



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

**North Pennine Moors Special Area of Conservation (SAC)
Site code: UK0030033**



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About this document

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

Where this site overlaps with other European Site(s), 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	North Pennine Moors SAC
Location	Cumbria; North Yorkshire; Northumberland; Tyne and Wear; Tees Valley and Durham
Site Maps	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	103,109.42 ha
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	This SAC comprises; Allendale Moors SSSI, Arkengarthdale, Gunnerside and Reeth Moors SSSI, Bollihope, Pikestone, Eggleston and Woodland Fells SSSI, Bowes Moor SSSI, Cotherstone Moor SSSI, East Nidderdale Moors (Flamstone Pin - High Ruckles) SSSI, Geltsdale and Glendue Fells SSSI, Hexhamshire Moors SSSI, Lovely Seat - Stainton Moor SSSI, Lune Forest SSSI, Mallerstang - Swaledale Head SSSI, Muggleswick, Stanhope, Edmundbyers Commons and Blanchland Moor SSSI, West Nidderdale, Barden and Blubberhouses Moors SSSI, Whitfield Moor, Plenmeller and Ashholme Common SSSI
Relationship with other European or International Site designations	This SAC includes, partially overlaps or is adjacent with; Ox Close SAC ; North Pennine Dales Meadows SAC ; River Eden SAC ; North Pennine Moors SPA ; Moorhouse- Upper Teesdale SAC

Site background and geography

The North Pennine Moors SAC forms part of the [North Pennines National Character Area](#) (NCA), a distinctive upland landscape characterised by remote upland moorlands divided by quiet dales at the northern end of the English Pennine ridge. It comprises some of the highest and most exposed moorland summits in England, with several major rivers, including the South Tyne, Wear and Tees, draining out to the north, east and south-east. It is bordered to the west by the Eden valley, to the north by the Tyne valley, to the east by the Durham lowlands and to the south by the Yorkshire Dales.

There are dramatic and panoramic views both across the moorlands and outwards, especially towards the west. The area's natural beauty is reflected in the fact that 88 per cent of it has been designated as the [North Pennines Area of Outstanding Natural Beauty](#). Part of this SAC (west of Northallerton in North Yorkshire) is also within the [Yorkshire Dales National Park](#). The North Pennines are a world class geological heritage area and are part of the UNESCO European and Global Geoparks.

The SAC is split into approximately fourteen smaller sections, underpinned by fourteen separate SSSIs and spanning four counties. This large, 150,000 hectares area of moorland extends 110 km from north to south, between the Tyne Gap (Hexham) and the Ribble-Aire corridor (Skipton).

Within the site is an extensive upland plateau lying at altitudes of between 600m and 893m, with the highest areas touching the montane zone (Backshall *et al.* 2001). These areas are often subject to high rainfall levels. The growing season is typically short at 150 to 180 days per annum (English Nature 1997). The varied topography, hydrology, soils and underlying geology has contributed to a high degree of habitat heterogeneity with grouse shooting and hill sheep farming the two major land uses, although tourism is increasing. The extensive upland farming systems result in a low population density for the area. The area was, however, formerly mined intensively for lead and zinc and parts of the landscape still reflect these past mining activities (English Nature 1997).

Access varies throughout the site with three main roads cutting through the site from the A69 in the North; A66 in Deep Dale and the A59 across the southern most part of the site.

The North Pennines are composed of two fault-bounded crustal blocks. The Alston Block is in the northern counties of Northumbria, Cumbria and Durham, with the Askrigg Block found in North Yorkshire. The rocks that make up these two Blocks form part of a cyclothermic sequence of sediments deposited during repeated marine transgressions during the lower and middle Carboniferous Period. These sediments include sandstones, limestones, shales and the occasional coal seams.

The North Pennine Moors hold much of the upland heathland of northern England. The most abundant heath communities are heather – wavy hair-grass heath and heather – bilberry heath. At higher altitudes and to the wetter west and north of the site complex, the heaths grade into extensive areas of blanket bog. A significant proportion of the bog remains active with accumulating peat. The main type is heather – hare's-tail cotton-grass blanket mire. The site contains other wetland habitats including wet heaths and calcium-rich fens, which support populations of yellow marsh saxifrage. Tufa-forming springs are localised in occurrence, but where the habitat does occur it is species-rich with abundant bryophytes, sedges and herbs including bird's-eye primrose and marsh valerian. Acidic rock outcrops and scree are well-scattered across the North Pennine Moors and support a range of lichens and bryophytes, such as the woolly fringe moss *Racomitrium lanuginosum*, and species like stiff sedge and fir clubmoss. The site also contains base-rich rocks that supports rare and distinctive lime-loving crevice vegetation.

At the moorland fringes are areas of enclosed grassland including mountain hay meadows which have been managed at a relatively low level of agricultural intensification and so retain a diversity of meadow species. Bird populations of international importance are present. The North Pennine area supports 40% of the UK's species-rich upland hay meadows and approximately 21% of England's blanket bog. Further, with over 22,000 pairs of breeding wading birds this is England's wader hotspot, as well as supporting 80% of England's black grouse population.

Birk Gill Wood (within East Nidderdale SSSI) is an example of western acidic oak woodland in a sheltered river valley. It supports rich bryophyte and lichen communities under a canopy of sessile oak, birch and rowan. The slopes are boulder-strewn, with mixtures of heather, bilberry and moss carpets in the ground flora. The North Pennine Moors includes one major stand of juniper scrub in Swaledale as well as a number of small and isolated localities. The Swaledale site grades into heathland and bracken but there is a core area of juniper woodland with scattered rowan and birch.

In addition, the North Pennine Moors contain important areas of calcareous grassland, montane acid grassland and grasslands on soils rich in heavy metals, such as old lead mines.

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.

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 North Pennines this vegetation corresponds to the following NVC types:

M15 *Scirpus cespitosus* – *Erica tetralix* wet heath

M16 *Erica tetralix* – *Sphagnum compactum* wet heath

- **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 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.

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 North Pennines this vegetation corresponds to the following NVC types:

H9 *Calluna vulgaris* – *Deschampsia flexuosa* heath

H10 *Calluna vulgaris* – *Erica cinerea* heath

H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath

H16 *Calluna vulgaris* – *Arctostaphylos uva-ursi* heath

H18 *Vaccinium myrtillus* – *Deschampsia flexuosa* heath

H21 *Calluna vulgaris* – *Vaccinium myrtillus* – *Sphagnum capillifolium* heath

The North Pennine Moors (along with the North York Moors) hold much of the upland heathland of northern England. At higher altitudes and to the wetter west and north of the site complex, the heaths grade into extensive areas of blanket bogs. They often hold important populations of breeding moorland birds.

- **H5130. *Juniperus communis* formations on heaths or calcareous grasslands; 'Juniper on heaths or calcareous grasslands'**

In northern England and Scotland juniper is found on a wide range of acidic substrates supporting acidophilous plant communities. In many instances these are simply stands of

heathland or acidic grassland that have become invaded by juniper. Juniper stands can therefore occur in juxtaposition with a wide range of other vegetation types.

However, at sites where the juniper has been established for longer, the community corresponds to NVC woodland type W19 *Juniperus communis* ssp. *communis* – *Oxalis acetosella* woodland. Such vegetation is typically dominated by juniper, with downy birch *Betula pubescens* and rowan *Sorbus aucuparia* often scattered throughout. The understorey is rich in acidophilous species, such as bilberry *Vaccinium myrtillus*, wood-sorrel *Oxalis acetosella*, heath bedstraw *Galium saxatile* and hairy wood-rush *Luzula pilosa*. Species with a northern distribution, including chickweed wintergreen *Trientalis europaea*, twinflower *Linnaea borealis* and lesser twayblade *Listera cordata*, occur locally. There is usually a well-developed layer of pleurocarpous mosses and ferns. On lower slopes with flushing and on more base-rich substrates the flora is enriched by species that reflect an increased base-status, such as common dog-violet *Viola riviniana*, dog's mercury *Mercurialis perennis* and northern bedstraw *Galium boreale*.

In northern England, at higher altitude on limestone, juniper scrub is often associated with limestone pavements and calcareous cliffs and screes. Beyond the distribution range of many rosaceous shrubs and often in heavily grazed situations, such scrub may be relatively poor in specialist scrub species. In such circumstances the vegetation has affinities to the species-poor juniper scrub more usually found on acidic substrates.

The North Pennine Moors includes one major stand of juniper scrub in Swaledale as well as a number of small and isolated localities.

- **H6130. Calaminarian grasslands of the *Violetalia calaminariae*; 'Grasslands on soils rich in heavy metals'**

Calaminarian grasslands typically occur on soils that have significant levels of heavy metals, such as lead, zinc, chromium and copper that are toxic to most plant species. The greatest extent of the habitat occurs on artificial sites associated with past mining activities. Near-natural examples on stable river gravels rich in lead and zinc and serpentine rock outcrops are much more localised.

