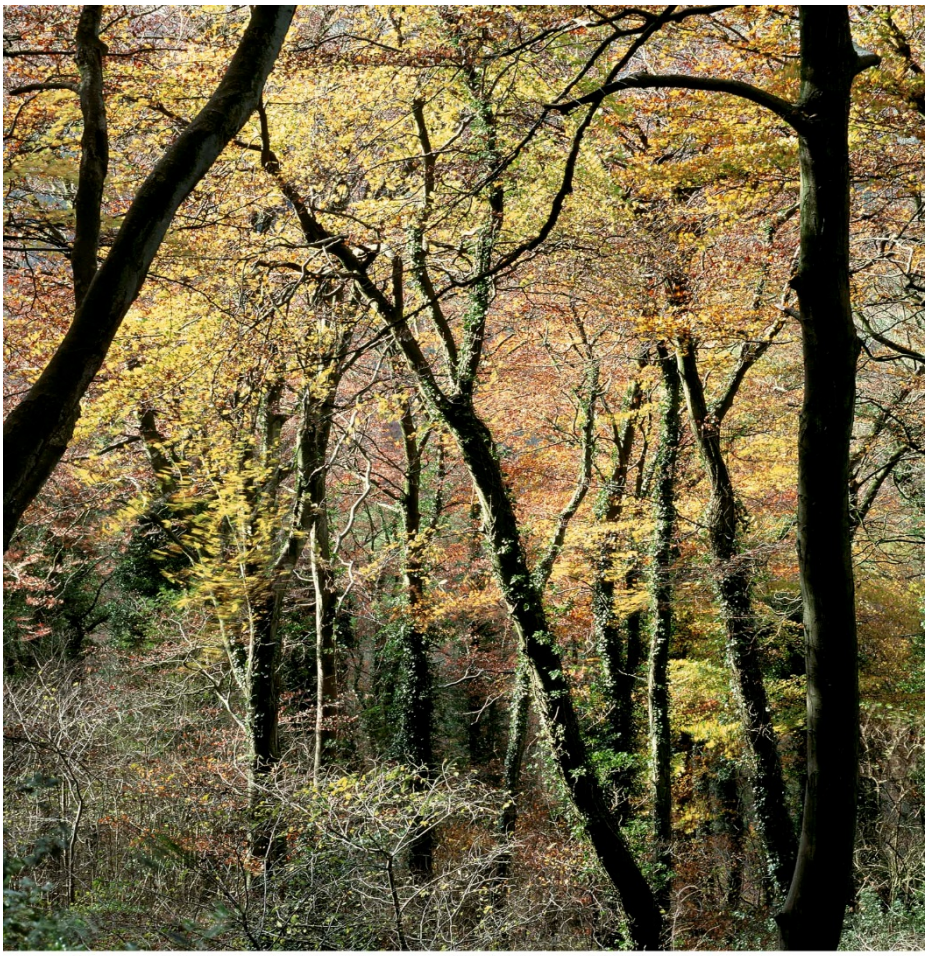
European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

Cotswold Beechwoods Special Area of Conservation (SAC)
Site code: UK0013658



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Buckholt Wood near Cranham

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Cotswold Beechwoods SAC. This advice should therefore be read together with the SAC Conservation Objectives.

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	Cotswold Beechwoods Special Area of Conservation (SAC)
Location	Gloucestershire
Site Maps	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	April 2005
Qualifying Features	See section below
Designation Area	590.2 ha (JNCC)
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)	Cotswold Commons and Beechwoods SSSI
Relationship with other European or International Site designations	n/a

Site background and geography

The Cotswold Beechwoods SAC lies within the Cotswold National Character Area (NCA 107) and is part of a much larger area of woodland that forms a mosaic with adjacent unimproved and semi improved pasture along much of the length of the Cotswold scarp (the western edge of the Cotswold Hills).

Part of the SAC forms the Costwolds Commons and Beechwoods National Nature Reserve managed by Natural England and other partner organisations, and the more extensive Cotswold Commons and Beechwoods SSSI.

The SAC consists of ancient beech woodland, some secondary woodland and a small area of unimproved grassland. The underlying Jurassic limestone rock largely influences the vegetation type and the varied soil depth, aspect and slope add to the diversity. These woodlands are considered amongst the most diverse and species-rich of their type, whilst the grassland typifies the unimproved calcareous grassland for which the Cotswolds are famous.

