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

South Pennine Moors Special Area of Conservation (SAC)
Site Code: UK0030280

Date of Publication: 11 February 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to South Pennine Moors SAC. This advice should therefore be read together with the SAC Conservation Objectives available here.

This site overlaps with other European Sites. You should also refer to the separate European Site Conservation Objectives and Supplementary Advice (where available) provided for those sites.

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	South Pennine Moors Special Area of Conservation (SAC)
Location	Barnsley, Bradford, Calderdale, Cheshire, Derbyshire, Kirklees, Lancashire, Leeds, North Yorkshire, Oldham, Rochdale, Sheffield, Staffordshire, Tameside
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	64983.13 ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Dark Peak SSSI, Eastern Peak District Moors SSSI, Goyt Valley SSSI, Leek Moors SSSI, South Pennine Moors SSSI
Relationship with other European or International Site designations	South Pennine Moors (Phase II) SPA (UK9007022) Peak District Moors (South Pennine Moors Phase 1) SPA (UK9007021)

Site background and geography

This site covers the key moorland blocks of the Southern Pennines from Ilkley Moor in the north to the Peak District in the south. The moorlands are on a rolling dissected plateau formed from rocks of Millstone Grit at altitudes of between 300m – 600m and a high point of over 630m at Kinder Scout. The greater part of the gritstone is overlain by blanket peat with the coarse gravely mineral soils and shales occurring only on the lower slopes. The moorlands as a whole support a breeding bird community of national and international importance.

This site is characterised by extensive areas of blanket bog although the bog vegetation communities are botanically poor, impoverished by pollution, grazing and burning. Hare's-tail cottongrass *Eriophorum vaginatum* is, often, overwhelmingly dominant and the usual bog-building *Sphagnum* mosses are scarce. Where the blanket peats are slightly drier, heather *C. vulgaris*, crowberry *Empetrum nigrum* and bilberry *V. myrtillus* become more prominent. The cranberry *Vaccinium oxycoccus* and the uncommon cloudberry *Rubus chamaemorus* is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass *E. angustifolium*. Substantial areas of the bog surface are eroding, and there are extensive areas of bare peat. In some areas erosion may be a natural process reflecting the great age (up to 9000 years) of the South Pennine peats, but the picture is complex with a number of factors contributing to peat loss.

The site is representative of upland dry heath which covers extensive areas, occupies the lower slopes of the moors on mineral soils or where peat is thin, and occurs in transitions to acid grassland, wet heath and blanket bogs. The upland heath of the South Pennines is strongly dominated by *Calluna vulgaris* –

Deschampsia flexuosa heath and *C. vulgaris – Vaccinium myrtillus* heath with the *Vaccinium vitis-idaea* sub-community evident on the eastern slopes. More rarely *C. vulgaris – Ulex gallii* heath and *C. vulgaris – Erica cinerea* heath are found. On the higher, more exposed ground *V. myrtillus – D. flexuosa* heath becomes more prominent. The smaller area of wet heath is characterised by cross-leaved heath *Erica tetralix* and purple moor grass *Molinia caerulea*. The site also supports extensive areas of acid grassland largely derived from both dry and wet heath. In the cloughs, or valleys, which extend into the heather moorlands, a greater mix of dwarf shrubs can be found together with more lichens and mosses. The moors support a rich invertebrate fauna, especially moths, and important bird assemblages.

Around the fringes of the upland heath and areas of bog are blocks of old sessile oak woods, usually on slopes and particularly cloughs. These tend to be drier than those further north and west, such that the bryophyte communities are less developed (although this lowered diversity may in some instances have been exaggerated by the effects of air pollution from the early 1800's to the 1970's). Other components of the ground flora such as grasses, dwarf shrubs and ferns are common. Small areas of alder woodland along stream-sides add to the overall richness of the woods.

The moorland also supports a range of flush and fen habitats associated with bogs, cloughs, rivers and streams. Although generally small scale features they have a specialised flora and fauna, which makes a great contribution to the overall biodiversity of the moors. Acid flushes are the most common type and these include transition mires and quaking bogs characterised by a luxuriant carpet of bog mosses *Sphagnum* spp., rushes and sedges.

The South Pennine Moors SAC is largely enclosed on two sides by large industrial urban areas, which means that large numbers of people use the area for recreational activities. Around two-thirds of the site is within the Peak District National Park. Land management is primarily driven by drinking water collection (reservoirs are frequent in and around the site), rough grazing for sheep (and some cattle), and grouse-shooting and, more recently, recreational activities including rambling, rock climbing mountain biking and paragliding.

Access management has been a key issue, and with proposals under the Countryside and Rights of Way Act, will continue as such. Mechanisms for addressing access management issues include a range of fora, research and the role of organisations such as the Peak District National Park Authority and its Ranger Service. Accidental fires can cause extensive damage to vegetation. As well as private ownership through estates and farms, The National Trust owns a significant area of moorland, as does the National Park Authority and the regional water companies.

South Pennine Moors SAC is part of the National Character Area Profiles: 36 Southern Pennines (NE323); 51 Dark Peak (NE378) & 53 South West Peak (NE453).

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:

- **H4010. Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath**

Wet heath usually occurs on acidic, nutrient-poor substrates, such as shallow peats or sandy soils with impeded drainage. The vegetation is typically dominated by mixtures of cross-leaved heath *Erica tetralix*, heather *Calluna vulgaris*, grasses, sedges and *Sphagnum* bog-mosses.

Wet heaths occur in several types of ecological gradient. In the uplands they occur most frequently in gradients between dry heath or other dry, acid habitats and H7130 Blanket bogs. Flushed wet heaths are especially frequent in areas of high rainfall, and occur as topogenous fens, usually in channels within heath or grassland vegetation. It is considered likely that wet heath habitat has been lost to wet acid grassland and other vegetation communities and may be under-represented given the extent of blanket bog habitat.

Wet heath is an important habitat for a range of vascular plant and bryophyte species of an oceanic or Atlantic distribution in Europe, several of which have an important part of their EU and world distribution in the UK.

In the South Pennines this vegetation corresponds to the following NVC types:

M15 *Scirpus cespitosus – Erica tetralix* wet heath
M16 *Erica tetralix – Sphagnum compactum* wet heath

Northern Atlantic wet heaths with *Erica tetralix* is a qualifying feature for this SAC but not the primary reason for designation.

- **H4030. European dry heaths**

European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation; the most common and widespread is heather *Calluna vulgaris*, which often occurs in combination with bilberry *Vaccinium spp*. or bell heather *Erica cinerea*, though other dwarf-shrubs are important locally.

At low to moderate altitudes in warm oceanic parts of southern Britain, the typical form of the habitat is H8 *Calluna – Ulex* heath, characterised by abundant *Calluna, U. gallii and E. cinerea. U. gallii* becomes scarce in the cooler oceanic climate further north, where *E. cinerea* and Calluna are abundant together in H10 *Calluna – Erica* heath, especially on more southerly-facing slopes; E. cinerea becomes dominant in the hyper-oceanic fringes of the north-west. On more sheltered, humid slopes there are H21 *Calluna – Vaccinium* – Sphagnum heaths with a high cover of bog-mosses Sphagnum spp. and Hypnaceous mosses, which are best-developed in Scotland. At low to moderate elevations in the less oceanic areas of north-east England and the Midlands there are often extensive species-poor heaths (H9 *Calluna – Deschampsia* heaths) with an overwhelming dominance of Calluna and frequent wavy hair-grass *Deschampsia flexuosa*. These are often the least diverse of all UK heaths. In upland regions further north, there are sub-montane Calluna-dominated heaths with abundant bilberry *Vaccinium myrtillus* and crowberry *Empetrum nigrum* ssp. nigrum (H12 *Calluna – Vaccinium*).

Nearly all dry heath is semi-natural, being derived from woodland through a long history of grazing and burning. Most dry heaths in the English Uplands are managed as grouse moors or on occasion for livestock grazing.

In the South Pennines this vegetation corresponds to the following NVC types:

H8 Calluna *vulgaris* – *Ulex gallii* heath
H9 Calluna *vulgaris* – *Deschampsia flexuosa* heath
H10 Calluna *vulgaris* – *Erica cinerea* heath
H12 Calluna vulgaris – Vaccinium myrtillus heath
H18 Vaccinium *myrtillus* – *Deschampsia flexuosa* heath

South Pennine Moors SAC is representative of upland dry heath at the southern end of the Pennine range, the habitat's most south-easterly upland location in the UK. Dry heath covers extensive areas, occupies the lower slopes of the moors on mineral soils or where peat is thin, and occurs in transitions to acid grassland, wet heath and H7130 blanket bogs. The upland heath of the South Pennines is strongly dominated by heather *Calluna vulgaris*. Its main NVC types are H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. More rarely H8 Calluna vulgaris – Ulex gallii heath and H10 *Calluna vulgaris – Erica cinerea* heath are found. On the higher, more exposed ground, typically above 500m and on north and east facing slopes on Black Hill, H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath becomes more prominent. In the cloughs, or valleys, which extend into the heather moorlands, a greater mix of dwarf shrubs can be found together with more lichens and mosses. The moors support a rich invertebrate fauna, especially moths, and important bird assemblages.

- **H7130. Blanket bogs (*priority feature when active)**

These extensive peatlands have formed in areas where there is a climate of high rainfall and a low level of evapotranspiration, allowing peat to develop not only in wet hollows but as a blanket over large expanses of undulating ground. Blanket bogs show a complex pattern of variation related to climatic factors, particularly illustrated by the variety of patterning of the bog surface in different parts of the UK. Such climatic factors also influence the floristic composition of bog vegetation.

'Active' blanket bog supports a significant area of vegetation that is normally peat-forming. Typical species include the important peat-forming species, such as bog-mosses Sphagnum spp. and cotton-grasses *Eriophorum spp*., or purple moor-grass *Molinia caerulea* in certain circumstances, together with heather *Calluna vulgaris* and other ericaceous species.

Heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, cotton-grasses *Eriophorum* spp., deer-grass *Trichophorum cespitosum* and bog-mosses such as *S. papillosum*, *S. tenellum* and *S. capillifolium* are characteristic of blanket bog throughout its UK range. Other species are more characteristic of, or more abundant in, certain areas. For example, the higher, drier eastern bogs typically support a higher proportion of hare's-tail cotton-grass *Eriophorum vaginatum* and bilberry *Vaccinium myrtillus*. Similarly, purple moor-grass *Molinia caerulea* and bog-myrtle *Myrica gale* are much more widespread and typical on western bogs.

Where managed burning for grouse has been adopted the vegetation assumes some characteristics of dry heath most typically H9 *Calluna vulgaris – Deschampsia flexuosa* heath

South Pennine Moors SAC represents blanket bog in the South Pennines, the most south-easterly occurrence of the habitat in Europe. The bog vegetation communities are botanically poor. Hare's-tail cottongrass *Eriophorum vaginatum* is often overwhelmingly dominant and the usual bog-building Sphagnum mosses are scarce. Where the blanket peats are slightly drier, heather *Calluna vulgaris*, crowberry *Empetrum nigrum* and bilberry *Vaccinium myrtillus* become more prominent. Where surface peats are too dry to sustain blanket bog vegetation and where managed burning is practiced a species poor variant of the H9 *Calluna vulgaris – Deschampsia flexuosa* dry heath community is established. The uncommon cloudberry *Rubus chamaemorus* is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass E. angustifolium. Substantial areas of the bog surface are eroding, and there are extensive areas of bare peat. In some areas erosion may be a natural process reflecting the great age (9000 years) of the south Pennine peats.

The most abundant NVC blanket bog types on South Pennines Moors SAC are:

M3 *Eriophorum angustifolium* bog pool community
M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire
M20 *Eriophorum vaginatum* blanket and raised mire
M25 *Molinia caerulea – Potentilla erecta* mire.

- **H7140 Transition mires and quaking bogs; Very wet mires often identified by an unstable 'quaking' surface**

The term 'transition mire' relates to vegetation that in floristic composition and general ecological characteristics is transitional between acid bog and H7230 Alkaline fens, in which the surface conditions range from markedly acidic to slightly base-rich. The vegetation normally has intimate mixtures of species considered to be acidophile and others thought of as calciphile or basophile. In some cases the mire occupies a physically transitional location between bog and fen vegetation, as for example on the marginal lagg of raised bog or associated with certain valley and basin mires. In other cases these intermediate properties may reflect the actual process of succession, as peat accumulates in groundwater-fed fen or open water to produce rainwater-fed bog isolated from groundwater influence. Many of these systems are very unstable underfoot and can therefore also be described as 'quaking bogs'.

Transition mires and quaking bogs can occur in a variety of situations, related to different geomorphological processes: in flood plain mires, valley bogs, basin mires and the lagg zone of raised bogs, and as regeneration surfaces within mires that have been cut-over for peat or areas of mineral soil influence within H7130 Blanket bogs.

The following NVC types form the core of transition mire vegetation within South Pennine Moors SAC:

M4 *Carex rostrata – Sphagnum recurvum* mire
M5 *Carex rostrata – Sphagnum squarrosum* mire
M9 *Carex rostrata – Calliergon cuspidatum/giganteum* mire
S27 *Carex rostrata – Potentilla palustre* tall-herb fen.

H7140 Transition mires and quaking bogs is a qualifying feature, but not the primary reason for South Pennine Moors SAC being designated.

- **H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; Western acidic oak woodland**

This habitat type comprises a range of woodland types dominated by mixtures of oak (*Quercus robur* and/or *Q. petraea*) and birch (*Betula pendula* and/or *B. pubescens*). It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK.

The habitat shows considerable variation across its range, in terms of the associated ground flora and the richness of bryophyte communities. There is also a continuous spectrum of variation between oak-dominated and birch-dominated stands. Often these local variations reflect factors such as rainfall, slope, aspect, soil depth, and past and present woodland management (e.g. coppicing, planting, grazing). The most distinctive forms of the habitat have a ground flora dominated by bryophytes, such as *Dicranum majus*, *Hylocomium splendens*, *Isothecium myosuroides*, *Plagiothecium undulatum*, *Rhytidiadelphus loreus*, *Bazzania trilobata* and *Plagiochila spinulosa*. Other variants include stands in which the ground flora is characterised by the prominence of dwarf shrubs, such as bilberry *Vaccinium myrtillus*; grasses, such as wavy hair-grass *Deschampsia flexuosa*, common bent *Agrostis capillaris* and sweet vernal-grass *Anthoxanthum odoratum*; and plants indicative of more mesophytic conditions, including bluebell *Hyacinthoides non-scripta*, bramble *Rubus fruticosus*, scaly male-fern *Dryopteris affinis*.

Birch-dominated woodlands which contain at least some oak, and which either (a) occur as part of an intimate mosaic with oak-dominated stands, or (b) are clearly successional stages which are reverting to oak woodland, are included in the Annex I definition.

Frequently the oak woodland occurs as part of a mosaic of woodland types (including other Annex I habitats, such as 9180 *Tilio-Acerion* forests of slopes, screes and ravines and 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)) that varies with position on the slope, occurrence of streams or other waterbodies, and local soil enrichment. These transitions are important in maintaining the structure and function of the habitat type and differ across the country.

A key feature of European importance is the rich Atlantic bryophyte communities that are often well-developed within this Annex I type. These include numerous rare species, such as *Campylopus setifolius*, *Sematophyllum demissum*, *Adelanthus decipiens*, *Leptoscyphus cuneifolius* and *Plagiochila atlantica*.

The habitat corresponds broadly to the 'western oakwoods' described in previous accounts of UK woodlands. Within the South Pennine Moors SAC, the following NVC types make up this feature:

W10e *Quercus robur – Pteridium aquilinum – Rubus fruticosus* woodland*, Acer pseudoplatanus – Oxalis acetosella* sub-community
W11 *Quercus petraea – Betula pubescens – Oxalis acetosella* woodland
W16b *Quercus spp. – Betula spp. – Deschampsia flexuosa* woodland*, Vaccinium myrtillus – Dryopteris dilatata* sub-community

Around the fringes of the upland heath and bog of the south Pennine Moors are blocks of old sessile oak woods, usually on slopes. These tend to be dryer than those further north and west, such that the bryophyte communities are less developed (although this lowered diversity may in some instances have been exaggerated by the effects of 19th century air pollution). Other components of the ground flora such as grasses, dwarf shrubs and ferns are common. Small areas of alder woodland along stream-sides add to the overall richness of the woods.

This woodland habitat is found to be a sparsely distributed habitat within the South Pennines SAC, mostly located on the side of steep valleys (cloughs). Relatively few woodland areas remain, and although most SSSIs have some parcels of woodland remaining they are, with a few exceptions in the Dark Peak, all small and fragmented in nature. Given the very high biodiversity associated with this habitat type, and its spatially poor representation in the South Pennines, expansion of this habitat along with a more natural woodland edge is a key restoration target.

Qualifying Species:

N/A

References

RODWELL, J.S. (ed).1991. British Plant Communities Volume 2: Mires and heaths. Cambridge University Press

AVERIS, A.M., AVERIS, A.B.G, BIRKS, H.J.B., HORSFIELD, D., THOMPSON, D.B.A. & YEO, M.J.M. 2004. An Illustrated Guide to British Upland Vegetation. Peterborough, JNCC.

TRATT, R., PARNELL, M. & EADES, P. 2014. Peak District Wetlands: Vegetation Types, Notable Species and Distribution. Draft Report to: Natural England

Table 1: Supplementary Advice for Qualifying Features: H4010. Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath.