Grasslands of this type are typically species-poor but contains a number of species principally found in this habitat, most notably spring sandwort *Minuartia verna* and alpine penny-cress *Thlaspi caerulescens*. There is a genetically-adapted range of other species, such as sheep's fescue *Festuca ovina*, bladder campion *Silene vulgaris*, sea campion *Silene uniflora* and thrift *Armeria maritima*. Heavy metal toxicity of the soils, perhaps combined with a low nutrient status, is believed to maintain the open vegetation, retarding succession. The rarer species are favoured by lack of competition from more vigorous colonists. The Annex I habitat type also includes assemblages of metal-tolerant lower plants on mine waste, even if higher plant metallophytes are lacking.

In the UK some forms of this vegetation correspond to NVC type OV37 *Festuca ovina* – *Minuartia verna* community; other forms characterised by different metallophyte plant species or races and ecotypes are not described in the NVC.

- **H6150. Siliceous alpine and boreal grasslands; 'Montane acid grasslands'**

Siliceous alpine and boreal grasslands are one of the few predominantly near-natural habitats remaining in the UK. The habitat is the most extensive type of vegetation in the high mountain zone, i.e. above an altitude of about 750 m. It characteristically forms large continuous tracts, covering summit plateaux and the tops of the higher summits and ridges.

The habitat comprises a range of grassland types whose composition is influenced by contrasting extremes of exposure and snow-lie. Late-lie snow-bed communities dominated by bryophytes and dwarf-herbs are also included within the definition of the habitat. The flora is characterised by

a strong montane element which includes several uncommon vascular plants, mosses and liverworts.

- **H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); 'Dry grasslands and scrublands on chalk or limestone'**

This grassland habitat is typically found on thin, well-drained, lime-rich soils associated with chalk and limestone. They occur predominantly at low to moderate altitudes in England and Wales, extending locally into upland areas in northern England, Scotland and Northern Ireland.

Most of these dry calcareous grasslands are maintained by grazing. A large number of rare plants are associated with this habitat, including purple milk-vetch *Astragalus danicus*, dwarf sedge *Carex humilis*, spotted cat's-ear *Hypochaeris maculata*, spring cinquefoil *Potentilla tabernaemontani*, pasqueflower *Pulsatilla vulgaris*, bastard-toadflax *Thesium humifusum* and the Annex II species 1654 early gentian *Gentianella anglica*, as well as various bryophytes and lichens.

- **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.

The North Pennine Moors hold the major area of blanket bog in England. A significant proportion remains active with accumulating peat, although these areas are often bounded by sizeable zones of currently non-active bog, albeit on deep peat.

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.

- **H7220. Petrifying springs with tufa formation (Cratoneurion); 'Hard-water springs depositing lime'* (priority feature)**

This habitat type is closely associated with hard-water springs, where groundwater rich in calcium bicarbonate emerges at the surface. On contact with the air, carbon dioxide is lost from the water and a hard deposit of calcium carbonate (tufa) is formed. These conditions occur most often in areas underlain by limestone or other calcareous rocks, and particularly in the uplands of northern England.

Tufa-forming spring-heads are characterised by the swelling yellow-orange mats of the mosses *Cratoneuron commutatum* and *C. filicinum*. Many rare, lime-loving ('calcicole') species live in the moss carpet, particularly arctic-alpine species, such as bird's-eye primrose *Primula farinosa* and false sedge *Kobresia simpliciuscula*.

There are two main NVC types associated with tufa formation:

M37 *Cratoneuron commutatum* – *Festuca rubra* spring

M38 *Cratoneuron commutatum* – *Carex nigra* spring

Tufa-forming springs are often associated with H7230 Alkaline fens, where they may form prominent upwelling masses of short open vegetation around the spring-heads that feed the fen system. There may also be transitions to a wide range of other habitats, particularly calcareous grassland, acid grassland, heath, 8240 Limestone pavements, and calcareous cliff and scree.

The petrifying spring habitat is highly localised in occurrence within the North Pennine Moors, but where it does occur it is species-rich with abundant bryophytes, sedges and herbs including bird's-eye primrose *Primula farinosa* and marsh valerian *Valeriana dioica*.

- **H7230. Alkaline fens; ‘Calcium-rich spring water-fed fens’**

Alkaline fens consist of a complex assemblage of vegetation type’s characteristic of sites where there is tufa and/or peat formation with a high water table and a calcareous base-rich water supply.

The core vegetation is short sedge mire (mire with low-growing sedge vegetation) of the following NVC types:

M9 *Carex rostrata* – *Calliergon cuspidatum/giganteum* mire

M10 *Carex dioica* – *Pinguicula vulgaris* mire

M13 *Schoenus nigricans* – *Juncus subnodulosus* mire

At most sites there are well-marked transitions to a range of other fen vegetation. Alkaline fens may also occur with various types of swamp, wet grasslands and areas rich in rush species, as well as fen carr and, especially in the uplands, wet heath and acid bogs.

- **H8110. Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*); ‘Acidic scree’**

Scree habitats consist of rock fragments covering the frost-shattered summits of mountains or accumulating on slopes below cliffs. Siliceous scree are made up of siliceous rocks such as quartzite, granite and sandstone. They may occur at any altitude, but scree in the lowlands are excluded from the Annex I definition. The scree may be colonised by a range of pioneer species. It also provides shelter for many species sensitive to frost, such as parsley fern *Cryptogramma crispa*, species requiring a humid microclimate such as Wilson’s filmy-fern *Hymenophyllum wilsonii*, and species sensitive to grazing such as stone bramble *Rubus saxatilis*.

The U21 *Cryptogramma* – *Deschampsia* community extends to lower altitudes in mild oceanic climates in western Scotland, north-west England and north Wales.

Other forms of siliceous scree are dominated by bryophytes and lichens and are not described in the NVC.

- **H8210. Calcareous rocky slopes with chasmophytic vegetation; ‘Plants in crevices in base-rich rocks’**

‘Chasmophytic’ vegetation consists of plant communities that colonise the cracks and fissures of exposed rock faces.

The type of plant community that develops is largely determined by the base-status of the rock face. Calcareous sub-types develop on lime-rich rocks such as limestone and calcareous schists, whereas siliceous communities develop on acid rocks. The presence of calcareous bands within otherwise mainly siliceous rocks often brings the two types together on the same rock outcrop. As a result, Calcareous rocky slopes with chasmophytic vegetation may occur in close association with Annex I type 8220 Siliceous rocky slopes with chasmophytic vegetation, and some sites are listed for both types. Calcareous rocky slopes may also be closely associated with

8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) or 8240 Limestone pavements.

Both forms of chasmophytic vegetation in the UK correspond to the rock fissure communities described from continental Europe (*Asplenieta trichomanis*). Some forms of the calcareous type correspond to NVC types OV39 *Asplenium trichomanes* – *Asplenium ruta-muraria* community and OV40 *Asplenium viride* – *Cystopteris fragilis* community, but other forms are not described by the NVC. The vegetation is characterised by bryophytes such as *Tortella tortuosa*, *Anoetangium aestivum* and *Ctenidium molluscum*. Associated vascular plants include brittle bladder-fern *Cystopteris fragilis*, green spleenwort *Asplenium viride* and glaucous meadow-grass *Poa glauca*.

Floristic variation within the habitat type is influenced by geographical location, altitude and rock type.

- **H8220. Siliceous rocky slopes with chasmophytic vegetation; ‘Plants in crevices on acid rocks’**

Acidic rock outcrops and scree are well-scattered across the North Pennine Moors and support vegetation typical of siliceous rocky slopes with chasmophytic vegetation in England, including a range of lichens and bryophytes, such as *Racomitrium languginosum*, and species like stiff sedge *Carex bigelowii* and fir clubmoss *Huperzia selago*.

- **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 corresponds broadly to the ‘western oakwoods’ described in previous accounts of UK woodlands, particularly NVC types:

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

W17 *Quercus petraea* – *Betula pubescens* – *Dicranum majus* woodland

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*, *Isoetecium 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*.

Qualifying Species:

- **S1528. *Saxifraga hirculus*; Marsh saxifrage**

Yellow marsh saxifrage *Saxifraga hirculus* is a yellow-flowered perennial that requires base-rich and wet conditions. It typically grows to approximately 15-20cm high. Its large flowers appear from July. Yellow marsh saxifrage propagates both vegetatively and by seed after cross pollination.

The marsh saxifrage is now restricted to approximately 20 sites in Britain. The northern Pennines is the main area for the species, holding 80–90% of the British population.

It is now considered an upland species because its favoured habitats in the lowlands have been destroyed. It has suffered from overgrazing and drainage. Many of the sites for the species are heavily grazed, although moderate levels of grazing are probably beneficial to this plant by providing pockets of bare ground for seedlings to establish and limiting competition with vigorous grasses, sedges, mosses or flowering plants.

On Cotherstone Moors, *Saxifraga hirculus* was recorded in Unit 16 (Carnigill) as being present at Little Aygill Bogs (grid ref: NY888 171) in 1975. It was absent from the same location in later surveys (1986 & 1999). However, this blanket bog community appeared suitable for reintroduction of the species by translocation (1999), especially where the management is combined with strategic grip-blocking. On Lune Forest a large population of *Saxifraga hirculus* was discovered in August 2006. Numbers of plants present have not been established so far.