The woods are structurally varied, mostly high forest with some areas of remnant beech coppice and pollard. The canopy is dominated by beech, with ash, pedunculate oak and some areas of sycamore. Characteristic understorey species include holly and yew but regenerating ash, sycamore and beech often accounts for much of the shrub layer. The ground flora can be rich in places with other areas consisting mainly of bramble, dog's mercury and ivy. There are a number of rare orchid species on the site and the woods include an exceptional variety of invertebrate species, including rare wet flush mollusc species. The limestone geology and hydrology of the area has resulted in a number of tufa formations.

The unimproved limestone grassland of the SAC consists of areas of glades and rides within the woodland, the largest area being the cheese-rolling slope at Coopers Hill. The grassland habitat contains upright brome, tor-grass and sheep's-fescue, with quaking grass and a wide range of other flowering herbaceous plants. Typically these include cowslips, common bird's-foot-trefoil, common rock-rose, wild thyme and field scabious.

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:

- **H9130 *Asperulo-Fagetum* beech forests**

  This habitat type typically occurs on circumneutral to calcareous soils. In the UK it mostly corresponds to NVC type W12 *Fagus sylvatica – Mercurialis perennis* woodland, but more calcareous stands of NVC type W14 *Fagus sylvatica – Rubus fruticosus* woodland may also conform to this habitat type. The two NVC types often occur together on a site. Each community has a different associated suite of species which change according to slope and soil type. As slopes become steeper, there is a shift from relatively deep, moist and moderately base-rich soils to thin, dry and strongly base-rich profiles. There is an associated floristic gradient in the woodland understorey, with dense cover of bramble *Rubus fruticosus* on the shallowest slopes gradually being replaced by frequent dog's mercury *Mercurialis perennis* as the gradient increases, and then by sanicle *Sanicula europaea*, wall lettuce *Mycelis muralis* and wood melick *Melica uniflora*.

  While many sites have a core of ancient woodland, planting of beech *Fagus sylvatica* and its natural spread on to adjacent grassland under reduced grazing pressures have led in places to an expansion of this habitat over the 20th century. Sites therefore often have a complicated history. The beech dominance in particular has often been emphasised by past silvicultural treatment.

  The Cotswold Beechwoods SAC represent the most westerly extensive blocks of *Asperulo-Fagetum* beech forest in the UK. The woods are floristically richer than the Chilterns, and rare plants include red helleborine *Cephalanthera rubra*, stinking hellebore *Helleborus foetidus*, narrow-lipped helleborine *Epipactis leptochila* and wood barley *Hordelymus europaeus*. There is a rich mollusc fauna. The woods are structurally varied, including blocks of high forest and some areas of remnant beech coppice.

  The woodland corresponds to predominantly NVC type W12 *Fagus sylvatica-Mercurialis perennis* with smaller areas of W14 *Fagus sylvatica-Rubus fruticosus,* W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum and* W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland.

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

  These grasslands are usually found on thin, well-drained, lime-rich soils associated with chalk and limestone. They occur predominantly at low to moderate altitudes in England and Wales, extending locally into upland areas in northern England, Scotland and Northern Ireland. Most of these calcareous grasslands are maintained by grazing.

  A large number of rare plants are associated with this type of grassland as well as various bryophytes and lichens. The invertebrate fauna is also noteworthy.

Orchid-rich examples of this habitat type
This priority habitat type comprises *Festuco-Brometalia* calcareous grasslands containing important orchid assemblages and/or rare orchids. These sites host a rich suite of orchid species, and/or an important population of at least one orchid species considered uncommon, or one or several orchid species considered to be rare, very rare or exceptional.

The habitats at Cotswold grasslands correspond to the NVC types CG3 *Bromus erectus* grassland, CG4 *Brachypodium pinnatum* grassland and CG5 *Bromus erectus - Brachypodium pinnatum* grassland.

References

RODWELL, J.S. (ed.) 1991. *British Plant Communities. Volume 1. Woodlands and scrub*. Cambridge University Press.
RODWELL, J.S. (ed.) 1992. *British Plant Communities. Volume 3. Grasslands.* Cambridge University Press.

