A summary of the sites is given below: Banwell Caves – cave – hibernation Banwell Ochre Caves – cave – hibernation, possible maternity? Brockley Hall Stables – building – maternity Compton Martin Ochre mines – cave – hibernation King's Wood and Urchinwood – mines – hibernation and maternity Cheddar – cave – hibernation and maternity Wookey Hole – cave – hibernation and maternity</p> <p>See notes for 'Extent of supporting habitat' attribute which are also valid for the distribution of supporting habitat, with particular importance placed on the location of suitable foraging habitat directly around and close to maternity sites.</p>	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitats which support the feature at 561 hectares	<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 woodland surrounding the underground mines is important for the maintenance of optimal humidity conditions inside the mine system and also as foraging areas. The woodland structure should be maintained.</p> <p>For the maternity site at Cheddar Caves, much of their supporting habitat is included in the species rich SAC grassland and woodland surrounding the caves. It is not however, known whether the bats use the whole area of the SSSI.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	External condition of building - maternity colony	Maintain the structural integrity and weatherproofing of roof, walls etc, with no significant shading of the main roost area by trees/vegetation or manmade structures.	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	External condition of underground site - maternity and hibernation	Maintain the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability.	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Internal condition of underground site – maternity and hibernation	Maintain the structural integrity of the roost space to provide consistently cool (8-12°C) and dark conditions suitable for hibernation with a relative humidity of over 90%	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost. There should be no recent collapses/falls or signs of geological instability. The variation between hibernation sites and the strong adherence of the bats to their traditional sites makes it important to refer to file notes on the condition of the site. Greater and lesser horseshoe bats roost mainly in underground sites during winter, often communally, however, they are also known to use some caves in this SAC as a maternity roost. They are usually found in hibernation sites with a relative humidity over 90%	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Internal condition of building - maternity	Maintain appropriate light levels, humidity, temperature and ventilation	Changes to light levels, through-draught, ventilation, noise levels, vibration and water penetration may adversely alter the necessary roost conditions. Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	
Supporting habitat: structure/	Roost access	Maintain the number of access points to the roost at an optimal size and in an unlit and	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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function		<p>unobstructed state, with surrounding vegetation providing sheltered flyways without obstructing access points</p> <p>Maintain vegetation close to the entrances but not obstructing it.</p>	<p>Normal minima dimensions for horseshoe access points: Greater horseshoe bats: 400 x 300mm</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 (Downs <i>et al.</i> 2003; Stone, Jones & Harris 2009).</p>	
Supporting habitat: structure/function	Supporting off-site habitat flightlines from the roost into surrounding habitat and foraging areas	<p>Maintain the presence, structure and quality of any linear landscape features which function as flightlines between the SAC and the surrounding foraging areas used by Greater Horseshoe bats. Flightlines should remain unlit, functioning as dark corridors.</p>	<p>This recognises that sites do not exist in isolation. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which are outside the designated site boundary and changes in surrounding land-use may adversely (directly or indirectly) affect the functioning of the feature and its component species.</p> <p>This supporting habitat may be critical to the feature to support, for example, their ability to feed, breed, roost and their population dynamics ('metapopulations'). Surrounding areas can also prevent, reduce or absorb damaging impacts from adjacent land uses such as pesticide drift.</p> <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. The provision of rich feeding areas around a roost, and the commuting routes (or flight-lines) to them, will be an important element in sustaining the SAC population.</p> <p>The concept of Core Sustenance Zones (North Somerset Council <i>et al.</i>, 2017) can be used to take account of the supporting habitat within the area of highest bat activity surrounding the roost. North Somerset Council <i>et al.</i> (2017), have published guidance which identifies zones around the SAC which reflect the likely importance of the habitat for bats and proximity to maternity and other roost sites. Special consideration is also to be given to habitat within 8km of the roost site, within the juvenile Sustenance Zone. Feeding areas within this 2.2km zone are vitally important during spring and</p>	<p>BAT CONSERVATION TRUST. 2016</p> <p>CLARKE WEBB. 2003</p> <p>ENGLISH NATURE. 2001</p> <p>ENGLISH NATURE. 1999</p> <p>FROIDEVAUX <i>et al.</i> 2017</p> <p>NATURAL ENGLAND. 2015b</p> <p>NORTH SOMERSET COUNCIL <i>et al.