As well as being a qualifying feature of the SAC, the marsh saxifrage is specifically protected in the UK by Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 5 of the Conservation of Habitats and Species Regulations 2017, making it a 'European Protected Species'. A [Licence](#) may therefore be required for any activities likely to harm plants.

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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 or restore as appropriate the total extent of the H4010 feature to approximately 618.09 ha	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>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.</p> <p>Where a feature is susceptible to natural dynamic processes such as succession to scrubby woodland, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p> <p>This habitat type represents only a small portion (approximately 1.5%) of this SAC. However, this habitat type is also known to be present as intimate mosaics with H4030. European dry heaths and H7130 Blanket bog. Therefore this figure may be under or over recorded.</p>	<p>Area data obtained from the 10 SSSIs where this feature is present.</p> <p>Habitat information for component SSSIs within Northumberland and Durham:</p> <p>NATURAL ENGLAND. 2002. N2K NVC Survey. Unpublished data. (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in Cumbria:</p> <p>NATURAL ENGLAND. 1999. NVC Survey of Appleby Fells. Unpublished data. (Available from Natural England on request.)</p> <p>O'REILLY, J. 2011. Geltsdale Farm and RSPB NVC data. Unpublished data. (Available from Natural England on request.)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>RSPB. 1999. Upland Vegetation Condition Assessment, Unpublished data, (Available from Natural England on request.)</p> <p>RSPB. 1995. NVC Survey. Unpublished data, (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in North Yorkshire:</p> <p>NATURAL ENGLAND. 2004. North Pennines Survey. Unpublished data. (Available from Natural England on request.)</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>
	Spatial distribution of the feature	Maintain or restore as appropriate the distribution and	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	This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	within the site	configuration of the H4010 feature, including where applicable its component vegetation types, across the site	<p>structure and composition, and may undermine its resilience to adapt to future environmental changes.</p> <p>This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>This feature currently has pressures that may cause habitat fragmentation, for example, burning; birch succession and consequently drying out; erosion through access, vehicle use and over grazing.</p>	<p>England's site condition assessments</p> <p>See references to extent data, above.</p>
Structure and function (including its typical species)	Vegetation community transitions	Maintain or restore as appropriate any areas of transition between the H4010 feature and other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	<p>Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities.</p> <p>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.</p>	
	Vegetation community composition	<p>Ensure the component vegetation communities of the H4010 feature are broadly referable to and characterised by the following National Vegetation Classification types:</p> <p>M14 <i>Schoenus</i></p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring as appropriate these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall SAC habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community),</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p><i>nigricans</i> – <i>Narthecium ossifragum</i> mire</p> <p>M15 <i>Scirpus cespitosus</i> – <i>Erica tetralix</i> wet heath</p> <p>M16 <i>Erica tetralix</i> – <i>Sphagnum compactum</i> wet heath</p>	<p>and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).</p>	
	Vegetation structure: cover of dwarf shrubs	<p>Maintain an overall cover of dwarf shrub species which is typically between 50-75% and with a high cover and frequency of <i>Erica tetralix</i></p>	<p>Variations within 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.</p> <p>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 <i>Calluna vulgaris</i>, bell heather <i>Erica cinerea</i>, cross-leaved heath <i>Erica tetralix</i>, bilberry or blaeberry <i>Vaccinium myrtillus</i> and cowberry <i>Vaccinium vitis idaea</i> are the commonest and most characteristic dwarf-shrubs. <i>Calluna vulgaris</i> and <i>Erica tetralix</i> are usually the most abundant.</p> <p><i>Erica tetralix</i> should be present within a 20m radius of any point within this H4010 wet heath habitat.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Vegetation structure: heather age structure	<p>Maintain or restore as appropriate a diverse age structure amongst the ericaceous shrubs typically found on the site</p>	<p>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 at any one time.</p> <p>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.</p> <p>Within some areas of this SAC uniformity in age structure is a concern possibly</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			as a consequence of poor soil conditions and previous burning management.	
	Vegetation structure: cover of gorse	Maintain a low cover of common gorse across the H4010 feature (typically at <10%)	<p>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.</p> <p>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. Extensive mature stands may also be serious fire hazards.</p> <p>Scrub encroachment is generally low within this SAC with exception from peripheral areas where there is some accepted woodland expansion, which provides a fragmented habitat for birds.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Vegetation structure: tree cover	Maintain the open character of the H4010 feature, with a typically scattered and low cover of trees and scrub (<20% cover in total)	<p>Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food-plants, 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 such as black grouse, then a higher level of cover will be acceptable.</p> <p>Overall, there is a low cover of encroaching shrubs and trees on H4010 wet heath habitat excluding <i>Betula nana</i> and <i>Myrica gale</i>. However, in some localised areas scrub and bramble <i>Rubus spp.</i> encroachment is a concern and needs regular monitoring, especially around some of the Southern edges of the North Pennine Moors.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Key structural, influential and distinctive species	Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable component of the	<p>Some plant or animal species or related groups of such species make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;</p> <ul style="list-style-type: none"> • <i>Structural</i> species which form a key part of the Annex I habitat's structure 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)
		<p>H4010 wet heath habitat;</p> <p>Heather <i>Calluna vulgaris</i>, Crowberry <i>Empetrum nigrum</i>, Bell heather <i>E. cinerea</i>, Cross leaved heath <i>E. tetralix</i>, Bog myrtle <i>Myrica gale</i>, Billberry <i>Vaccinium</i> spp. Carnation sedge <i>Carex panicea</i>, Common cottongrass <i>Eriophorum angustifolium</i>, Sharp flowered rush <i>Juncus acutiflorus</i>, Jointed rush <i>Juncus articulatus</i>, Purple moor-grass <i>Molinia caerulea</i>, White beak-sedge <i>Rhynchospora alba</i>, Deer-grass <i>Trichophorum cespitosum</i>. Sundews <i>Drosera</i> spp., Bog rosemary <i>Andromeda polifolia</i>, Bog bean <i>Menyanthes trifoliata</i>, Health Bedstraw <i>Galium saxatile</i>, Bog asphodel <i>Narthecium ossifragum</i> Tormentil <i>Potentilla erecta</i></p>	<p>help to define that habitat on a particular SAC see also the attribute for 'vegetation community composition'.</p> <ul style="list-style-type: none"> • <i>Influential</i> 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. • <i>Site-distinctive</i> species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p> <p>It is particularly important 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. Attention should also be given to restoring the floristic diversity previously found on areas of the site which have been subject to fire damage.</p>	
Structure and function (including its	Vegetation: undesirable species	Maintain the frequency/cover of the following undesirable	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	This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		<p>species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread;</p> <p>Common bent <i>Agrostis capillaris</i>, Yorkshire fog <i>Holcus lanatus</i>, Common reed <i>Phragmites australis</i>, Bracken <i>Pteridium aquilinum</i>, Creeping buttercup <i>Ranunculus repens</i> Common nettle <i>Urtica spp.</i> Willowherbs <i>Epilobium spp.</i> (excl. <i>E. palustre</i>), Creeping thistle <i>Cirsium arvense</i> <i>Acrocarpous mosses</i></p>	<p>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.</p> <p>Soft rush <i>Juncus effusus</i> encroachment is a concern for several of the H4010 wet heath habitat areas.</p>	England's site condition assessments
	Functional connectivity with wider landscape	<p>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</p>	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. 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.</p> <p>These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>The extent and connectivity of H4010 wet heath habitat is 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.</p>	
	Adaptation and resilience	<p>Maintain or restore as appropriate the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.</p>	<p>This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary.</p> <p>The vulnerability and response of features to such changes will vary. The overall vulnerability of this SAC to climate change has been assessed by Natural England as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats. These sites are considered to be vulnerable overall but moderately so. This means that 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 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 required.</p> <p>Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>Further potential future impacts include spread of diseases and heather beetle damage.</p>	<p>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].</p> <p>CORBY, R AND TAYLOR, F 2011., Bowes Moor Survey County Durham, Final Report, ANOB</p>
Supporting processes (on which the feature relies)	Conservation measures	<p>Maintain or restore as appropriate the management measures (either within and/or</p>	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England.</p>	<p>ENGLISH NATURE, 2005. Views about the management of SSSIs.</p>

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	outside the site boundary as appropriate) which are necessary to maintain or restore as appropriate the structure, functions and supporting processes associated with the H4010 feature	<p>This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <ul style="list-style-type: none"> •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. 	<p>NATURAL ENGLAND, 2014. Site Improvement Plan: North Pennines Group (SIP154). Available at http://publications.naturalengland.org.uk/publication/6534899699810304</p>
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 H4010 habitat.	<p>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.</p> <p>This Annex 1 H4030 wet heath habitat has essentially raw soils with little humus and low nutrient status.</p> <p>This is currently no specific information on soil properties for this SAC.</p>	
Air quality	Maintain or restore as appropriate the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for the H4010 feature of the site on the Air Pollution Information System (APIS).	<p>This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on APIS.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis.</p> <p>Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).</p>	
	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.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed.</p> <p>Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p>	
	Hydrology	At a site, unit and/or catchment level (as necessary, maintain the natural hydrological regime 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.	
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-				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>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.</p>			