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 to the extent baseline-value of 4356.63 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. 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. H4010. Northern Atlantic wet heaths with *Erica tetralix* cover 6.7% of the SAC and are recorded frequently in mosaics with other Upland habitats within all five underpinning SSSIs.	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England JNCC. 2016. NATURA 2000 – Standard Data Form. Available here
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Maintain or restore as appropriate the distribution and configuration of the H4010 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	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)
			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.	
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain any areas of transition between H4010 feature and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	Transitions 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. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. Throughout South Pennine Moors SAC, there are occasional areas of reasonably intact wet heath vegetation. However, more frequent are wet heath transitions with dry heath, blanket bog, mosaics of soligenous mires (M4, M6, M11), scrub and damp acid grassland.	Natural England. 2009. South Pennine Moors SSSI FCT - Draft. English Nature. 1995. South Pennine Moors SAC An Integrated Management Strategy. And Conservation Action Programme. Available from Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments
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 types:	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).	Rodwell J.S. 1991. British Plant Communities Volumes 1-5. Cambridge University Press, Cambridge.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		M15 - *Scirpus cespitosus - Erica tetralix* wet heath M16 - *Erica tetralix - Sphagnum compactum* wet heath.	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). Many examples of wet heath on South Pennine Moors appear to be moderately or heavily degraded, probably by a combination of past burning and heavy grazing, and as a consequence their flora is very impoverished. This has left many sites being almost totally dominated by *Molinia caerulea*. Thus there is frequently little in appearance to be easily distinguished without going into a micro scale between the two NVC communities found for wet heath on South Pennine Moors SAC. Furthermore, the geographical location of South Pennine Moors appears to be somewhat intermediate between the drier eastern and southern lowland M16 samples, and the wetter northern and western M15 samples at moderate altitudes, described in Rodwell (1991).	
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Maintain or restore as appropriate to achieve an overall cover of dwarf shrub species which is typically between 25-90%	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The ericaceous species heather or ling *Calluna vulgaris*, bell heather *Erica cinerea*, cross-leaved heath *Erica tetralix*, bilberry or blaeberry *Vaccinium myrtillus* and cowberry	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Vaccinium vitis-idaea are the commonest and most characteristic dwarf-shrubs. *Erica tetralix* should be present within a 20m radius of any point within this H4010 wet heath habitat. However, in parts of the H4010 feature *Erica tetralix* is found infrequently. The cover of dwarf shrubs is variable and should be assessed on site on a case by case basis. Generally many management and external influences has impacted on dwarf shrubs on site. These include hydrological changes, overgrazing, management changes, historic burning, recreational disturbances during waterlogged conditions and previously atmospheric pollution over the last few hundred years has impacted dwarf-shrubs growth.	
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Maintain or restore as appropriate a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Cover of common gorse is low typically at <10%	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands en	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)
			masse may also be serious fire hazards. Scrub encroachment is fairly low within this SAC with exception from peripheral areas where there is some accepted woodland expansion, which provides a fragmented habitat for birds. However, for a few locations gorse is a concern and appropriate management should be put in place to manage it on a case by case basis.	
Structure and function (including its typical species)	**Vegetation structure: tree cover**	Maintain or restore as appropriate the open character of the feature, with a typically scattered and low cover of trees and scrub (<20% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, foodplants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole. Overall, there is a low cover of encroaching shrubs and trees on H4010 wet heath habitat. However, in some localised areas scrub and birch *Betula spp*. encroachment is a concern and needs regular monitoring.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	**Vegetation composition: bracken cover**	Maintain or restore as appropriate a cover of dense bracken which is low, typically at <5%	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Usually active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has some nature conservation value, with bracken stands providing	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)
			habitat supporting twite, ring ouzel and stonechat. Bracken encroachment is a concern for some parts of the site and should be managed on a case by case basis.	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain or restore as appropriate the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; Heather *Calluna vulgaris,* Cross leaved heath *Erica tetralix,* Billberry *Vaccinium spp.* Carnation sedge *Carex panicea,* Common cottongrass *Eriophorum angustifolium,* Deergrass *Trichophorum cespitosum.* Sundew *Drosera spp.,*	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; • **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'). • **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. 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. Many South Pennine examples appear to be moderately or heavily degraded, probably by a combination of past burning and heavy grazing, and as a consequence their flora is very impoverished with many sites being almost totally dominated by *Molinia caerulea.*	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)
Structure and function (including its typical species)	**Vegetation: undesirable species**	Maintain or restore as appropriate 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;	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants. Undesirable species may include: Common bent *Agrostis capillaris,* Yorkshire fog *Holcus lanatus,* Common reed *Phragmites australis,* Bracken *Pteridium aquilinum,* Rhododendron *Rhododendron ponticum,* Creeping buttercup *Ranunculus repens,* Common nettle *Urtica spp,* Willowherb *Epilobium spp. (*excl. *E. palustre),* Creeping thistle *Cirsium arvense,* Soft rush *Juncus effusus.* Acrocarpous mosses <occasional.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	**Functional connectivity with wider landscape**	Maintain or restore as appropriate 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. These connections 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. 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. The extent and connectivity of H4010 wet heath habitat is	English Nature. 1995. South Pennine Moors - An Integrated Management Strategy. And Conservation Action Programme. Available from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			frequently found in small patches within H430 dry heath habitat or H7130 blanket bog habitat. This has resulted in difficulty in ascertaining the connectivity of this feature with the wider landscape. However, the small patches of H4010 wet heaths, acid grassland semi-improved mosaics on the edge of the moors provide connectivity and important habitat for curlew *Numenius arquata*, snipe *Gallinago gallinago* and lapwing *Vanellus vanellus* breeding sites.	
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	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. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats and supporting habitats. This means that this site is considered to be vulnerable overall, but moderately so. Some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat	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].

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable. In general terms, the relative sensitivity of this feature is considered to be moderate.	
Supporting processes (on which the feature relies)	**Conservation measures**	Maintain or restore as appropriate the management measures which are necessary to maintain or restore as appropriate 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. The principal management measures on this site are: • Ensure burning does not take place on sensitive areas. • Continually monitor the hydrology of the site including monitoring the re-vegetation and success of grips and plastic dams and where necessary repair or replace. • Maintain appropriate stocking densities to prevent overgrazing. • Maintain public access to the site through maintaining designated walking routes. • Monitor vehicle access on site and prevent vehicle use on sensitive areas of the site. To help achieve favourable conservation status an ecosystem approach is desirable to recognise the interdependence of ecosystem services and optimal habitat condition including developing greater flexibility within existing funding streams deriving support for management across a range of interests.	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here Natural England. 2009. South Pennines Moor SSSI FCT - Draft. Natural England. 2007. Dark Peak SSSI FCT - Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT – Consultation Draft Natural England. 2004. Goyt Valley SSSI FCT – Draft NATURAL England. 2004. Leek Moors FCT – Draft 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 processes (on which the feature relies)	**Soils, substrate and nutrient cycling**	Restore 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. This Annex 1 habitat has essentially raw soils with little humus and low nutrient status. There are large areas of shallow peat (<50cm in depth) in the South Pennines which may once have been wet heath. These are typically on gently sloping ground with some water movement preventing stagnation. These areas have become dominated, almost exclusively in some areas, by Molinia (although sparse heather or cross-leaved heath may remain).	Natural England. 2009. South Pennines Moor SSSI FCT - Draft. Natural England. 2007. Dark Peak SSSI FCT - Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT – Consultation Draft Natural England. 2004. Goyt Valley SSSI FCT – Draft NATURAL England. 2004. Leek Moors FCT – Draft This attribute will be periodically monitored as part of Natural England's site condition assessments
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary, 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). As a staged recovery the target for South Pennine Moors SAC should be to transition to the next lower class of critical load exceedance ie, for Acidity reduce deposition to 0.5-1.0 keq/ha/yr And for nutrient Nitrogen reduce deposition to between 7-14 kgN/ha/yr	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	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). JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England - http://uk-air.defra.gov.uk/data CEH. Trends in critical load exceedance in UK – Report to DEFRA

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Atmospheric pollution over the last few hundred years has depleted the lichen and bryophyte flora and may be affecting dwarf-shrubs.	
Supporting processes (on which the feature relies)	**Water quality**	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.	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. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as appropriate), restore a hydrological regime to provide the conditions necessary to sustain the H4010 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.	Pennine Moors SAC Site Improvement Plan. Available here Dark Peak SSSI FCT This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The complexity of the pattern of degraded hydrology from surface vegetation to subterranean pipes and artificial hydrological changes (drains and grips) means that the production of a restoration plan for each wet heath can only be achieved through factoring in multiple factors on a case by case basis. This includes maintaining or restoring as appropriate a high water table.	
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: The objectives for some of the attributes listed above include both 'maintain' and 'restore' targets. This is because this SAC is an extensive complex of geographically-separate component sites which currently vary in their condition status. Overall, both objectives will currently be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.				

Table 2: Supplementary Advice for Qualifying Features: H4030. European dry heaths