</i> 2017</p> <p>SOMERSET WILDLIFE TRUST. 2016.</p> <p>WEST OF ENGLAND PARTNERSHIP (WENP). 2013</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>summer months for pregnant and lactating females, as well as their young, with bats spending about half their peak activity time within this zone.</p> <p>Greater horseshoe bats 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>Flightlines should remain unlit, functioning as dark corridors. They will extend beyond the designated site boundary into the wider local landscape and are especially important as a link between summer and winter roost sites e.g. Brockley Hall Stables SSSI maternity roost and King's Wood and Urchin Wood which does have a maternity roost but also supports a hibernating population of bats.</p> <p>It has been concluded that the conservation of photophobic bat species such as the Greater Horseshoe bat should concentrate on both the improvement of foraging/commuting habitats as well as the creation of dark areas. (Froidevaux <i>et al.</i> 2017)</p> <p>Connectivity between sites is important as the bats navigate using linear features particularly such as hedgelines, walls and ditches. They use many caves within Somerset and migrate quite large distances including flying to and from Gloucestershire and Devon. It was found that the Greater Horseshoe Bats used 76 different sites on Mendip in one year, (Clarke Webb 2003)</p> <p>Mapping has been undertaken to find where the distribution of ecological networks are fragmented to enable bodies to find funding to work on linking up habitats such as species rich grassland and woodland, Somerset Wildlife Trust 2016</p> <p>In North Somerset, the radio tracking study of Greater Horseshoe bats from Brockley Hall Stables were found to have flown over 210 square km, using a total of 20 main foraging areas. They regularly commuted between the stables and the</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>caves at King's Wood an Urchinwood SSSI.</p> <p>Studies have also shown that Greater Horseshoe Bats use hedges, walls and ditches to navigate around the area of North Somerset, foraging over grassland which is grazed by animals, providing insects such as dung beetles</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 Greater Horseshoe bats during their breeding and 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 flight-lines) between them, will be an important element of sustaining the SAC population.</p> <p>Greater 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.</p> <p>Greater 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 (English Nature, 2003). Flight-lines should remain as unlit, dark corridors.</p> <p>Flightlines will extend beyond the designated site boundary into the wider local landscape.</p> <p>During the winter, greater 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. 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 zones' or 'functionally-linked land').</p>	<p>CLARKE WEBB. 2003</p> <p>ENGLSIH NATURE. 2001</p> <p>SOMERSET WILDLIFE TRUST. 2016</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Although the SAC includes the SSSIs noted here, their supporting habitat includes a large range of sites surrounding their maternity and hibernation roosts. It is generally agreed that the juvenile sustenance zones are in the 1-2 km surrounding maternity roosts and are especially important in providing foraging habitats close to the roost for the adults. It is especially important that grazing of this area particularly with cattle continues to provide invertebrates for the bats to eat. Adult bats are known to forage over a larger area, for example, over the Somerset Levels from the roosts at Cheddar and Wookey Hole.</p> <p>Greater Horseshoe bats are known to shift their foraging sites over several nights so that any radio tracking survey at one point in time is not necessarily representative of the bats' foraging range. A circular radius is therefore too simplistic to be very accurate but gives an indication of their potential habitat.</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	<p>See explanatory notes for this attribute in Table 1.</p> <p>The Greater Horseshoe bat in England is at the northern edge of its European range. With climate change it is expected that its range boundary may move further north.</p> <p>It has been shown that the population expansion of the Greater Horseshoe bat in the UK has been driven by climate change rather than any conservation or habitat management. (Froidevaux <i>et al.</i> 2017).</p> <p>Temperature regulation within roost/hibernation sites or the availability of roosts with a variety of temperature and humidity regimes is important to ensure the continued availability of suitable roosts. There may be a decrease in hunting ability with an increase in wet weather as bats avoid hunting in heavy rain due to increased energy costs.</p> <p>Changing vegetation around caves/mines may affect humidity</p>	<p>FROIDEVAUX <i>et al.</i> 2017</p> <p>SHERWIN <i>et al.</i> 2013.</p> <p>VOIGT <i>et al.</i> 2011.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			of the hibernation site and the availability of food during winter emergence. Wider landscape changes in vegetation may also affect food availability and flightlines between foraging areas. Climate change resilience will be aided by the protection and maintenance/restoration of quality feeding habitat close to the roosts and the identification and protection of satellite roosts and their surrounding habitat to enable sufficient feeding to occur during sub-optimal weather conditions.	