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 or restore as appropriate the total extent of the H4030 feature at or to approximately 44,868.82 ha.	<p>See notes for this attribute in Table 1 above.</p> <p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. However, in certain circumstances replanting edge habitats with native trees and scrubs may be advantageous to encourage a heterogeneous habitat, beneficial to wildlife such as black grouse.</p> <p>Over 40% of this SAC supports the interest feature, H4030, Dry Heath. However, this habitat type is also recorded in mosaics with H4010 Northern Atlantic Wet Heaths and to a lesser extent H7130 Blanket Bog. Therefore this figure may be under or over recorded.</p> <p>European Dry Heath H4030 is a feature found throughout the SAC.</p>	<p>Area data obtained from the 14 SSSIs where this feature is present.</p> <p>Habitat information for component SSSIs within Northumberland and Durham:</p> <p>NATURAL ENGLAND. 2002. N2K NVC Survey. Unpublished data. (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in Cumbria:</p> <p>NATURAL ENGLAND. 1999. 1999 NVC Survey of Appleby Fells. Unpublished data. (Available from Natural England on request.)</p> <p>O'REILLY, J. 2011. Geltsdale Farm and RSPB NVC data. Unpublished data. (Available from Natural England on request.)</p> <p>RSPB. 1999. Upland Vegetation Condition Assessment, Unpublished data, (Available from Natural England on request.)</p> <p>RSPB. 1995. NVC Survey. Unpublished data, (Available from Natural England on request.)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>Habitat information for component SSSIs in North Yorkshire:</p> <p>NATURAL ENGLAND. 2004. North Pennines Survey. Unpublished data. (Available from Natural England on request.)</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>
	Spatial distribution of the feature within the site	Maintain or restore as appropriate the distribution and configuration of the H4030 feature, including where applicable its component vegetation types, across the site	<p>See notes for this attribute in table 1 above.</p> <p>This site has pressures of fragmentation from burning; bracken encroachment; succession; erosion through walkers and estates vehicles and grazing (to a lesser extent).</p>	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	<p>Ensure the component vegetation communities of the H4030 feature are broadly referable to and characterised by the following National Vegetation Classification type(s):</p> <p>H9 <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath H10 <i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath H16 <i>Calluna vulgaris</i> –</p>	See notes for this attribute in table 1 above.	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p><i>Arctostaphylos uva-ursi</i> heath H18 <i>Vaccinium myrtillus</i> – <i>Deschampsia flexuosa</i> heath H21 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> – <i>Sphagnum capillifolium</i> heath</p>		
	Vegetation community transitions	Maintain any areas of transition between the H4030 feature and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	<p>See notes for this attribute in table 1 above.</p> <p>Further, mosaics exist with the following types:</p> <p>U1e - <i>Festuca Ovina</i> - <i>Agrostis Capillaris</i> - <i>Rumex Acetosella</i> grassland, U4 <i>Festuca ovina</i>-<i>Agrostis capillaris</i>-<i>Galium saxatile</i> Grassland, CG9 <i>Sesleria albicans</i>-<i>Galium sternerii</i> grassland and CG10 - <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus praecox</i> grassland</p>	
	Cover of dwarf shrubs	Maintain or restore as appropriate an overall cover of dwarf shrub species which is typically between 50-75%	<p>See notes for this attribute in table 1 above.</p> <p><i>Calluna vulgaris</i> is usually the most abundant dwarf shrub within this feature.</p> <p>The most common characteristic dwarf-shrubs in this H4030 habitat are heather or ling <i>Calluna vulgaris</i> and bilberry <i>Vaccinium myrtillus</i>. Localised areas of heath with <i>E.cinerea</i> and <i>Vaccinium vitis-idaea</i> occur occasionally on the steep slopes. Low species diversity of dwarf shrubs (excluding <i>Calluna vulgaris</i>) is a concern locally.</p> <p>In some areas this lower cover of dwarf shrubs is due to excessive burning or overgrazing.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Bracken	Maintain a low cover of dense	The spread of bracken <i>Pteridium aquilinum</i> is a problem on	This attribute will be periodically

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	cover	bracken typically at <5%	<p>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 also some nature conservation value, for example on sites where fritillary butterflies occur and utilise bracken litter habitat.</p> <p>Bracken <i>Pteridium aquilinum</i> occur on lower slopes in the north of the SAC. Largely bracken control is managed through Moorland Management plans and through individual higher level stewardships. Presence of bracken is likely to indicate soils suitable for scrubby woodland cover.</p>	monitored as part of Natural England's site condition assessments .
	Cover of gorse	Maintain a low cover of common gorse <i>Ulex europaeus</i> at <25%	<p>See notes for this attribute in table 1 above.</p> <p>There has been no excessive quantities of gorse recorded on site and as such is currently not considered a concern.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Tree cover	Maintain the open character of the H4030 feature by maintaining a typically scattered and low cover of trees and scrub at <20% cover	<p>See notes for this attribute in table 1 above.</p> <p>On some sites such as on the western side of the SAC, scrub around the margins of dry heath is encouraged to create more structural diversity and more dynamic moorland fringe vegetation beneficial to black grouse <i>Lyrurus tetrix</i>.</p> <p>Overall excessive tree cover is not a concern for this SAC. There are only a few localised areas where a small number of Sitka spruce <i>Picea sitchensis</i> were noted and should be removed before they begin to set seed.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Heather age structure	Maintain or restore as appropriate a diverse age structure amongst the ericaceous shrubs typically found on the site	<p>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.</p> <p>Typically this age structure will consist of between 10-40%</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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.</p> <p>Late mature and degenerate heather were the least frequent age structure found over the SAC. Overgrazing by sheep and rabbits as well as rotational burning were the main causes of less mature heather. Additionally this contributed largely to single age stands of heather.</p>	
	Undesirable species	<p>Maintain the frequency/cover of undesirable species at within acceptable levels of <1% and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread.</p> <p>Undesirable species include:</p> <p>Creeping thistle <i>Cirsium arvense</i>; Spear thistle <i>Cirsium vulgare</i>; Common sorrel <i>Rumex acetosa</i>; Creeping buttercup <i>Ranunculus repens</i>; or Common nettle <i>Urtica dioica</i></p> <p>All invasive non-native species are included as undesirable species</p>	<p>See notes for this attribute in table 1 above.</p> <p>Overall, the occurrence of undesirable species is minimal and below <1%. However, monitoring should continue on site, especially on bare ground areas which are more susceptible to the growth of undesirable species.</p> <p>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 <i>Juncus effuses</i> encroachment was further a localised issue on some of the sites and should be monitored.</p> <p>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.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Key structural, influential and distinctive species	<p>Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable component of this H4030 Annex 1 habitat;</p> <p>Heather <i>Calluna vulgaris</i>,</p>	<p>See notes for this attribute in Table 1 above.</p> <p>Localised overgrazing from sheep and rabbits is a concern for some areas of this SAC.</p> <p>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</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>NATURAL ENGLAND. 2014. Site Improvement Plan: North</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Cross leaved heath <i>Erica tetralix</i> , Bell heather <i>E.cinerea</i> , Billberry <i>Vaccinium myrtillus</i> , Crowberry <i>Empetrum nigrum</i> and Cowberry <i>V.vitis-idaea</i> .	<p>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.</p> <p>A further localised concern which is being monitored and managed is the occurrence of heather beetle <i>Lochmaea suturalis</i>. Steps to control this beetle are cited in Moorland Management Plans.</p>	Pennines Group. Available from: http://publications.naturalengland.org.uk/publication/6534899699810304?category=6280398447312896
	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.	<p>See notes for this attribute in table 1 above.</p> <p>Due to the large relative geographic areas this SAC covers it is difficult to ascertain connectivity to the wider landscape.</p> <p>However, 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.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	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	<p>See notes for this attribute in table 1 above.</p> <p>Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	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].
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and funga/bacterial ratio, to within typical values this H4030 habitat.	<p>See notes for this attribute in table 1 above.</p> <p>There is currently no specific information on soil properties for this SAC.</p>	
Supporting processes	Conservation measures	Maintain or restore as appropriate the management	See notes for this attribute in table 1 above.	NATURAL ENGLAND. 2014. Site Improvement Plan: North

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(on which the feature relies)		measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore as appropriate the structure, functions and supporting processes associated with the feature.	<p>Maintain low nutrient levels to maintain high numbers of species through the management activities of grazing and burning. Rush control and some bracken control is a consideration for the management of H4030 on this site.</p> <p>Specific on-site erosion through walkers and estate vehicles is a further concern for reducing connectivity across the SAC. Further high populations of rabbit on localised areas may have exacerbated peat erosion.</p> <p>There is some concern over localised areas of erosion on site. 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.</p> <p>Specific areas of this SAC have had problems with overgrazing and this is still a concern in certain areas. Stocking rates and any new and amended higher level stewardship agreements need to review livestock numbers as required.</p>	<p>Pennines Group. Available from: http://publications.naturalengland.org.uk/publication/6534899699810304?category=6280398447312896</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>
	Air quality	Maintain, 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).	<p>See notes for this attribute in table 1 above.</p> <p>The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (APIS).
Version Control				
Variations from national feature-framework of integrity-guidance:				
<p>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.</p>				