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 H4030. European dry heaths feature.	See general explanatory notes for this attribute in Table 1. European Dry Heath H4030 is a feature found throughout the SAC. Further, dry heath exists within mosaics of bracken beds, rushy flushes, acid grassland and stands of Molinia. Therefore the accurate extend of this habitat is difficult to define. Within the following component SSSIs H4030 dry heath covers the following extent: 294.5ha – Leek Moor SSSI 3141.7ha – South Pennine Moors SSSI Not currently available at a site level - Eastern Peak District Moors SSSI, Goyt Valley SSSI and The Dark Peak SSSI	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England JNCC. 2016. NATURA 2000 – STANDARD DATA FORM. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Maintain and restore the distribution and configuration of the 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	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature. This site has pressures of fragmentation from burning; wildfires, bracken encroachment; succession; erosion through walkers, recreation including public access, estates vehicles and sheep, cattle, rabbit and deer grazing.	
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 types: H8 *Calluna vulgaris-Ulex gallii* heath including H8e - *Calluna vulgaris – Ulex gallii heath, Vaccinium myrtilus* sub-community H9 - *Calluna vulgaris – Deschampsia flexuosa* heath H12 *Calluna vulgaris-Vaccinium myrtillus* heath.	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). H8, H9 and H12 are the main NVC habitats found for dry heath within South Pennine Moors SAC. However, heather / grass mosaic. (H9 heath / U4 / U5 grassland mosaic) and Bilberry / grass mosaics. (H12 heath / U4 / U5 grassland mosaic) occur extensively over the site.	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain or restore as appropriate any areas of transition between this and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	Transitions between adjacent 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. This is an important attribute as many characteristic heathland	Natural England. 2017. Dark Peak SSSI FCT. Available here JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. Over this site, may transitions in habitat occur, especially around edge areas These include dry heath transitioning into wet *Molinia* dominated grassland or dry acid grassland or bracken and following flush lines, soft rush flushes grading into degraded heathland. H4030 dry heath is created and maintained mostly through human management by grazing, cutting and burning. If this habitat had no management and was left purely to natural processes, then they it is likely that it would transition into thick scrub or secondary forest. However some fluctuations, transitions and variations from year to year are normal and acceptable.	England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Maintain or restore as appropriate an overall cover of dwarf shrub species which is typically between 25-90%	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The most common characteristic dwarf-shrubs in this H4030 habitat are heather or ling *Calluna vulgaris* and to a lesser extent bilberry *Vaccinium myrtillus.* Localised areas of heath with *E.cinerea* and *Vaccinium vitis-idaea* occur occasionally on the steep slopes. Low species diversity of dwarf shrubs (excluding *Calluna vulgaris*) is a concern locally. In some areas this lower cover of dwarf shrubs is due to excessive burning or overgrazing.	Natural England. 2014. Deer Impact Assessment 2014 on Big Moor. Eastern Moors Partnership. Available from Natural England This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Fenced off areas on site, provide the most diverse mix of dwarf shrubs with grazing pressures still an issue in unfenced areas leading to these areas having less shrub diversity.	
Structure and function (including its typical species)	**Vegetation composition: bracken cover**	Restore a cover of dense bracken which is low, typically at <5%.	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Usually some active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has nature conservation value on this site, for example on as nesting habitat for twite *Linaria flavirostris*, ring ouzel *Turdus torquatus* and stonechat *Saxicola rubicola.* There are extensive and spreading stands of bracken across sections of South Pennine Moors SAC. Largely bracken control is managed through Moorland Management Plans and through individual higher level stewardships and should be managed on a case by case basis. The presence of bracken is likely to indicate soils suitable for scrubby woodland cover. However, a small portion of bracken should also be retained at specific locations as an important structure on heathland.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Maintain cover of common gorse *Ulex europaeus* at <25% and the combined cover of *U. europaeus* and *U. gallii* at <50%	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands en masse may also be serious fire hazards.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Gorse species support a rich invertebrate and vertebrate fauna. However, the can affect the soil characteristics. There has been no excessive quantities of gorse recorded on site or encroaching on to areas of H4030, and as such is currently not considered a concern.	
Structure and function (including its typical species)	**Vegetation structure: tree cover**	Restore the open character of the feature, with a typically scattered and low cover of trees and scrub (<25% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing shelter, cover, as foodplants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole within heathland communities. In some parts of South Pennine Moors SAC, notably near conifer plantations and old burn sites, the level of tree regeneration needs to be monitored and controlled, if necessary, if stock do not keep on top of it. However, in other parts of the site, especially around the edges of dry heath to native woodland fringe, native tree species can encouraged to create more structural diversity and more dynamic moorland fringe vegetation for birds and invertebrates. Therefore, the extent of tree and scrub cover should be assessed and maintained on a case by case basis.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Restore a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers. A diverse age structure is highly dependent on level of management intervention through burning and sheep grazing and is therefore highly variable across the site. Historic over-grazing and burning are the main reason for the presence of pioneer heathers rather than natural regeneration of dead or late mature stands. In some areas of the dry heath where high grazing pressure exists, the dwarf shrub species while frequent, are grazed to a uniform low level, or to characteristic stunted forms. However, the removal or reduction of grazing in some parts of the SAC through agri-environment schemes and/or the implementation of Moorland Management Plans have allowed the dwarf shrub component to thrive, the tall vegetation making ideal nesting habitat for merlin *Falco columbarius* and short-eared owl *Asio flammeus*.	the underpinning SSSs.
Structure and function (including its typical species)	**Vegetation: 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. Undesirable species include: Creeping thistle *Cirsium arvense;* Spear thistle *Cirsium vulgare;* Common sorrel *Rumex acetosa;* Creeping buttercup *Ranunculus repens;* or	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants. Overall, the occurrence of undesirable species is minimal and below <1%. Exceptionally, and at a local level, this figure is far exceeded and the feature will be threatened unless an action plan is implemented. Monitoring should continue on site, especially on bare ground areas which are more susceptible to the growth of undesirable species.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. EMP. 2014. Deer Impact Assessment 2014 on Big Moor. Eastern Moors Partnership. Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Common nettle *Urtica dioica* Less than 10% of the vegetation cover should consist of *Juncus effusus.* All invasive non-native species including specifically to this site *Rhododendron ponticum,* Salal *Gaultheria shallon,* Japanese knotweed *Fallopia japonica* are included as undesirable species	The grassy marginal edge around some of the dry heath habitat should be periodically monitored to ensure grasses and undesirable herbs are not encroaching onto the dry heath. Soft rush *Juncus effuses* encroachment is a localised issue on some of the site and should be monitored. Rush control is largely managed through Moorland Management plans and through individual higher level stewardships but would benefit from periodical review to ascertain levels of spread as appropriate and should be monitored Other undesirable species of concern on site include the fungus-like pathogen Phytophthora spp. which is known to be killing various species within the SAC. Species effected included Hybrid Bilberry *Vaccinium x intermedium* and Bilberry *Vaccinium myrtillus.* Few control mechanisms exist for the disease so early detection and proper disposal of infected plant material are essential. Additionally outbreaks of the Heather beetle *Lochmaea suturalis* have been recorded in localised areas within the SAC. Steps to control this beetle are cited in Moorland Management Plans.	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain or restore as appropriate the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: Heather *Calluna vulgaris,* Cross leaved heath *Erica tetralix,* Bell heather *E.cinerea,* Bilberry *Vaccinium myrtillus,* Crowberry *Empetrum nigrum* and Cowberry *V. vitis-idaea*.	See general explanatory notes for this attribute in Table 1. It is particularly important for example to ensure that distinctive species growing on the low lying accessible areas of the site are not over grazed or trampled by sheep and walkers. In areas of high visitor use, footpath improvements may need to be carried out. Heather seed scattering and brash spreading may need to be carried out along footpaths on a case by case basis. Other notable species on site are Adder (*Vipera berus*) which is a notable species on the Eastern Peak District Moors SSSI, as mentioned in the SSSI citation.	Mclay. A. 2015. A Waxcap Grassland Survey of land at New High Laithe Farm, Hardcastle Crags Estate and a Waxcap Grassland Survey of land at Hollin Hall, Hardcastle Crags Estate. Natural England and National Trust. Available on request. Sorby Natural History Society Sheffield. 2014. The Sorby Record No. A Journal of Natural History for the Sheffield Area.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The site has a particularly good beetle fauna with seven nationally scarce terrestrial beetles and four nationally scarce water beetles and very many species of local interest recorded. Good numbers of craneflies, including several local and four nationally scarce species have been recorded from different localities and habitats. Further nationally rare waxcaps have been recorded on the fringe habitats bordering acid grassland. The moorlands are known for their bird species and also support nationally important numbers of golden plover *Pluvialis apricaria*, curlew *Numenius arquata*, merlin *Falco columbarius* and twite *Carduelis flavirostris*.	Available from Natural England Eastern Moors Partnership. 2013. Hewetts Bank Adder Survey. Available from Natural England Lincolnshire Naturalists' Union 2018. Eastern Moors (SK27) Invertebrate Species List - Ramsley Moor (SK2875) and Bar Brook (SK2774). Available from Natural England Strawbridge. K. Ecological Monitoring Summary. 2014. Eastern Moors Partnership. RSPB and NT. Available from Natural England Natural England. 1994. South Pennine Moors SSSI Citation. Available here Natural England. 1994. Eastern Peak District Moors SSSI Citation. Available here
Structure and function (including its typical species)	**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. These connections 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	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. Natural England. 2012. National Character Area Profiles: 36 Southern Pennines (NE323); 51 Dark Peak (NE378) & 53 South West Peak (NE453).These profiles can be viewed here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. The plant communities within this habitat type are found often within the lag habitat of H4010 Northern Atlantic Wet Heaths and to a lesser extent H7130 Blanket Bog. Therefore this habitat may have high connectivity within localised areas.	
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	See general explanatory notes for this attribute in Table 1.	Natural England, 2015a. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available at http://publications.naturalengland.org.uk/publication/4954594591375360]. Peak District National Park: Climate Change – Adaption and Mitigation, available **here**
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. Soils vary across the site – some are thin and derived from the shattered rock and associated landslips, while others are discrete lenses of deep peat which have developed where topography allows. Some gullies are prone to erosion and bear	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			peat but are not causing a significant impact at present. However, it must also be noted that a range of invertebrates and plants require bare ground/peat where it is not too frequently disturbed by vehicles or feet. Bare ground should form a patchwork with vegetation and be present mainly in south-facing slopes. Exclude rock, stone or litter. Tracks or paths can also be a source or bare ground for nesting invertebrates. A higher percentage of bare ground is acceptable if the site is important for certain bird species, e.g. curlews *Numenius arquata*, woodlarks *Lullula arborea*, nightjars *Caprimulgus europaeus*.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain or restore as appropriate the management measures (either within and/or outside the site boundary as appropriate) which are necessary for 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. Management that may be relevant to this feature includes maintaining low nutrient levels to maintain high numbers of species through the management activities of grazing, burning, mowing, sod-cutting and scrub/tree cutting. Management of succession is a critical aspect of management for this habitat, by a combination of active processes and grazing/cutting. A range of invertebrates and plants require bare ground/peat where it is not too frequently disturbed by vehicles or feet. The site management (including the burning regime) provides a mosaic of habitats suitable for a range of moorland birds. However, managed burning on dry heath can have both positive and negative impacts on the habitat for SPA birds through changes to vegetation. Further, low grazing levels should be maintained to aid regeneration in burn areas and it	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here Natural England. 2014. Moorland Habitat Monitoring of South Pennine Moors SSSI: A resurvey of Selected Moorland Agri-environment Agreement Sites: Site reports – No.17. Available on request.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			should be ensured that burns are cool and do not go into the moss layer. Specific on-site erosion through walkers, off road bikers and estate vehicles is a further concern for reducing connectivity across the SAC. Specific areas of this SAC have had problems with overgrazing and this is still a concern in certain areas. Stocking rates should be reviewed as part of any new Management Plans and Stewardship agreements. Further high populations of rabbits and deer on localised areas can also lead to degradation of this habitat and should be controlled. Rush control and some bracken control is a consideration for the management of H4030 on this site.	
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary, 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). As a staged recovery the target for Peak District Moors SPA should be to transition to the next lower class of critical load exceedance ie, for Acidity reduce deposition to 0.5-1.0 keq/ha/yr And for nutrient Nitrogen reduce deposition to between 7-14 kgN/ha/yr	See general explanatory notes for this attribute in Table 1. Nitrogen deposition currently (2014) exceeds site relevant critical loads.	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. 2014. South Pennine Moors SAC Site Improvement Plan. Available here CEH. 2015. Trends in critical load exceedance in UK - report to Defra
Supporting processes (on which the feature relies)	**Water quality**	Where the feature is dependent on surface water and/or groundwater, restore water quality and quantity to a standard	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	Moors for the Future. 2016. Moscar Science Project: Annual Report for 2015/16. Available from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		which provides the necessary conditions to support the feature.	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. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC. On moorland edge sites the water quality in steams and depressions show a significant negative correlation between dissolved oxygen content and pH.	
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as necessary, restore 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. There are still some old grips on site, especially on the plateau that drain the peat making this system dry out.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. Penny Anderson Associates. 2010. Yorkshire Water Keighley Moor Restoration Implementation Plan. Available from Natural England.
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: The objectives for some of the attributes listed above include both 'maintain' and 'restore' targets. This is because this SAC is an extensive complex of geographically-separate component sites which currently vary in their condition status. Overall, both objectives will currently be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.				