Supporting processes (on which the feature and/or its supporting habitat relies)	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 Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1. Target set to Restore because current levels of nitrogen and acid deposition (APIS accessed on 14/12/2018) are exceeding the critical loads for woodland supporting habitat.	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 (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/or its supporting habitats.	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. Management for this SAC includes maintaining grills to hibernation entrances, maintaining appropriate wooded cover around entrances, maintaining and restoring flightlines and feeding grounds and protecting swarming sites associated with the SAC bat population and flightlines to swarming sites. Management of the wider landscape is also integral to the condition of the SAC, such as keeping farmland in appropriate management to support the food supplies for the bat population (maintain grazing, particularly cattle) A heater was installed in the Cheddar Complex caves in 1998 to provide optimum conditions for the maternity colony and this	Natural England component SSSI Views About Management (VAM), available from https://designatedsites.naturalengland.org.uk/

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>needs to be maintained.</p> <p>A number of Greater horseshoe bat nocturnal roosts have been identified on site and the importance of these roosts is being increasingly recognised and understood through a number of projects (Batscapes, Devon Greater Horseshoe Bat Project and Beacons for Bats).</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise unauthorised public 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>Wooden safety fences are to be installed around the cave entrances at Banwell Ochre Caves SSSI by the landowner who was carrying out forestry works. These are to be placed to avoid any people falling into the cave entrances and also to provide a buffer around the cave entrances.</p> <p>Most of the mine entrances at King's Wood and Urchin Wood SSSI have also been fenced off for safety reasons.</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 within the associated bat foraging areas including those areas outside of the SAC designation 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. 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>The SSSIs within the North Somerset Levels have water quality standards which are more stringent than the WFD standards.</p>	<p>See FCT for Tickenham, Nailsea and Kenn SSSI.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available from Natural England on request.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Bats in North Somerset are known to use the rhyes or ditches to navigate by and also as a place to forage. Good water quality ensures there is a good mix of plants with different structures, in turn providing a rich habitat for invertebrates as prey for the bats.</p> <p>Water availability is particularly important for lactating females. Hibernating bats also need a water source close to the hibernation site.</p>	
<p>Version Control Advice last updated: 28 February 2019 following stakeholder comments. 'Population abundance – hibernation' attribute, peak count updated with more recent survey data within supporting and explanatory notes. 'Supporting off-site habitat flightlines from the roost into surrounding habitat and foraging areas' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes. 'Conservation measures' attribute the importance of bat night roosts mentioned in supporting and explanatory notes. Further information added regarding North Somerset Council Bat Guidance and core sustenance zones.</p> <p>Variations from national feature-framework of integrity-guidance: The following attributes were removed as they are not considered relevant to the Greater Horseshoe bats within this SAC: Soils substrate and nutrient recycling; External condition of the building – hibernation site.</p>				

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