Table 3: Supplementary Advice for Qualifying Features: H5130. *Juniperus communis* formations on heaths or calcareous grasslands; Juniper on heaths or calcareous grasslands

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	<p>Maintain the total extent of the H5130 feature to approximately 300 ha.</p> <p>The exact figure of H5130 habitat is difficult to ascertain due to the fragmented and small patch areas of this woodland.</p>	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>For this feature, this attribute includes the extent of semi-natural wood-pasture mosaic area; tree'd area; the number of veteran trees (except through natural causes), including dead and living trees. Tree roots (particularly of veteran trees) may extend a considerable distance beyond the boundary of the site. A reduction of woodland/wood-pasture area - whether at the edge or in the middle of a site will reduce the core area where wood-pasture conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts may interrupt the movement of species between the remaining parts of the woodland, especially those with limited powers of dispersal.</p> <p>Juniper on heaths or calcareous grasslands H5130 is located scattered in relic populations throughout the SAC.</p>	Area data obtained from existing spatial data from all 4 of the SSSIs where H5130 Juniper on heath or calcareous grassland is an interest feature.
	Spatial distribution of the feature within the site	Restore the distribution and configuration of the H5130 feature, including where applicable its component vegetation types, across the site	<p>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.</p> <p>Swaledale in North Yorkshire supports the largest area of juniper scrub with other areas supporting small or relic juniper populations.</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are broadly referable to and characterised by the following National Vegetation Classification type:</p> <p>W19 <i>Juniperus communis</i> spp. <i>communis</i> – <i>Oxalis acetosella</i> woodland</p>	See notes for this attribute in table 1 above.	
	Key structural, influential and distinctive species	<p>Maintain the abundance of the species listed below to enable each of them to be a viable component of the H5130 habitat;</p> <p>Juniper <i>Juiperus communis</i> Birch <i>Betula pubescens</i> Rowan <i>Sorbus aucuparia</i> Bilberry <i>Vaccinium myrtillus</i> Wood-sorrel <i>Oxalis acetosella</i> Heath bedstraw <i>Galium saxatile</i> Hairy wood-rush <i>Luzula pilosa</i></p>	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Undesirable species	<p>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.</p> <p>Sweet vernal-grass <i>Anthoxanthum odoratum</i>, Great willowherb <i>Epilobium hirsutum</i>, Yorkshire fog <i>Holcus lanatus</i>,</p>	<p>See notes for this attribute in table 1 above.</p> <p>Bracken encroachment is further a consideration on Lovely Seat - Stainton Moor and needs to be regularly controlled as part of the Management Plan.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Common reed <i>Phragmites australis</i> , Creeping buttercup <i>Ranunculus repens</i> Creeping thistle <i>Cirsium arvense</i> , Spear thistle <i>Cirsium vulgare</i> , Rhododendron <i>Rhododendron ponticum</i> , Common nettle <i>Urtica dioica</i>		
	Canopy cover	Restore an appropriate balance between scrub canopy and open field layer within stands of the H5130 feature.	The majority of juniper populations on site are relic populations with little to no regeneration. Therefore, canopy cover tends to be woody and spare, comprised of only mature plants. Restoration to increase the density and canopy cover of juniper is required.	NORTH PENNINES CONSERVATION OBJECTIVES STRATEGY 2005, Penny Anderson Associates and English Nature This attribute will be periodically monitored as part of Natural England's site condition assessments
	Age class structure	Restore an uneven-aged population of Juniper comprising plants at different life stages; this should comprise phases of old growth (>100 years old), building to mature and pioneer/seedling (<5cm girth)	Juniper regeneration can be infrequent and episodic, resulting in populations with few age classes. Populations with full and wider age range tend to be associated with conditions providing regular opportunities for establishment, such as continual exposure of bare soils on steep slopes. These will be more self-sustaining in the longer term. On Bollihope, Pikestone, Eggleston and Woodland Fells SSSI, Juniper woodland planting and restoration has occurred. Although a secondary target for the site, the young juniper needs to be continually monitored and weeded to prevent smothering and shading.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Vegetation community transitions	Maintain or restore as appropriate patterns of natural vegetation zonation/transitions	See notes for this attribute in table 1 above. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	Physical structure: ground disturbance	Ensure areas of disturbed and eroding bare ground are limited to a level which is compatible with maintaining or restoring the regeneration potential of the feature	The ability to provide some areas of exposed bare ground may be required to encourage natural regeneration of juniper plants in order to sustain the feature into the longer-term.	
	Supporting off-site habitat	Maintain or restore as appropriate the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature: For example isolated juniper populations around Upper Teesdale and Appleby Fells.	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.	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England
	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.	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)
			<p>Juniper is often restricted to small relic populations or isolated trees. Therefore their connectivity to the wider landscape is often extremely patchy or discontinuous. Some juniper planting projects have been actioned. However, the success of this is yet to be defined.</p> <p>Overall, due to the relic populations of juniper and the unknown success of replanting on sites, it is currently not possible to ascertain the resilience of this habitat type to future changes.</p>	
	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	<p>See notes for this attribute in table 1 above.</p> <p>The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>Overall, due to the relic populations of juniper and the unknown success of replanting on sites, it is currently not possible to ascertain the resilience of this habitat type to future changes.</p>	
Supporting processes (on which the feature relies)	Air quality	Maintain 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).	<p>See notes for this attribute in table 1 above.</p> <p>The critical load nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (APIS).
	Conservation measures	Maintain or restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore as appropriate the structure, functions and supporting processes associated with the feature	<p>See notes for this attribute in table 1 above.</p> <p>For this feature, conservation measures include replanting, reduced grazing, scrub management, bracken control and weed control.</p> <p>Retention of suitable land use infrastructure/patterns to enable site management e.g. pastoral livestock farming. Maintenance of local rabbit populations where applicable.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>NATURAL ENGLAND. 2014. Site Improvement Plan: North Pennines Group. Available from: http://publications.naturalengland.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				org.uk/publication/6534899699810304?category=6280398447312896
Version Control				
<p>Variations from national feature-framework of integrity-guidance:</p> <p>This habitat is problematic owing to defining what constitutes a stand. A single relict tree may not be construed as a representation of the woodland type; whilst such individuals are useful pointers to areas for woodland expansion, it may be that a pure juniper wood is not represented comparably within each SSSI where it is an interest feature.</p> <p>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.</p>				

Table 4: Supplementary Advice for Qualifying Features: H6130. Calaminarian grasslands of the *Violetalia calaminariae*; Grasslands on soils rich in heavy metals

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 H6130 grassland feature	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature. The extent of the feature will include any mosaics it forms with other vegetation communities.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Spatial distribution of the feature within the site	Maintain or restore as appropriate the distribution and configuration of the H6130 feature, including where applicable its component vegetation types, across the site	<p>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.</p> <p>These habitats show a limited distribution, but it is uncertain whether this is a true picture, or a reflection of the limited field assessment of these habitats to date.</p> <p>On this SAC this habitat exists in mosaics, further blurring their actual distribution.</p>	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	<p>Ensure the component vegetation communities of the H6130 feature are broadly referable to and characterised by the following National Vegetation Classification type:</p> <p><i>OV37 Festuca ovina – Minuartia verna</i> community</p>	<p>See notes for this attribute in table 1 above.</p> <p>However, due to the scattered distribution of this feature, predominately only found on old mine spoil it is difficult to ascertain exact community composition, often owing to varying succession communities associated with these areas.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	Key structural, influential and distinctive species	<p>Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable component of the H6130 habitat;</p> <p>Northern rock-cress <i>Arabis petraea</i> Spring sandwort <i>Minuartia verna</i> Alpine pennygrass <i>Thlaspi caerulescens</i> Pyrenean Scurvygrass <i>Cochlearia pyrenaica</i></p> <p><i>Assemblage of lichens including</i> <i>Cladonia rangiformis</i> <i>C. chlorophaea</i></p> <p><i>Coelocaulon aculeatum</i></p>	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Undesirable species	<p>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.</p> <p>Daisy <i>Bellis perennis</i>, Creeping thistle <i>Cirsium arvense</i>, Spear thistle <i>Cirsium vulgare</i>, Yorkshire fog <i>Holcus lanatus</i>, large docks (excluding <i>Common sorrel Rumex acetosa</i>), Perennial rye-grass <i>Lolium perenne</i>,</p>	See notes for this attribute in table 1 above.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Meadow buttercup <i>Ranunculus acris</i> , Creeping buttercup <i>Ranunculus repens</i> , Pearlwort <i>Sagina procumbens</i> , Common ragwort <i>Senecio jacobaea</i> , Common nettle <i>Urtica dioica</i>		
	Vegetation community transitions	Maintain or restore as appropriate the pattern of natural vegetation transitions typical of the H6130 feature at this site.	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.	
	Soils, substrate and nutrient cycling	Maintain or 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 H6130 habitat.	See notes for this attribute in table 1 above. There is currently no specific information on the soil properties for this SAC.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Hydrology: Flooding regime	Maintain or restore as appropriate the timing, frequency, extent and duration of surface flooding commensurate with the maintenance/restoration of the H6130 feature.	See notes for this attribute in table 1 above.	
	Supporting off-site habitat	Maintain or restore as appropriate the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the H6130 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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
	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	See notes for this attribute in table 1 above.	
	Adaptation and resilience	Maintain or restore as appropriate 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 notes for this attribute in table 1 above. Some localised areas have a slight decline in extreme conditions (i.e. toxicity, drought stress) leading to some small botanical changes. These need to be monitored and future management put in place to mitigate these changes as necessary. However, as this feature is widely scattered and often found within mosaics of other habitat how successful it will be at adapting to different future scenarios is likely to be on a case by case basis.	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 below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (APIS).	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	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 (APIS).
	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.	See notes for this attribute in table 1 above. Typical conservation measures include grazing, cutting, scrub management, weed and bracken control. Retention of suitable land use infrastructure/patterns to enable site management e.g. pastoral livestock farming. Maintenance of local rabbit populations where applicable.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Version Control				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>Variations from national feature-framework of integrity-guidance:</p>			
<p>There is no precise data available for the current extent of Calaminarian grassland as this was not mapped in the 2004 surveys due to the small and scattered distribution of these features. Further work is needed to provide a proper inventory of extent and quality of Calaminarian grassland across the SAC before objectives for this habitat can be adequately formulated. As to date not known work has progressed to map the extent and quality of this feature.</p>			
<p>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.</p>			