Table 3: Supplementary Advice for Qualifying Features: H7130. Blanket bogs. *

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**	Restore the total extent of the habitat feature at or to feature extent baseline-value of just under 20,000ha.	See general explanatory notes for this attribute in Table 1. Blanket bog H7130 was a feature throughout this SAC within all five underpinning SSSIs, accounting for about 40% of the total habitat area of this SAC. South Pennine Moors contains 15708ha of blanket bog alone. The blanket bogs of much of South Pennine Moors SAC are characterised by evidence of significant long term decline, caused by a range of natural and human induced factors. The most significant feature of this decline is the large area of bare and eroding peat and associated damaged vegetation. Currently from the Priority Habitats Inventory extent estimate for blanket bog is: South Pennine Moors 12464ha; Dark Peak 18867ha; Leek Moors 1786ha; Eastern Peak District Moors 1729 and Goyt Valley 888ha.	Natural England. 2014. South Pennine Moors SSSI NVC maps. Available on request South Pennine Moors - An Integrated Management Strategy. And Conservation Action Programme.1995. English Nature. Available from Natural England. JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England JNCC. 2016. NATURA 2000 – STANDARD DATA FORM. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2018. Priority Habitats Inventory – extent estimates for underpinning SSSIs.
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	This feature is defined by the presence of deep peat (>40cm depth) and features associated with that soil type. Conceptually the creation of this habitat within the timeframe of this advice is difficult and so habitat creation and spread of range can only be imagined as restoration of a former condition (that enabled the accumulation of peat) over deep peat not currently functioning as active blanket bog and additionally not	MoorLIFE. 2015. AfterLIFE Plan (LIFE08 NAT/UK/00202). Available from Natural England Crouch, T. 2015. Land Cover Map of the South Pennine Moors Special Area of Conservation. Moors for the Future Partnership

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			supporting blanket bog vegetation as described. A contraction in the range, or geographic spread, of the feature (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. Fragmentation of blanket bog is common with areas drying out through drainage, and burning encouraging a species-poor community dominated typically by *Calluna vulgaris* or *Molinia caerulea*. True bog species become fragmented or are lost. Hydrological fragmentation of the bog system can also occur. The Blanket Bog feature covers over half the SAC area making it the most extensive habitat type within the site. Therefore due to the scale of this habitat over many SSSIs, there are different sites having different threats and management options in place. However, largely important issues to get right on this feature are blocking the grips, the grazing pressure, atmospheric pollution and monitoring the extent and regeneration of areas previously burnt intentionally and through wildfires (and assisting through sphagnum inoculation on a case by case basis where funding allows).	MoorLIFE. 2015. AfterLIFE Plan (LIFE08 NAT/UK/00202). Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Over the last few years efforts have been made to correct the hydrology, reduce bare peat and increase species diversity through changes to grazing regimes through Environmental Stewardship Schemes, Catchment Management Plans, Lottery funding and the a series of EU Life projects. Further, fragmentation and damage to the habitat has occurred through popular public rights of way with people walking off the paths especially in wetter times of the year, resulting in enlarging areas of bare peat. This has been exacerbated by vehicle and bike use. Roads have also divided sections of Upland habitat.	
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 types: M3 *Eriophorum angustifolium* bog pool community, M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire, M20 *Eriophorum vaginatum* blanket and raised mire and M25 *Molinia caerulea – Potentilla erecta* mire	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). As blanket bog 'blankets' extensive areas it is not surprising that the habitat supports a range of different vegetation communities .Transitions can occur between bog pools, wetter Sphagnum lawns, through to more mixed terrestrial bog communities associated with both hummocks and hollows. At its margins (normally on the steeper slopes), blanket bog communities will gradually be lost and replaced by wet heath and dry heath communities. Blanket bog communities can be heavily influenced by land management, notably drainage, managed rotational burning and grazing. In these situations typical blanket bog communities are replaced by a variety of	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs. Moors for the Future. 2015. Trials to investigate the diversification of Molinia using flailing and Sphagnum propagules – setting up and baseline surveys , Available from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			degraded mire (M25), dry heath (H9, H12) or acid grassland (U6) vegetation types. Where these vegetation types occur on deeper peats, they should be assessed as blanket bog and restoration back to blanket bog in favourable condition should be the objective. Note: Blanket bog vegetation can sometimes become established on peats shallower than 0.4m. or may grade into dry heath on shallow peats that have arisen through transformation from wet heath (M15) On this SAC the majority of the blanket bog areas that require restoration are due to loss of function arising from long-term structural problems of human induced change such as pollution, fire, and grazing, which in turn has led to poor species diversity including low sphagnum cover and/or extensive bare peat.	
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature.	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum herbicides). *Rhododendron ponticum* needs to be controlled on a wider scale across the site to avoid the suppression of the SAC H7130 feature. This work will need to bring together various land owners, occupiers and organisations. Given the decades elapsed to arrive at the current levels of coverage, slowing or reversing the process will be long term with consistency and persistence from all parties being key.	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.
Structure and function (including its	**Presence/ cover of woody**	Maintain a low cover (<10% of the area) of scrub or trees within stands of H7130.	Native trees and shrubs which can tolerate permanently waterlogged conditions can occur naturally on bog and fen surfaces. An abundance of scrub and trees on bogs and fens	This attribute will be periodically monitored as part of Natural England's site condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)	**species**		is sometimes regarded as detrimental because water is lost by evapotranspiration from the trees and, as the tree canopies develop and close, water is further prevented from reaching the bog surface by interception. This can reduce the amount of water reaching the bog surface. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces. Encroachment of tree cover onto the bog area including conifers such as Sitka spruce *Picea sitchensis* is only a very localised concern within areas of the SAC close to plantations and access routes. Overall, tree cover is not over the 10% threshold target for this SAC. At the edges of H7130 habitat a low cover of native trees and shrubs is desirable and will be beneficial for many of the species that use the mires including black grouse, *Tetrao tetrix* passerine birds and many invertebrate species.	assessments and the relevant Favourable Condition Tables for the underpinning SSSs.
Structure and function (including its typical species)	**Vegetation composition: undesirable species**	The following undesirable competitive species should be absent or rare (individually and collectively less than 1% of vegetation cover); Common bent-grass *Agrostis capillaris,* Yorkshire fog *Holcus lanatus*, Common reed *Phragmites australis,* Bracken *Pteridium aquilinum*, Creeping buttercup *Ranunculus repens.*	These are species not considered to be a desirable part of the blanket bog vegetation community as they may spread and out-compete more sensitive typical species Bracken *Pteridium aquilinum* is a concern for some parts of the SAC and needs to be controlled across the site to avoid the suppression of the SAC H7130 feature. This work will need to bring together various land owners, occupiers and organisations. Given the decades elapsed to arrive at the current levels of coverage, slowing or reversing the process will be long term with consistency and persistence from all parties being key. In some areas of this SAC, there is an increase in grass species as a consequence of overgrazing. Stocking rates need to be monitored to ensure that a proportion of ericaceous species remain.	This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Rush *Juncus effusus* invasion is a localised concern for some sections of the H7130 blanket bog feature of the SAC and would benefit from further management. There have also been records of some heather beetle *Lochmaea suturalis* damage on a proportion of the SAC. Further, *Polytrichum commune* has become widespread on localised areas of the SAC which have been historically subjected to heavy grazing and burning. This has reduced the presence of positive blanket bog indicator species. It is difficult to see how these areas can be restored without significant intervention, it is however important to monitor the spread of Polytrichum and ensure grazing / burning / disturbance levels in these areas are minimised. *Polytrichum* and *Juncus* are often concentrated in disturbed areas within the feature or more typically in transformations of associated features such as acid flushes and transition mires.	
Structure and function (including its typical species)	**Structural diversity**	Restore the full range of typical structural features associated with the feature at this site, e.g. vegetation cover, surface patterning and hydrological zonations	Bogs in particular show varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the result of previous damage). These can occur at different macro and micro scales across the habitat and include alternative aquatic and terrestrial surface features, such as pools and hummocks, and terrestrial features such as ridges and hollows. These features will support distinctive patterns of bog vegetation, and so will be sensitive to changes in topography and hydrology. These can be modified or disrupted by activities such as drainage, burning, grazing, vehicular access and peat digging. These are likely to be missing or poorly represented in degraded blanket bog systems. These components may include areas with noticeably uneven structure, at a spatial scale of around 1m^2 or less. The unevenness should be the result of Sphagnum hummocks, lawns and hollows, or mixtures	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for Dark Peak SSSI FCT; Eastern Peak District Moors SSSI FCT; Goyt Valley SSSI FCT and Leek Moors FCT