Table 1: Supplementary Advice for Qualifying Features: H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution	**Extent of the feature within the site**	Maintain the total extent of the H9130 feature at 472.16 hectares.	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature. 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. 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. Currently about 5% of the woodland area is classified as coniferous, corresponding to an area of beech replanted following felling in WWII which used larch as a cover crop (SSSI unit 7). This restoration of plantation on ancient woodland is ongoing and will take some time before it is assignable to an Annex 1 habitat type. There is some scope to increase the extent of the SAC feature through plantation restoration but also scope to increase the quality (as the secondary woodland improves). For this feature, this attribute includes the extent of semi-natural treed area and the number of veteran trees (except through natural causes), including dead and living trees. Tree roots (particularly of veteran trees) may extend a considerable distance beyond the boundary of the site. A reduction of woodland area - whether at the edge or in the middle of a site will reduce the core 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 may interrupt the movement of species between the remaining parts of the woodland, especially those with limited powers of dispersal.	JNCC. Natura 2000 standard data form. Available from: http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0013658.pdf NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/ ECOSCOPE, 1999. Cotswold Commons and Beechwoods SSSI NVC survey NATURAL ENGLAND. Cotswold Beechwoods SAC habitat map and GIS layers, Available on request from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution	**Spatial distribution of the feature within the site**	Maintain the distribution and configuration of the H9130 feature, including where applicable its component vegetation types, across the site	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. 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.	Ecoscope, Cotswold Commons and Beechwoods SSSI NVC survey (1999) NATURAL ENGLAND. Gloucestershire team, Cotswold Beechwoods SAC habitat map and GIS layers, Available on request from Natural England
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities which comprise the H9130 feature are broadly referable to and characterised by the following National Vegetation Classification types: W12 *Fagus sylvatica-Mercurialis perennis* W14 *Fagus sylvatica-Rubus fruticosus* W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* Pockets of beech rich W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* 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. At this site, there are areas of ash woodland (W8 type) rich in beech which are characteristic of the beech woodland regeneration cycle and its natural variation.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/
	Woodland canopy cover	Maintain an appropriate tree canopy cover/density across	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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		the H9130 feature, which will typically be between 30-90%.	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. 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.	
Structure and function (including its typical species)	**Open space**	Restore areas of permanent/temporary open space within the H9130 feature, typically to cover approximately 10% of the feature area	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 objectives for woodland structure on a particular site takes account of its known interest, history, past management and the landscape context. 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 wind-throw/fire/tree falling over/snow damage. This SAC currently contains good sized areas of permanent open space/rides (in SSSI units 12 and 15 of the SAC), however, other units would benefit from more open space and thinning.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/
Structure and function (including its typical species)	**Old growth**	Restore the extent and continuity of undisturbed, mature/old growth stands or a scatter of large trees allowed to grow to over-maturity/death comprising a minimum of 10% of the H9130 feature at any one time) and the assemblages of veteran and	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 objectives for this attribute take account of the woodland's 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 should be a priority.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		ancient trees (5-10 trees per hectare).	Due to the historic management on this SAC some areas have few or no veteran trees, e.g. SSSI units 4, 5, 7 (replanted after WWII), 8 (oldest trees 150yrs), 10, 17 (trees of 100yrs), hence the minimum percentage is lower than might be considered acceptable at other sites. The overall aim is to maintain veterans at suitable frequency whether they exist and to develop trees to over-maturity and death in those units where ancient/veteran trees are currently lacking	
Structure and function (including its typical species)	**Dead and decaying wood**	Restore 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 3-5 fallen trees >20cm per hectare, and at least 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. Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature. Due to the historic management and existing commoners rights of estover, the targets vary across the site, however, in some of the underpinning SSSI units one of the components causes of failing to achieve favourable condition, is a lack of deadwood.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/ ENGLISH NATURE 2007 Dead Wood Survey report and data tables. Available on Request from NE Gloucestershire team