Table 5: Supplementary Advice for Qualifying Features: H6150. Siliceous alpine and boreal grasslands; Montane acid grasslands

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	<p>Maintain the current extent of the H6150 feature.</p> <p>The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature.</p>	<p>There should be no measurable net 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.</p> <p>See notes for this attribute in table 1 above.</p> <p>This feature is only found in small scattered locations throughout this SAC.</p>	<p>Area data obtained from the 4 SSSIs where this feature is present.</p> <p>Habitat information for component SSSIs within Northumberland and Durham:</p> <p>NATURAL ENGLAND. 2002. N2K NVC Survey. Unpublished data. (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in Cumbria:</p> <p>NATURAL ENGLAND. 1999. 1999 NVC Survey of Appleby Fells. Unpublished data. (Available from Natural England on request.)</p> <p>O'REILLY, J. 2011. Geltsdale Farm and RSPB NVC data. Unpublished data. (Available from Natural England on request).</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>RSPB. 1999. Upland Vegetation Condition Assessment, Unpublished data, (Available from Natural England on request.)</p> <p>RSPB. 1995. NVC Survey. Unpublished data, (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in North Yorkshire:</p> <p>NATURAL ENGLAND. 2004. North Pennines Survey. Unpublished data. (Available from Natural England on request.)</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>
	Spatial distribution of the feature	Maintain or restore as appropriate the distribution and configuration of the H6150	<p>See notes for this attribute in table 1 above.</p> <p>Fragmentation of this feature is of particular concern given its restricted</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE,

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	within the site	feature, including where applicable its component vegetation types, across the site.	<p>occurrence in England. In addition to the threats listed below, climate warming also has the potential to lead to vegetation zones and species shifting to higher elevations and/or becoming restricted to north facing slopes.</p> <p>This habitat is scattered and widely disbursed, often in mosaics with other elevated habitats and its exact distribution has not been fully mapped.</p>	2005. North Pennines Conservation Objectives Strategy. Available from Natural England
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the H6150 feature are broadly referable to and characterised by the following National Vegetation Classification type:</p> <p>U10 <i>Carex bigelowii-Racomitrium lanuginosum</i> moss-heath.</p>	<p>See notes for this attribute in table 1 above.</p> <p>Siliceous alpine and boreal grasslands are one of the few predominantly near-natural habitats remaining in the UK.</p> <p>There are seven main sub-types of Siliceous alpine and boreal grasslands recognised by the NVC, which are mostly referred to as 'heath' or snow-bed communities. Of these only two, U7 <i>Nardus stricta-Carex bigelowii</i> grass-heath and/or U10 <i>Carex bigelowii-Racomitrium lanuginosum</i> moss-heath occur in England. These are dominated by a short vegetation cover dominated variously by mosses, sedges, rushes or grasses depending on the degree of wind-exposure and snow lie experienced. These mossy heaths are often mat-like, and typically appear as mottled patches of vegetation. This is the predominant kind of vegetation on British mountains at high altitudes of around 750 m, and it occurs above the zone dominated by ericaceous dwarf-shrubs.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Invasive, non-native and/or introduced species	<p>Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H6150 feature</p>	<p>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).</p> <p><i>Juncus effusus</i> encroachment below the snow line is a concern. There are some evidence of rush management but the area needs to be monitored to ensure that this rush encroachment does not increase.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Vegetation structure - grazing.	Restrict grazing pressure to no more than very low levels	<p>Siliceous and boreal grasslands do not require land management to maintain their interest and the vegetation can be considered a climatic climax.</p> <p>The vegetation is slow-growing due to exposure and altitude, and grass-heaths and moss-heaths of this feature are very sensitive to grazing (and trampling). Either no grazing or very low levels of grazing are likely to be consistent with maintaining the interest of this feature.</p> <p>There is currently little evidence of overgrazing of this habitat on any of the underpinning SSSIs. However, due to the scattered and often fairly inaccessible locations of this feature it is difficult to ascertain the exact affect grazing has had on the condition of this feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
Physical structure: ground disturbance	Ensure significant areas of disturbed or eroding bare ground are not present. Where present, the affected areas should not exceed 1% of the total feature, and be considered only as a temporary stage.	It is important to make the distinction between bare ground that is a 'natural' part of the feature due to the harsh environment, exposure and thin soils and disturbed bare ground caused by trampling or vehicle use. This habitat is very sensitive to grazing and trampling, and can only withstand very low levels of grazing. Vehicle use will cause long term damage. Recovery may take decades.	
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 H6150 habitat.	Soils are generally shallow rankers or podsols, and because of strong leaching are mostly acidic. In many places the ground is patterned by solifluction and frost-heave, so that plants have to contend with shifting unstable soils as well as a severe climate.	
Adaptation and resilience	Maintain or restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.	<p>See notes for this attribute in table 1 above.</p> <p>This feature is scattered and often found within mosaics of other habitat and often in fairly inaccessible locations how successful it will be at adapting to different future scenarios is likely to be on a case by case basis.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
Key structural, influential and distinctive	Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	species: flora and fauna	<p>component of the Annex 1 habitat.</p> <p>Stiff sedge <i>Carex bigelowii</i> Wavy-hair grass <i>Deschampsia flexuosa</i> Sheep's/ vivipara fescue <i>Festuca ovina/ vivipara</i> Billberry <i>Vaccinium myrtillus</i> Woolly fringe-moss <i>Racomitrium lanuginosum</i> <i>Cladonia spp.</i></p>		condition assessments
Supporting processes (on which the feature relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (APIS).	<p>See notes for this attribute in table 1 above.</p> <p>The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed September 2018).</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (APIS).
	Conservation measures	Maintain or restore 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 H6150 feature.	<p>See notes for this attribute in table 1 above.</p> <p>Montane habitats include areas of near-natural vegetation in the UK, and are fragile and highly susceptible to human influences. These habitats are maintained by the severe climate and thin soils at high altitude and do not require grazing or other forms of land management to maintain them.</p> <p>Threats to the habitats include grazing and trampling, nitrogen deposition, recreation and access, use of vehicles, burning and climate change.</p>	NATURAL ENGLAND. 2014. Site Improvement Plan: North Pennines Group. Available from: http://publications.naturalengland.org.uk/publication/6534899699810304?category=6280398447312896

Version Control: n/a

Variations from national feature-framework of integrity-guidance:

This habitat was only found in small scattered areas, often within mosaics of other habitats and in fairly inaccessible areas. Therefore, an accurate picture of extent and condition is difficult to define and needs further assessment.

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

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
component site depending on its particular circumstances. Natural England will be able to provide further advice on request.			