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			of well-developed cotton-grass tussocks and spreading bushes of dwarf-shrubs. Overgrazing has already adversely affected blanket bog. This historical overgrazing still negatively impacting the habitats of the breeding birds; causing habitat change from heath to grassland and causes water run-off and erosion. This has led to long term impact leading to unfavourable condition for bog and heath communities. Burning (intentional and more recently wildfire) is also an issue in many areas. Dry bogs will support vigorous *Calluna* growth. However with a move to cutting to achieve the varied dwarf shrub structure required by the Upland Estates, more of this feature should slowly start to return to a functioning state. Long-term changes to hydrology should reduce the vigour and uniformity of the dry bog vegetation reducing the need for intervention and increasing fire resilience. However, unpredicted wildfire damage remains a concern for this site. Erosion, fire damage (intentional burn and wildfire), historic air pollution, overgrazing, public access routes and vehicle access are the main concerns on this site.	
Structure and function (including its typical species)	**Physical structure: ground disturbance (and peat erosion)**	Significant areas of disturbed and eroding bare ground should not be present. Where present, any affected areas should typically not exceed 1% of the total feature, and be considered only as a temporary stage.	Bare ground and eroding peat not only affects the hydrology of bog systems and its associated biodiversity but can also have wider environmental impacts on e.g. water quality. There will also be a carbon loss from the system. Substantial areas of the bog surface are eroding, and there are extensive areas of bare peat. In some areas erosion may be a natural process reflecting the great age (9000 years) of the south Pennine peats. However, over other areas peat erosion is a result of anthropogenic processes. Historic air pollution and wildfires have contributed to areas of bare and eroding peat, surface gullying and sub-surface peat pipes, loss of peat forming species. In many areas peatland restoration work has been undertaken to attempt to encourage these areas to re-vegetate, such work has been funded through the LIFE project,	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here JNCC. 2016. UK Biodiversity Action Plan Priority Habitat Descriptions – Blanket Bog. Available here Penny Anderson Associates. 2010. Yorkshire Water Keighley Moor Restoration Implementation Plan. Available from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			HLS agreements or the Sphagnum Propagation Project. In some areas of the SAC where here is extensive peat erosion have been fenced to exclude sheep and the areas are to be seeded with a mixture of heath species or sphagnum. The vegetation is slowly recovering there. In the worst areas heather brash has been spread which is also helping to stabilise the peat.	MoorLIFE. 2015. AfterLIFE Plan (LIFE08 NAT/UK/00202). Available from Natural England Moors for the Future. 2015. Trials to investigate the diversification of *Molinia* using flailing and Sphagnum propagules – setting up and baseline surveys , Available from Natural England.
Structure and function (including its typical species)	**Soils, substrate and nutrient cycling**	Restore the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungi: bacteria ratio, to within typical values for the habitat. For this feature the peat substrate should consist of both acrotelm and catotelm layers.	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. Peat is a soil distinguished from other soil types by its high content of organic matter (30%-100%). The organic matter content results form a combination of plant growth and waterlogging, the latter reducing oxygen diffusion to levels which are so slow that decomposition of the dead plant matter uses up this oxygen faster than it can be supplied. Consequently conditions rapidly become anaerobic, which reduces decomposition rates and the semi-decomposed plant material builds up over time to form peat. An active blanket bog should be made up of two layers, an acrotelm and a catotelm. The thin (5-75cm) upper layer or acrotelm consists of living plant material and is a zone of fluctuating water table, where relatively rapid plant decomposition occurs. Below this is the catotelm, a much thicker layer of peat (up to 10m), consisting of broken down plant material, and which is always below the water table.	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Degraded (through e.g. drainage and rotational burning) blanket bogs may have lost the acrotelm layer, and now has layer of damaged catotelm (haplotelm) at the surface. Agricultural drainage has affected some sites as well as erosion from public access. Increased prolonged dry weather and drought increase the risk of damage to peat soils through wildfire.	
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	See general explanatory notes for this attribute in Table 1. Rotational burning, drainage and atmospheric deposition can all compromise this feature's ability to adapt, especially in response to the effects of climate change.	Natural England, 2015a. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available at http://publications.naturalengland.org.uk/publication/4954594591375360] Peak District National Park: Climate Change – Adaption and Mitigation, available here
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Restore the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; Heather *Calluna vulgaris,* Cross leaved heath *Erica tetralix,* Bell heather *E. cinerea,* Bilberry *Vaccinium myrtillus,* Crowberry *Empetrum nigrum,* Cowberry *V.vitis-idaea,* Common cottongrass *Eriophorum angustifolium,* hare's-tail cottongrass E. vaginatum	See general explanatory notes for this attribute in Table 1. Within South Pennine Moors SAC the bog vegetation communities are for the most part botanically poor. Hare's-tail cottongrass *Eriophorum vaginatum* is often overwhelmingly dominant and the usual bog-building Sphagnum mosses are scarce. Where the blanket peats are slightly drier heather, *Calluna vulgaris*, crowberry *Empetrum nigrum* and bilberry *Vaccinium myrtillus* become more prominent. The uncommon cloudberry *Rubus chamaemorus* is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass *E. angustifolium*. There is some good habitat for breeding birds including golden plover in the naturally shorter areas of cottongrass as well as more tussocky wetter vegetation that would suit curlew and snipe. Short vegetation on some areas of blanket bog and the	Rosenburgh, A., and Caporn. A. 2013. Sphagnum reintroduction trials on Molinia Grassland, Manchester Metropolitan Peatland Ecological Advisory and Technical Sorby Natural History Society Sheffield. 2014. The Sorby Record No. A Journal of Natural History for the Sheffield Area. Available from Natural England Lincolnshire Naturalists' Union 2018. Eastern Moors (SK27) Invertebrate Species List - Ramsley Moor (SK2875) and Bar

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Limited assemblage of *Sphagnum* mosses.	surrounding lagg area combined with open aspect make it suitable for Dunlin and Golden Plover. Further, the H7130 blanket bog supports a range of invertebrate assemblages including the Golden dragonfly *Cordulegaster boltonii* and the Spikefly *Odonata, cordulegasteridae.*	Brook (SK2774). Available from Natural England Strawbridge. K. Ecological Monitoring Summary 2014. Eastern Moors Partnership. RSPB and NT. Available from Natural England Natural England. Citations for underpinning SSSIs. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables
Supporting processes (on which the feature relies)	**Air quality**	Restore as much as possible, 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 (APIS). As a staged recovery the target for Peak District Moors SPA should be to transition to the next lower class of critical load exceedance ie, for Acidity reduce deposition to 0.5-1.0 keq/ha/yr And for nutrient Nitrogen reduce deposition to between 7-14 kgN/ha/yr	See general explanatory notes for this attribute in Table 1. Atmospheric pollution from the last few hundred years has depleted the lichen and bryophyte flora and may be affecting dwarf-shrubs. Further, on site Nitrogen deposition is exceeding site critical loads.	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). JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England http://uk-air.defra.gov.uk/data CEH. 2015. Trends in critical load exceedance in UK, CEH report to Defra
Supporting processes (on which the	**Hydrology**	At a site, unit and/or catchment level (as necessary), restore the natural hydrological processes to	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	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		provide consistently near-surface water levels necessary to sustain the feature within the site	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. For this feature, various land management activities may impact on and interrupt natural hydrological processes and water levels, including artificial drainage, managed burning, wildfires; track construction; afforestation; and compaction by trampling and vehicular use. The loss of the acrotelm layer normally reflects significant changes to the hydrology of the bog. An increase in the cover of heather on the bog surface will also indicate a drying out of the bog, and can lead to further drying out through an increase in sub-surface peat pipes. Fire influences the near-surface hydrological functioning of peatland. This leads to enhanced overland flow and higher streamflow peaks and, in combination with a removed vegetation cover, can exacerbate surface erosion. There have been several historic hot wildfires which have impacted negatively on the site. Recovery from fire needs to be continually monitored and appropriate management practices put in place. The extent of restoration to improve the condition of the H7130feature cannot be fully quantified. The complexity of the pattern of degraded hydrology from surface vegetation to subterranean pipes means that several management practices are required; the production of a restoration plan for each blanket bog unit should provide the necessary detail. Restoration work is ongoing within South Pennine Moors SAC including gully blocking, stone dams to collect peat, re-profiling the larger gullies to encourage re-vegetation and using heather bales. Some restoration work has occurred on site under the MoorLIFE project.	Penny Anderson Associates. 2010. Yorkshire Water Keighley Moor Restoration Implementation Plan. Available from Natural England. MoorLIFE. 2015. AfterLIFE Plan (LIFE08 NAT/UK/00202). Available from Natural England This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Further, the water quality on site is being improved through The Peatland Restoration Project which aims to improve water quality by halving the amount of peat entering water systems in the Ashop and Alport river catchments. This is a joint initiative between the National Trust and the Moors for the Future Partnership on Rivers Alport and Ashop.	
Supporting processes (on which the feature relies)	**Conservation measures**	Maintain or restore as appropriate 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	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. Combined with historical overgrazing, burning (accidental and deliberate), drainage and locally trampling, large areas of blanket bog have become de-vegetated and eroded. It is unclear at this stage whether the effects are irreversible. Attempts over recent decades to reverse these processes have achieved mixed and limited results. The condition of blanket bog habitat in particular is under pressure from changes in: recreational use, land management (commercial grouse moor management, farming and restoration practices availability of agreement packages) and some illegal activity. To help achieve favourable conservation status an ecosystem approach is desirable to recognise the interdependence of ecosystem services and optimal habitat condition including developing greater flexibility within existing funding streams deriving support for management across a range of interests. Peat exposed by wildfire is at increased risk to wind and water erosion, with water run-off from uplands potentially resulting in downstream flooding, sedimentation of water courses and	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here Natural England. 2014. Moorland Habitat Monitoring of South Pennine Moors SSSI: A resurvey of Selected Moorland Agri-environment Agreement Sites: Site reports – No.17. Available on request. This attribute will be periodically monitored as part of Natural England's site condition assessments and the relevant Favourable Condition Tables for the underpinning SSSs