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Tree age class distribution**	Restore 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. While all three age classes exist across the site as a whole, appropriate age structure is affected by a lack of younger trees in some of the underpinning SSSI units and the historic management limits the largest age class in other units.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/
	Woodland edge (graduated edge; buffered; mosaics with other habitats)	Restore a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	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. 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. Scrub is an important component of the transition from the woodland into the surrounding unimproved calcareous grassland commons adjacent to areas of this SAC. A number of priority butterfly species rely on the graduated transition such as Duke of Burgundy. Scrub requires ongoing management to prevent it encroaching excessively onto the Grassland habitat and progressing into secondary woodland.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from :

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				https://designatedsites.naturalengland.org.uk/
Structure and function (including its typical species)	**Species diversity**	Maintain a diversity (at least 3 species on more base rich sites) of site-native trees (e.g. beech, ash, whitebeam, yew, sycamore, holly) across the site.	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. Sycamore is invasive at this site and in areas where sycamore is present, up to 15% Sycamore is acceptable in the understorey and up to 5% in the canopy on the basis that these are not seed bearing.	
	Supporting off-site habitat	Maintain the extent, quality and spatial configuration of the unimproved calcareous grasslands and Cotswold scarp woodlands surrounding or adjacent to the site which is known to support the H9130 feature	The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Including the extensive Cotswold scarp woodlands and surrounding unimproved calcareous grasslands. Changes in surrounding land-use may adversely (directly/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 its population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/) NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/
	Browsing and grazing by herbivores	Restore browsing/grazing by herbivores to sufficient levels to allow tree seedlings and saplings the opportunity to exceed browse height, and which restore the characteristic structure of the H9130 woodland feature	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. 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 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. In some areas of the site, deer browsing is heavier than target levels and	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			causes the failure in favourable condition of some underpinning SSSI units. Squirrel damage is also impacting tree regeneration as they tend to target young trees (8-10 year growth), ring barking them and causing their death.	
Structure and function (including its typical species)	**Regeneration potential**	Restore the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate ;	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 levels must permit regeneration at least in intervals of 5 years every 20. Regeneration from pollarding of veteran trees or coppice regrowth should be included where this is happening. High levels of deer browsing are currently preventing sufficient regeneration in some locations, as is the impact of squirrels.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND. Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/
	Tree and shrub species composition	Maintain a woodland canopy and under-storey of which 95% is composed of site native trees and shrubs	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species). Although sycamore might be considered a naturalised species which supports a range of invertebrate life, it is invasive at this site and should be controlled to keep levels below 15% in the understory and below 5% in the canopy (non-seed bearing). High densities of sycamore currently result in unfavourable condition at some locations within this SAC. Whilst it is appropriate for beech to be the most prominent tree across the SAC feature, a diversity of native tree and scrub species is to be encouraged both to support the associated fauna and flora and to retain resilience from the threat of tree diseases. Large-leaved Lime *Tilia platyphyllos* has been recorded in SSSI units 12 and 13.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat; Populations of Horseshoe bats *Rhinolophus ferrumequinum, Rhinolophus hipposideros* Red Helleborine (*Cephalanthera rubra*) Duke of Burgundy butterfly (*Hamearis Lucina*) Non-marine mollusc assemblage: *Ena montana, Phenacolimax major, Acicula fusca, Macrogastra rolphii, Helix pomatia, Abida secale* Notable woodland species include; Angular Solomon's-seal (*Polygonatum odoratum*), Mezereon (*Daphne mezereum*), Limestone Fern (*Gymnocarpum robertianum*), Green Hellebore (*Helleborus viridis*), Common Wintergreen (*Pyrola minor*), Bird's-nest Orchid (*Neottia nidus-avis*), Broad-leaved Helleborine (*Epicactis helleborine*), Lily-of-the-valley (*Convollaria majus*), Yellow Bird's-nest (*Monotropa hypopitys*).	Some plant or animal species (or related groups of such species) make a particularly important contribution to the structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; – *Structura***l** species which form a key part of the habitat's structure or help to define an Annex I habitat on a site (see also the attribute for 'vegetation community composition'). – *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 site. 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.	NATURAL ENGLAND, 2013. Cotswold Commons and Beechwoods SSSI Definitions of Favourable Condition (Available from : https://designatedsites.naturalengland.org.uk/)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Vascular plant species of disturbed areas within woodland: Fingered Sedge (*Carex digitata*), Narrow-leaved Helleborine (*Epicactis leptochila*), Yellow Star-of-Bethlehem (*Gagea lutea*), Stinking Hellebore (*Helleborus foetidus*), Wood Barley (*Hordelymus europaeus*), Pale St-John's-wort (*Hypericum montanum*)		
Structure and function (including its typical species)	**Undesirable species**	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.; sycamore, periwinkle	There are 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 include invasive non-natives such as periwinkle or coarse and aggressive native species e.g. sycamore which may uncharacteristically dominate the composition of the feature.	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/
	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 H9130 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.	
	Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition	The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013),