Table 6: Supplementary Advice for Qualifying Features: H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the current extent of the H6210 habitat feature. The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature.	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. See notes for this attribute in table 1 above. This feature is only found in small scattered locations throughout this SAC.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Spatial distribution of the feature within the site	Maintain or restore as appropriate the distribution and configuration of the H6210 feature, including where applicable its component vegetation types, across the site.	See notes for this attribute in table 1 above. On this SAC this habitat is fairly scattered, often existing in mosaics, which further blur the actual distribution of this feature. Therefore, the exact spatial distribution of this feature is not yet known.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H6210 feature are referable to and characterised by the following National Vegetation Classification type (s): <i>CG9 Sesleria albicans-Galium sternerii</i> grassland <i>CG10 Festuca ovina-Agrostis capillaris-Thymus praecox</i> grassland	See notes for this attribute in table 1 above.	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England
	Abundance of herbs (including <i>Carex spp</i>)	Maintain a high proportion of herbaceous species within the H6210 grassland habitat within the range 50%-80%	A high cover of characteristic herbs, including sedges (<i>Carex</i> species) is typical of the structure of this habitat type.	
	Key structural, influential and distinctive	Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable	See notes for this attribute in table 1 above. The list of typical species given for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	species: flora and fauna	<p>component of the Annex 1 habitat;</p> <p>Common bent <i>Agrostis capillaris</i> Quaking grass <i>Briza media</i> Common harebell <i>Campanula rotundiflora</i> Glaucous sedge <i>Carex flacca</i> Sheep / red fescue <i>Festuca ovina / rubra</i> Limestone bedstraw <i>Galium sternerii</i> Tormentil <i>Potentilla erecta</i> Self-heal <i>Prunella vulgaris</i> Blue-moor grass <i>Sesleria albicans</i> Wild thyme <i>Thymus praecox</i></p>	<p>may be added or deleted, as new information about this site becomes available or if our understanding of the term 'typical species' changes.</p>	
	Undesirable species	<p>Maintain the frequency/cover of undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread.</p>	<p>See notes for this attribute in table 1 above.</p> <p>There is currently no data for any undesirable species within this habitat type.</p>	
	Vegetation community transitions	<p>Maintain or restore as appropriate the pattern of natural vegetation transitions</p>	<p>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.</p> <p>Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.</p> <p>There is currently no data on the quality of vegetation transitions for this habitat type.</p>	
	Soils, substrate and	<p>Maintain or restore as appropriate the properties of the</p>	<p>See notes for this attribute in table 1 above.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	nutrient cycling	underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the H6210 habitat.	There is currently no data on the soil properties for this habitat type at this site.	
	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	See notes for this attribute in table 1 above.	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy 2005,
	Adaptation and resilience	Maintain or restore as appropriate 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 notes for this attribute in table 1 above.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (APIS).	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	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 (APIS).
	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 H6210 feature	See notes for this attribute in table 1 above.	NATURAL ENGLAND. 2014. Site Improvement Plan: North Pennines Group. Available from: http://publications.naturalengland.org.uk/publication/6534899699810304?category=6280398447312896
Version Control				
Variations from national feature-framework of integrity-guidance:				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>This habitat was only found in small scattered areas, often with key for a found within mosaics of other habitats and in fairly inaccessible areas. Therefore, an accurate picture of extent and condition is difficult to define and needs further assessment.</p> <p>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.</p>			

Table 7: 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	Maintain or restore as appropriate the total extent of the H7130 habitat feature at or to 38704 hectares.	<p>There should be no measurable reduction (excluding any trivial loss) in the current extent and area of this feature, and in some cases, the full extent of this habitat feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>Approximately 38% of this SAC supports the interest feature, H7130, Blanket Bog. However, this habitat type is also recorded in mosaics with H4010 Northern Atlantic Wet Heaths and to a lesser extent H4030 European dry heaths. Therefore this figure may be under or over recorded.</p> <p>Blanket bog H7130 was a feature throughout this SAC.</p>	<p>North Pennines Conservation Objectives Strategy 2005, Penny Anderson Associates and English Nature. Held by Natural England</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Spatial distribution of the feature within the site	Maintain or restore as appropriate the distribution and configuration of the H7130 feature, including where applicable its component vegetation types, across the site	<p>See notes for this attribute in table 1 above.</p> <p>Fragmentation of blanket bog is common with areas drying out through drainage, and burning encouraging a species-poor community dominated typically by heather <i>Calluna vulgaris</i> or Purple moor-grass <i>Molinia caerulea</i>. True bog species become fragmented or are lost. Hydrological fragmentation of the bog system can also occur.</p> <p>The North Pennine Moors hold the major area of blanket bog in England. Blanket bog is restricted to the higher areas of each underpinning SSSI and typically covers large expanses of land. It is most extensive to the west of the North Pennines, reflecting the higher rainfall and lower evapotranspiration conducive to blanket bog formation.</p> <p>A significant proportion of this blanket bog remains active with accumulating peat, although there are areas often bounded by sizeable zones of bog which may lack peat-building sphagnum, albeit on deep peat.</p> <p>Due to the scale of this habitat over many SSSIs, there are different sites</p>	<p>Area data obtained from the 4 SSSIs where this feature is present.</p> <p>Habitat information for component SSSIs within Northumberland and Durham:</p> <p>NATURAL ENGLAND. 2002. N2K NVC Survey. Unpublished data. (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>having different threats and management options in place. However, largely important issues to get right on this feature are the grips (mostly already blocked), the grazing (at sustainable levels in many cases) and continually monitoring the extent and frequency of burning.</p>	<p>Cumbria:</p> <p>NATURAL ENGLAND. 1999. 1999 NVC Survey of Appleby Fells. Unpublished data. (Available from Natural England on request.)</p> <p>O'REILLY, J. 2011. Geltsdale Farm and RSPB NVC data. Unpublished data. (Available from Natural England on request.)</p> <p>RSPB. 1999. Upland Vegetation Condition Assessment, Unpublished data, (Available from Natural England on request.)</p> <p>RSPB. 1995. NVC Survey. Unpublished data, (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in North Yorkshire:</p> <p>NATURAL ENGLAND. 2004. North Pennines Survey. Unpublished</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>data. (Available from Natural England on request.)</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>NATURAL ENGLAND Commissioned Report NECR086. 2011. A review of techniques for monitoring the success of peatland restoration. Available here</p>
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the H7130 feature are generally referable to and characterised by the following National Vegetation Classification type(s):</p> <p>M1 <i>Sphagnum auriculatum</i> bog</p>	<p>See notes for this attribute in table 1 above.</p> <p>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.</p>	<p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>pool community, M2 <i>Sphagnum cuspidatum</i> / <i>recurvum</i> bog pool community, M17 <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire, M18 <i>Erica tetralix</i> – <i>Sphagnum papillosum</i> raised and blanket mire, M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire, M20 <i>Eriophorum vaginatum</i> blanket and raised mire</p>	<p>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 degraded mire (M15, M16, M25), dry heath (H8, 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.</p> <p>Note: Blanket bog vegetation can sometimes become established on peats shallower than 0.4m deep.</p> <p>On this SAC the majority of the blanket bog areas that require restoration are due to poor species diversity including low sphagnum cover and/or heather shading out other species.</p> <p>However, the site does still include the least damaged and most extensive tracts of typical M19 <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire in England and shows this community type up to its highest altitude in England.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Invasive, non-native and/or introduced species	<p>Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H7130 feature</p>	<p>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).</p> <p>Rush <i>Juncus effusus</i> invasion towards the northern stretch of the SAC for example is an ongoing issue and should would benefit from further management. There have also been records of heather beetle damage on a high proportion of the SAC. There are no other issues with invasive species on blanket bog areas.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Presence/cover of woody species	<p>Maintain or restore as appropriate a low cover (<10% of the area) of scrub or trees within stands of H7130.</p>	<p>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 is sometimes regarded as detrimental because water is lost by evapotranspiration from the trees and, as the tree</p>	<p>This attribute will be periodically monitored as part of Natural England's site</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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. This excludes dwarf birch <i>Betula nana</i> (currently not recorded) and bog myrtle <i>Myrica gale</i> which has been recorded on site.</p> <p>There are a few small Sitka Spruce <i>Picea sitchensis</i> across the site. These should be removed before they begin to set seed. However, the number of tree species is well below 10% across the H7130 habitat feature. Stands of bog myrtle, <i>Myrica gale</i> are found on site, especially towards the base of slopes and should be maintained as the plants themselves and their deep leaf litter provide cover for bird and small mammal species. Further some scrub such as a low number of Birches, <i>Betula sp.</i> and rowan <i>Sorbus aucuparia</i> can be maintained around the peripheral of bogs to encourage structural diversity, beneficial as shelter and food for birds.</p>	condition assessments
	Undesirable species	<p>Ensure the following undesirable competitive species are either absent or rare (individually and collectively less than 1% of vegetation cover);</p> <p>Common bent <i>Agrostis capillaris</i>, Yorkshire fog <i>Holcus lanatus</i>, Common reed <i>Phragmites australis</i>, Common bracken <i>Pteridium aquilinum</i>, Creeping thistle <i>Ranunculus repens</i></p>	<p>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.</p> <p>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 high proportion of ericaceous species remain.</p> <p>Bracken is currently not a concern on blanket bog but is a concern on the lower dryer areas of this SAC and should be monitored across the site as a whole.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Structural diversity	Maintain or restore as appropriate the full range of	Bogs in particular show varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the	This attribute will be periodically monitored