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			discolouration of drinking water. Wildfire varies from year to year depending on the condition of the vegetation (drier etc.) and this will result in varying levels of impact. The cause of ignition is generally accepted to be of human origin with deliberate intent a pattern on some parts of the site and elsewhere careless behaviour near to footpaths and car parks appear to be the chief cause of ignition. The National Park Authority has produced a strategic Fire Plan and areas are close to the public at times of high fire risk. The principal management measures on this site are: • Prevent where possible and if not manage the risk of wildfires. • Ensure deliberate burning does not occur on blanket bog and deep peat. • Control bracken spread on site. • Actively manage and monitor the hydrology of the site including assessing the re-vegetation and success of grips and plastic dams and where necessary repair or replace. • Maintain appropriate stocking densities to prevent overgrazing. • Maintain public access to the site through maintaining designated walking routes and working with the local authorities to prevent litter and fly tipping. • Monitor vehicle and recreational users (rock climbers, Hang gliders etc.) access on site and prevent vehicle use on sensitive areas of the site. Atmospheric pollution over the last few hundred years has depleted the lichen and bryophyte flora and may be affecting dwarf-shrubs. The impact has arguably been greatest on blanket bog, wet heath and transition mire where the bog-building *Sphagnum* mosses have been largely lost. Combined with historical overgrazing, burning (accidental and deliberate), drainage and locally trampling, large areas of blanket bog have become de-vegetated and eroded. It is unclear at this stage whether the effects are irreversible. Attempts over recent	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			decades to reverse these processes have achieved mixed and limited results. Whilst all efforts can be made to control current factors such as current grazing and burning patterns, current atmospheric pollutant levels and access impacts, it is unclear whether this can fully mitigate the long-term influence of the historical factors such as atmospheric pollution, past burning and overgrazing. The situation is further complicated by a view that some erosion features can be considered natural phenomena of intrinsic interest. It may not therefore always be appropriate to try and revegetate bare peat even if suitable techniques exist.	
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: The objectives for some of the attributes listed above include both 'maintain' and 'restore' targets. This is because this SAC is an extensive complex of geographically-separate component sites which currently vary in their condition status. Overall, both objectives will currently be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.				

Table 4: Supplementary Advice for Qualifying Features: H7140. Transition mires and quaking bogs; Very wet mires often identified by an unstable 'quaking' surface.

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	See general explanatory notes for this attribute in Table 1. H7140. Transition mires and quaking bogs has only been recorded within a small section of Leek Moors SSSI and these bogs are estimated to cover an extent of <0.5% of the entire South Pennine Moors SAC area. There is limited data to provide a measure of extent for this feature. H7140 Transition mires and quaking bogs are often small in extent and their boundaries may be difficult to determine. Their extent may also vary in relation to season and/or recent rainfall events. These should be taken into account when making an assessment on condition.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2004. Favourable Condition Tables - Leek Moors SSSI Draft. JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Maintain or restore as appropriate the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	Distribution includes the spatial pattern or arrangement of this habitat feature, and its component vegetation types, across the site. Changes in distribution may affect the nature and range of the vegetation communities present, the operation of the physical, chemical, and biological processes in the system and the resiliency of the site and its features to changes or impacts. Transition mires have not been mapped for this site and records of its existence are poor.	
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: M4 *Carex rostrata – Sphagnum recurvum* mire M9 *Carex rostrata - Calliergon*	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 attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2004. Favourable Condition Tables - Leek Moors SSSI Draft.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		cuspidatum/giganteum mire		
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; Sedges including: *Carex diandra, C. lasiocarpa, C. rostrata, C. limosa, C. panicea, C. nigra,* Common cottongrass *Eriophorum angustifolium:,* *Bryophytes including Calliergon giganteum, Campylium stellatum, Scorpidium scorpioides, Drepanocladus revolvens, Bryum pseudotriquetrum, Palustriella commutata, Cratoneuron filicinum, Ctenidium molluscum:* Other notable species: Bogbean *Menyanthes trifoliate* Water mint *Mentha aquatica* Red-rattle *Pedicularis palustris* *Marsh willowherb* Epilobium palustre, Marsh cinquefoil *Potentilla palustris* Cuckoo Flower *Cardamine pratensis* Marsh marigold *Caltha palustris* A prominent bryophyte carpet is a feature of all but the very wettest stands.	See general explanatory notes for this attribute in Table 1.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2004. Favourable Condition Tables - Leek Moors SSSI Draft.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). The undesirable species for H7140 Transition mires and quaking bogs include all invasives and the following undesirable species: Common reed *Phragmites australis,* Canary grass *Phalaris arundinacea,* Great manna grass *Glyceria maxima,* Hairy willowherb *Epilobium hirsutum,* Common nettle *Urtica dioica,* Rough stalked feather moss *Brachythecium rutabulum,* Common feather moss *Eurhynchium praelongum.* Further not more than one of this group of species and that account for <5% cover: Bracken *Pteridium aquilinum*, Bramble *Rubus fruticosus*, and Purple moor-grass *Molinia caerulea*	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2004. Favourable Condition Tables - Leek Moors SSSI Draft.
Structure and function (including its typical species)	**Presence/ cover of woody species**	Maintain a low cover (<10% of the area) of scrub or trees within stands of H7140	Native trees and shrubs occur naturally on bog and fen surfaces but an abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces. Scrub and woodland are integral components of many systems and may be particularly important for invertebrates. However invasion by woody species and their development to maturity may indicate drying out, dereliction, disturbance and/or	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)
			enrichment for both fen. Trees and shrubs may also exacerbate drying out.	
Structure and function (including its typical species)	**Exposed substrate**	Maintain a low cover of exposed substrate of between 5% & 10% across feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions. A high frequency and cover of exposed substrate will usually be undesirable and may indicate, inter alia, over-grazing, and water scour. More than 25% litter cover indicates insufficient removal of biomass by grazing.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	**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. Wheeler *et al*. (2009) provide range and mean for summer & winter water levels for those wetland NVC types constituting Annex 1 habitats. This provides a rough guide to appropriate levels, but it is critical that individual sites and their needs are considered as there is considerable variation within the NVC communities listed and recorded water levels. The hydrological integrity of Transition mires and quaking bogs (H7140) has been adversely affected across the site by a range of external factors, principally historic air pollution and wild fires which in some areas has been added to by historical and continuing land use management practices. Ensuring that the correct hydrological regime is maintained is important for this feature.	Wheeler, BD, Shaw, SC, and Tanner, KA. 2009. Wetland Framework for Impact Assessment at Statutory Sites. McBride *et al*. 2011. Environment Agency Science report. Fen Management Handbook Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Water chemistry**	Maintain the surface water and groundwater supporting the hydrology of the bog at a low nutrient status.	UKTAG (2012) provides threshold values for nitrate concentration in groundwaters for different wetland types. The threshold values will mainly be used in the characterisation of GWDTE status for the WFD, primarily as a risk screening tool, to assess if sites are 'at risk' or 'not at risk' from groundwater mediated nutrient pressure. Due to the complex cycling of nutrients within many GWDTE, these threshold values are less well suited for application within sites but rather just to groundwater that is directly feeding the site.	
Structure and function (including its typical species)	**Hydrology**	Maintain a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations) on groundwater dependent sites.	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. Some examples of H7140 may be wholly or partly groundwater dependent. Others have a greater dependence on surface water or rain water inputs. It is critically important to understand the ecohydrological context of all sites.	
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain 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	See general explanatory notes for this attribute in Table 1.	Natural England, 2015a. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available at http://publications.naturalengland.org.uk/publication/4954594591375360] Peak District National Park: Climate Change – Adaption and

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				Mitigation, available here
Structure and function (including its typical species)	**Supporting off-site habitat**	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the 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. 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, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
Supporting processes (on which the feature relies)	**Air quality**	Maintain as necessary, 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 general explanatory notes for this attribute in Table 1. Atmospheric pollution over the last few hundred years has depleted the lichen and bryophyte flora and may be affecting dwarf-shrubs. The impact has arguably been greatest on blanket bog, wet heath and transition mire where the bog-building *Sphagnum* mosses have been largely lost.	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). JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here
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 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	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Management Statement for the underpinning SSSI and/or management agreements. This habitat in most cases requires ongoing cutting or grazing maintain its open character. The exact condition of H7140 Transition mires and quaking bogs is currently unclear but it is likely to be under pressure from changes in recreational use, public legal and illegal access on site, wildfires, land management (commercial grouse moor management, farming and restoration practices availability of agreement packages) and some illegal activity. To help maintain this feature an ecosystem approach is desirable to recognise the interdependence of ecosystem services and optimal habitat condition including developing greater flexibility within existing funding streams deriving support for management across a range of interests.	
Version Control N/A				
Variations from national feature-framework of integrity-guidance: The objectives for some of the attributes listed above include both 'maintain' and 'restore' targets. This is because this SAC is an extensive complex of geographically-separate component sites which currently vary in their condition status. Overall, both objectives will currently be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.				