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			together, leaving little space for air and water which are essential for root growth. Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during recreational activity may all contribute to excessive soil compaction around ancient trees. Recreational pressure including walking and mountain biking can be an issue in this SAC. Monitoring of erosion/creation of new paths is being undertaken within the NNR	Available from : https://designatedsites.naturalengland.org.uk/
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary the concentrations and deposition of air pollutants to within 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).	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. 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 (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales. The levels of Nitrogen and Acid deposition are currently exceeding the critical loads for this habitat.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on APIS
	Hydrology	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the H9130 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. . Currently there are no large abstractions within 3 km of the site. The vulnerability of the site to groundwater abstraction is low. When deciding	THE ENVIRONMENT AGENCY, Midlands Region Hydrogeological Assessment of Sites of Special Scientific interest Final Report Cotswold Commons

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			future groundwater applications consideration should be given to protecting the spring flow and base-flow of the Painswick Stream system. Wet flush features forming part of the H9130 feature are important for the assemblage of rare woodland snails as well as tufa deposits.	and Beechwoods (Aug 1998).
Supporting processes (on which the feature relies)	**Illumination**	Maintain any artificial light at levels which are unlikely to affect natural phenological cycles and processes to the detriment of the H9130 feature and/or its typical species at this site.	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. Old mine/cave structures below the SAC are used by greater and lesser horseshoe bats which are typical of this habitat type and particularly sensitive to artificial light levels. Other bats species also use the woodland.	NATURAL ENGLAND Bat surveys (2018).
Version Control Advice last updated: n/a				
Variations from national feature-framework of integrity-guidance: Structure and function (including its typical species) - Vegetation: undesirable species – have added this row (or could be non-native instead) as no invasive or non-native target was included in the table and it is applicable to sycamore and periwinkle at this site.				

Table 2: 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 the total extent of the H6210 feature at 4.13 hectares.	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. 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. At this site, this feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. The area of grassland included in the SAC designation consists of a number of glades and rides e.g.at Coopers Hill there is an extensive glade/ride area. As these grassland areas are surrounded by woodland, care must be taken that the woodland does not encroach on the extent of the grassland. Scrub is an integral part of the habitat and its location can vary, but it should be managed so that it does not smother the grassland and progress into secondary woodland. 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.	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Condition summary (2009-2013). Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013), Available from : https://designatedsites.naturalengland.org.uk/ JNCC.2015.Natura 2000 Standard Data Form for Cotswold Beechwoods SAC http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0013658.pdf
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H6210 feature, including where applicable its component vegetation types, across the site	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.	NATURAL ENGLAND. Gloucestershire team, Cotswold Beechwoods SAC habitat map and GIS layers, Available on request from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. 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. The calcareous grassland feature is a very small component of this SAC <1% and is fragmented within the woodland, however, extensive areas of calcareous grassland lie adjacent to the SAC as elements of the larger SSSI.	
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities which comprise the H6210 feature are broadly referable to and characterised by the following National Vegetation Classification types: CG3 *Bromus erectus* grassland CG4 *Brachypodium pinnatum* grassland. CG5 *Bromus erectus, Brachypodium pinnatum* grassland.	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. 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).	JNCC: http://jncc.defra.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H6210 NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013), Available from : https://designatedsites.naturalengland.org.uk/
	Abundance of herbaceous species	Maintain a characteristic abundance of herbaceous species, typically within the range 40-90% cover	A high cover of characteristic herbs, including sedges (*Carex* species) is typical of the structure of this habitat type. In this habitat, a low proportion of grassland herbs can indicate eutrophication, usually from fertilisers, or insufficient removal of biomass, leading to dominance by grasses.	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013), Available from : https://designatedsites.naturalengland.org.uk/

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the l species listed below to enable each of them to be a viable component of the Annex 1 habitat; Community constant/preferential species of the component NVC types including *Brachypodium pinnatum* and *Bromopsis erecta,* Populations of notable plant species: Musk Orchid (*Herminium monorchis),* Bastard Toadflax (*Thesium humifusum),* Fly orchid *(Ophrys insectifera),* Population of Duke of Burgundy butterfly (*Hamearis Lucin* - and food plants – *Primula veris* and *P. vulgaris*)	Some plant or animal species (or related groups of such species) make a particularly important contribution to the structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; – *Structural* species which form a key part of the habitat's structure or help to define an Annex I habitat on a site (see also the attribute for 'vegetation community composition'). – *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 site. 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.	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013), Available from : https://designatedsites.naturalengland.org.uk/
	Undesirable species	Maintain 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;	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 Cotoneaster species or coarse and aggressive native species which may uncharacteristically dominate the composition of the feature. The named Invasive species were chosen to indicate problems of eutrophication and disturbance from various sources when outside target e.g. poaching, stock feeding.	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013), Available from : https://designatedsites.naturalengland.org.uk/

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Thistles *Cirsium arvense, & Cirsium vulgare,* docks *Rumex crispus & Rumex obtusifolius,* Ragwort *Senecio jacobaea,* common nettle *Urtica dioica*.		
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain the natural pattern of vegetation zonations/transitions between the H6210 grassland feature and scrub and woodland within the site	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 H6210 habitat feature, and support additional flora and fauna.	
	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 H6210 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 associated with this Annex I feature.	
	Supporting off-site habitat	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the SAC which is known to support the H6210 feature.	The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. The connectivity of the site to its wider landscape may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I 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. Changes in surrounding land-use may adversely (directly/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, population dynamics	NATURAL ENGLAND, Cotswold Commons and Beechwoods SSSI Favourable Condition Table (2013), Available from : https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND, Priority habitat inventory (available on interactive mapping system MAGIC: http://www.natureonthe

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment. There are additional areas of unimproved calcareous grassland, neutral grassland and semi-improved grassland, which, together with woodland glades and rides, that connect to the SAC and contribute to the grassland ecological network along the Cotswold scarp, including 29.05 ha of calcareous grassland designated as part of the larger Cotswold Commons and Beechwoods SSSI (Painswick Beacon, Cranham Common, Sheepscombe Common). Additional grassland occurs as part of the wider landscape of the Cotswolds scarp mosaic of woodland and grassland, including Rodborough Common SAC approx. 10km away and a number of Calcareous grassland SSSIs in between. In some locations the connectivity is good, however, other stretches of the scarp would benefit from appropriate management of grassland and woodland rides and glades to improve the linkages of the network.	map.naturalengland.org.uk/) NATURAL ENGLAND, Gloucestershire team, Cotswold grassland network maps (2014), Available from Natural England on request
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain the H6210 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	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 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. It is currently considered that the sensitivity of unimproved calcareous grassland to climate change at this SAC is low. Older established grasslands being more resilient to those in the earlier stages of succession. 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. For example, maintaining appropriate management and providing habitat connectivity to enable the movement of species and genetic material.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England [Available at http://publications.naturalengland.org.uk/publication/4954594591375360].
Supporting processes (on which the feature relies)	**Air quality**	Maintain the concentrations and deposition of air pollutants at within the site-relevant Critical Load or Level values given for this	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.	More information about site-relevant Critical Loads and Levels for this SAC is available by

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		feature of the site on the Air Pollution Information System (www.apis.ac.uk).	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 (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. Concentrations are currently within maximum limits set for this habitat. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	using the 'search by site' tool on APIS
Supporting processes (on which the feature 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 H6210 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. Part of the site is an NNR managed by Natural England and the National Trust.	NATURAL ENGLAND, Cotswold Beechwoods SAC Site Improvement Plan (2015), Available from https://designatedsites.naturalengland.org.uk NATURAL ENGLAND, Cotswold Commons and Beechwoods NNR Management Plan 2017-2022. ENGLISH NATURE, 2005. SSSI views about management. Available from https://designatedsites.naturalengland.org.uk/
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