Table 5: Supplementary Advice for Qualifying Features: H91A0. Old sessile oak woods with Ilex and Blechnum in the British Isles

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 at the baseline-value of 650 hectares. Restore other relict woodland sites and establish new native woodland at suitable locations across the SAC.	See general explanatory notes for this attribute in Table 1. 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. 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. However, this woodland type is found in fragments mainly within Dark Peak SSSI and Eastern Peak District Moors SSSI and only very locally within South Pennine Moors SSSI so this estimated figure may be over or under estimated. Some areas where tree cover has been lost but some woody species and typical ground flora remain should be restored. Elsewhere some regeneration identifies suitable areas for woodland habitat expansion. Care should be taken in site selection to avoid loss of other feature habitat such as dry heath.	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England JNCC. 2016. NATURA 2000 – Standard Data Form. Available here Moors for the Future Partnership and Forestry Commission. 2013. Clough Woodland Project Guiding Principles Forestry Commission. 1995. Establishing New Native Woodland, Bulletin 112
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site through enhancement of existing feature	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	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		and creation of new habitat.	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. The largest stands of H91A0 Old sessile oak woods are found in Dark Peak and Eastern Peak District Moors SSSI with small areas of planting occurring on three underpinning SSSIs. However, the previous extensive cover of woodland has declined over many centuries to the point that it is fragmented, relatively small-scale and largely restricted to steeper valley sides. There is no woodland included in the site to the north of the National Park.	England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft
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 types: W10e *Quercus robur – Pteridium aquilinum – Rubus fruticosus* woodland*, Acer pseudoplatanus – Oxalis acetosella* sub-community W11 *Quercus petraea – Betula pubescens – Oxalis acetosella*	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). W16b is typically quite moist, leading to the development of a	English Nature. 2005. South Pennine Moors SAC citation. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		woodland W16b *Quercus spp. – Betula spp. – Deschampsia flexuosa* woodland*, Vaccinium myrtillus – Dryopteris dilatata* sub-community W17 *Quercus petraea-Betula pubescens-Dicranum majus* woodland	fairly well-developed bryophyte flora, although this is often offset in the southern Pennines by atmospheric pollution.	Consultation Draft
Structure and function (including its typical species)	**Vegetation structure - canopy cover**	Restore an appropriate tree canopy cover across the feature, which will typically be between 40-90% of the feature	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. 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. The extent of canopy covers varies from location to location within this SAC with some areas supporting extensive closed oak / or birch canopies made up of multiple mature oaks/ birch. Whereas other areas support just a few standard oak and the lack of regeneration has resulted in limited overall canopy	Natural England. 2003. SSSI Whole Site Objective Statements – Dark Peak SSSI and Eastern Peak District Moors SSSI. Available from Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			extent. Further, in coppiced stands a lower canopy cover (of standards) can be accepted,	
Structure and function (including its typical species)	**Vegetation structure - open space**	Restore areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10%of 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 targets set within this attribute will 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. 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. Overgrazing, resulting in the low natural regeneration of trees and shrubs, has been one of the main concerns for this habitat. This has resulted in stock proof fences being put up around old woodlands and deer management in place. Thus, for a lot of the more scattered woodland, the extent of open space without regenerating trees can be viewed as too extensive due to the single age class of remaining mature trees. Active management to plant these areas are in place on all underpinning SSSIs, which will in time alter the open spaces available.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft
Structure and function (including its typical	**Vegetation structure - old growth**	Maintain or restore as appropriate the extent and continuity of undisturbed, mature/old growth stands	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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)		(typically comprising at least 20% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	The targets set within this attribute will 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 should be a priority.	
Structure and function (including its typical species)	**Vegetation structure - dead wood**	Maintain or restore as appropriate the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m3 per hectare of standing or fallen timber or 3-5 fallen trees >30cm per hectare, and >10 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 will 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. 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.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft
Structure and function (including its typical species)	**Vegetation structure - age class distribution**	Maintain or restore as appropriate 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. The lack of age structure was variable throughout this feature. On the areas where the lack of age structure was a concern, changes in grazing pressure have been trialled. Fencing off areas of woodland to encourage natural regeneration and replanting accessible areas should be encouraged where appropriate. Further, replacing sheep with cattle have been trialled on a few	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			locations to prevent excessive grazing of tree seedlings and to open up scrub or overgrown areas to tree seedling growth. Deer browsing is also an issue affecting recruitment of new trees. Controlling bracken is also key on certain locations to allow space for young tree growth.	
Structure and function (including its typical species)	**Vegetation structure - shrub layer**	Maintain an Understorey shrubs covering 20 - 60% of the stand area (this will vary with light levels and site objectives)	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 will 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. The scrub layer on this SAC is largely a mix of native tree canopy species plus hawthorn *Crataegus monogyna* and hazel *Corylus avellana.* The ground flora consists of a mix of heather Calluna vulgaris ferns (male fern, *Dryopteris filix-mas*, Broad buckler fern *Dryopteris dilatata* and hard fern *Blechnum spicant*), grasses (including wavy hair grass *Deschampsia flexuosa* and purple moor grass *Molinia caerulea*), bilberry *Vaccinium myrtillus* and bracken *Pteridium aquilinum*.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft
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.	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. Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc.).	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Adaptation and resilience**	Restore the resilience of the feature by ensuring a diversity (at least 2 species) of site-native trees (e.g. sessile oak, birch, holly) across the site.	See general explanatory notes for this attribute in Table 1. As well as restoring existing stands of woodland there is an emphasis on re-creation to expand and link fragments which inevitably involves changing existing habitats. This requires a balance of vegetation types on the site. The flora of woodlands, quality as with bog and heath, has suffered from poor air quality. Again, it is less clear what can be done to reverse this situation other than to try and ensure continued improvements in air quality to allow affected species to recolonise if they can.	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England 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]. Peak District National Park: Climate Change – Adaption and Mitigation, available here
Structure and function (including its typical species)	**Browsing and grazing by herbivores**	Maintain or restore as appropriate 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.	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 field layer devoid of some species. Several sections of woodland are or have had problems due to overgrazing from sheep, deer and rabbits preventing natural regeneration. Changes in grazing pressure such as fencing off areas of woodland to encourage natural regeneration and	EMP. 2014. Deer Impact Assessment 2014 on Big Moor. Eastern Moors Partnership. Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			replanting accessible areas is in place in some areas but need long term monitoring to gauge their success. Another alternative trialled on site is replacing sheep with Highland cattle, this has been trialled to prevent excessive grazing of tree seedlings and to open up niches for seed establishment	
Structure and function (including its typical species)	**Regeneration potential**	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 - 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. The level of regeneration is variable across South Pennine Moors SAC. In areas where stock fencing has been installed, natural regeneration is highest. Other issues in addition to overgrazing affecting natural regeneration on site include: The extent of bracken as a large covering of bracken tends to make any regeneration of seedlings difficult in the growing season. Cover of rhododendron preventing natural tree regeneration Tight canopy preventing any light reaching the ground and suppressing natural regeneration. Possible management needed on a location by location basis to thin and let more light in. The level of native tree planting and management on the woodland including cutting to encourage coppicing.	JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here
Structure and function (including its	**Tree and shrub species composition**	Maintain a canopy and under-storey of which 95% is composed of trees and shrubs native to the	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	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		site.	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). Overall, most areas of woodland support high levels of native tree and shrub species with bracken encroachment one of the major concerns.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; Trees / scrub include: Sessile oak *Quercus petraea* holly *Ilex aquilinum* alder *Alnus glutinosa* (frequently on lower wetter slopes) birch *Betula spp.* (primarily *Betula pubescens*) hazel *Corylus avellana* elder *Sambucus nigra* rowan *Sorbus aucuparia* hawthorn *Crataegus monogyna* and willows *Salix caprea* and *S. cinerea* And occasional aspen *Populus tremula* and beech Fagus sylvatica	See general explanatory notes for this attribute in Table 1. Other typical species within this habitat on site include: Common bent *Agrostis capillaris;* Sweet vernal grass *Anthoxanthum odoratum;* Hard-fern *Blechnum spicant;* Stag's-horn clubmoss *Lycopodium clavatum;* Wavy hair-grass *Deschampsia flexuosa;* Greater folk-moss *Dicranum majus;* Creeping soft-grass *Holcus mollis;* Glittering wood-moss *Hylocomium splendens;* Woodrush *Luzula spp.,;* Wood sorrel *Oxalis acetosella* and Bilberry *Vaccinium myrtillus*	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	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. 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 rhododendrons, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species. There are a few planted blocks of mature conifers (mainly larch *Larix decidua* Sitka spruce *Picea sitchensis* and pine *Pinus spp*.) nearby the feature H91A0 old sessile oak woods. This is more of a concern for seed spread and conifer regeneration. Further, stands of Rhododendron have also been recorded within and nearby to woodland stands. The fungus-like pathogen *Phytophthora spp*. is known to be killing various species within the SAC. Few control mechanisms exist for the disease so early detection and proper disposal of infected plant material are essential. Plant species known to be affected or that have been affected or may require future monitoring are: Hybrid Bilberry *Vaccinium x intermedium* , Bilberry *Vaccinium myrtillus*, Common alder *Alnus glutinosa*, Common ash *Fraxinus excelsior*, English oak *Quercus robur*, Sessile oak *Quercus petraea*, Moor birch *Betula pubescens,* and Rhododendrons.	Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England. 2007. Dark Peak SSSI FCT Draft Natural England. 2011. Eastern Peak District Moors SSSI FCT Consultation Draft
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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. There is currently no specific data on soil condition of this feature within this SAC.	
Structure and function (including its typical species)	**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 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.	
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary, 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 general explanatory notes for this attribute in Table 1. Atmospheric pollution over the last few hundred years has depleted the lichen and bryophyte flora and may be affecting woodland ground flora. Currently nitrogen deposition is also still exceeding site relevant critical loads for certain soil types.	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). JNCC.2011. UK SAC data form – South Pennine Moors SAC. Available from Natural England Natural England. 2014. South Pennine Moors SAC Site Improvement Plan. Available here
Supporting processes (on which the	**Hydrology**	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to	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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		provide the conditions necessary to sustain the feature within the site	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 etc.	
Supporting processes (on which the feature relies)	**Illumination**	Ensure artificial light is maintained to 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.	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.	
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: The objectives for some of the attributes listed above include both 'maintain' and 'restore' targets. This is because this SAC is an extensive complex of geographically-separate component sites which currently vary in their condition status. Overall, both objectives will currently be applicable to the SAC but these will differ between each component site depending on its particular circumstances. The Dark Peak SSSI component has an objective to conserve and enhance this feature and an active programme of habitat creation is underway. Natural England will be able to provide further advice on request.				