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>typical structural features associated with the H7130 feature at this site, e.g. vegetation cover, surface patterning and hydrological zonations</p>	<p>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.</p> <p>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 1 m² or less. The unevenness should be the result of Sphagnum hummocks, lawns and hollows, or mixtures of well-developed cotton-grass tussocks and spreading bushes of dwarf-shrubs.</p> <p>On this SAC structural diversity varies locally within the interest feature, H7130 blanket bog with between 3 and 6 notable species recorded constantly.</p> <p>Further this SAC has a few large areas that are dominated by Heather with little species diversity. However, there are pockets within this of more diversity, and it is expected that with time and appropriate management the older heather will open out and allow other species to increase.</p> <p>Erosion, fire damage, overgrazing and vehicle access are the main concerns on this site.</p>	<p>as part of Natural England's site condition assessments</p>
	<p>Physical structure: ground disturbance (and peat erosion)</p>	<p>Ensure that significant areas of disturbed and eroding bare ground are not present. Where present, any affected areas should typically not exceed 1% of the total H7130 feature, and be considered only as a temporary stage.</p>	<p>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.</p> <p>Some areas of the SAC have eroded gullies with bare peat and areas which have been densely gripped (drained) to varying success. On areas where exposed peat has been a problem, measures are in place to fund grip blocking and bare peat restoration plans through agri-environment schemes.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>NATURAL ENGLAND. 2014. Site Improvement Plan: North Pennines Group. Available from:</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				http://publications.naturalengland.org.uk/publication/6534899699810304?category=6280398447312896
	Soils, substrate and nutrient cycling	<p>Maintain or restore as appropriate 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 H7130 habitat.</p> <p>For this feature the peat substrate should consist of both acrotelm and catotelm layers.</p>	<p>See notes for this attribute in table 1 above.</p> <p>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.</p> <p>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. 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.</p> <p>This is currently no specific site information on soil properties for this SAC.</p>	
	Adaptation and resilience	<p>Maintain or restore as appropriate the H7130 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.</p>	<p>See notes for this attribute in table 1 above.</p> <p>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. Rotational burning, drainage and atmospheric deposition can all compromise this feature's ability to adapt, especially in response to the effects of climate change.</p> <p>Blanket bog is the second most extensive habitat on this SAC, covering just less than 40% of the SAC total area. The surrounding habitat to blanket bog on site is predominately dry heath. The natural hydrological conditions need to be present in each hydrological unit of blanket bog to</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			prevent habitat degradation.	
	Key structural, influential and distinctive species: flora and fauna	<p>Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat;</p> <p>Heather <i>Calluna vulgaris</i>, Cross leaved heath <i>Erica tetralix</i>, Bell heather <i>E.cinerea</i>, Billberry <i>Vaccinium myrtillus</i>, Crowberry <i>Empetrum nigrum</i>, Cowberry <i>V.vitis-idaea</i>, Sundew <i>Drosera spp.</i>, Common cottongrass <i>Eriophorum angustifolium</i>, Broad leaved cottongrass <i>E. vaginatum</i></p> <p>Assemblage of <i>Sphagnum</i> mosses.</p>	<p>See notes for this attribute in table 1 above.</p> <p>The majority of the mires on this SAC are characterised by carpets of bog-mosses <i>Sphagnum papillosum</i>, <i>S. magellanicum</i>, <i>S. capillifolium</i>, <i>S. tenellum</i> and <i>S. pulchrum</i> with species such as cross-leaved heath <i>Erica tetralix</i>, bog rosemary <i>Andromeda polifolia</i>, round-leaved sundew <i>Drosera rotundifolia</i> and cranberry <i>Vaccinium oxycoccus</i> occurring occasionally.</p> <p>In addition, <i>Rubus chamaemorus</i> occurs sparingly near the summit areas and Lesser twayblade <i>Listera cordata</i> occurs sparingly within the hummocks.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
Supporting processes (on which the feature relies)	Air quality	<p>Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (APIS).</p>	<p>See notes for this attribute in table 1 above.</p> <p>The critical loads for nitrogen deposition and acidity are currently being exceeded for this feature (APIS accessed July 2018).</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (APIS).</p>
	Hydrology	<p>At a site, unit and/or catchment level (as necessary), maintain or restore as appropriate the natural hydrological processes to provide consistently near-surface water levels necessary to sustain the H7130 feature</p>	<p>See notes for this attribute in table 1 above.</p> <p>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.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		within the site	<p>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.</p> <p>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.</p> <p>Most of the grips across the site have been blocked which has resulted in some temporary disturbance where the peat plugs have been taken, but these re-vegetate as do the grips. This will require monitoring and the strengthening or modifying the dams as required.</p>	
	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 H7130 feature	<p>See notes for this attribute in table 1 above.</p> <p>The principal management measures on this site are:</p> <ul style="list-style-type: none"> • Ensure burning does not take place on sensitive areas. • Control bracken spread on site. • 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. • Manage public access to the site through maintaining designated walking routes. • Manage vehicle access on site especially in sensitive areas of the site. 	NATURAL ENGLAND. 2014. Site Improvement Plan: North Pennines Group. Available from: http://publications.naturalengland.org.uk/publication/6534899699810304?category=6280398447312896

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 8: Supplementary Advice for Qualifying Features: H7220. Petrifying springs with tufa formation (Cratoneurion); Hard-water springs depositing lime *

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 current extent of the H7220 feature.	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p> <p>The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	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.	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type (s):</p> <p>M37 <i>Cratoneuron commutatum</i> – <i>Festuca rubra</i> spring</p> <p>M38 <i>Cratoneuron commutatum</i> – <i>Carex nigra</i> spring</p>	<p>See notes for this attribute in table 1 above.</p> <p>Appropriate NVC types (i.e. those indicating adequate supply of low nutrient base rich water and appropriate management regime) will normally be the M37 and M38 communities, although it should be recognised the vegetation types associated with the feature have yet to be comprehensively described.</p> <p>The petrifying spring habitat is highly localised in occurrence within the North Pennine Moors, but where it does occur it is species-rich with abundant bryophytes, sedges and herbs including bird's-eye primrose <i>Primula farinosa</i> and marsh valerian <i>Valeriana dioica</i>.</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	<p>Invasive, non-native and/or introduced species</p> <p>Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature</p>	<p>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).</p> <p>This habitat is only found very localised and scattered, with little known little data available on condition or threats such as encroachment of undesirable species. Spring-head rills or stony flushes may merge into alkaline fens where slope or soil change occurs.</p>	
	<p>Presence/cover of woody species</p> <p>Maintain or restore as appropriate a low cover of woody species in flushes or springs; low-growing <i>Salix spp.</i> acceptable more than 5m from the feature.</p>	<p>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.</p> <p>This habitat is only found very localised and scattered, with little known little data available on condition or threats such as extent of cover from woody species.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	<p>Browsing and grazing by herbivores</p> <p>Maintain or restore as appropriate levels of grazing</p>	<p>These characteristically small-scale habitat features are often preferentially grazed and may be vulnerable to significant overgrazing pressure associated with the management of the wider local landscape.</p>	
	<p>Exposed substrate</p> <p>Maintain or restore as appropriate a low cover of exposed substrate of between 5-25% across the H7220 feature.</p>	<p>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. The open nature and sometimes skeletal nature of the substrate supporting these features requires a higher, upper threshold than for some other wetlands.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	<p>Integrity of</p> <p>Ensure that no more than 1% of</p>	<p>Tufa is a fragile soft porous rock composed of calcium carbonate which</p>	

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)	
	tufa features	the vegetation in which tufa is visible is showing signs of damage or disturbance	is deposited as lime-rich subterranean water issues out from springs and chemically interacts with the air. It is easily damaged or disturbed. There has been no notable damage or disturbance to any of the tufa on site.	
	Key structural, influential and distinctive species: flora and fauna	Maintain the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat; Curled hook-moss <i>Cratoneuron commutatum</i> Common green bryum moss <i>Bryum pseudotriquetrum</i> Red fescue <i>Festuca rubra</i> Cuckoo flower <i>Cardamine pratensis</i> Bird's-eye primrose <i>Primula farinosa</i> Marsh valerian <i>Valeriana dioica</i>	See notes for this attribute in table 1 above. For this feature appropriate (i.e. those indicating a low nutrient status environment appropriate management regime) bryophytes and vascular plant species taken from core community constants and preferentials. Also include scarce species associated with the habitat, e.g. <i>Lycopodiella inundata</i> , <i>Rhynchospora fusca</i> . This Annex 1 habitat is not well-defined in the JNCC guidance and includes a wide range of 'transitional' wetland vegetation. In addition this habitat type has not been comprehensively surveyed on site so exact species composition and presence are not yet strictly defined. Future surveys are recommended.	
	Hydrology	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the H7220 feature within the site.	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Water chemistry	Maintain the low nutrient status of irrigating water, ensuring it is rich in base ions, particularly calcium.	UKTAG (2012) provides threshold values for nitrate concentration in ground waters 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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			There is currently no available water chemistry data for this site.	
	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 notes for this attribute in table 1 above. 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.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Supporting off-site habitat	Maintain or restore as appropriate the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the H7220 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.	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England
Supporting processes (on which the feature relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (APIS).	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	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 (APIS).
	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Version Control: n/a				
Variations from national feature-framework of integrity-guidance:				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>The petrifying spring habitat is highly localised in occurrence within the North Pennine Moors and found in small scattered areas, often within mosaics of other habitat. Thus, surveying for this habitat has been challenging with little survey effort to quantify extent or condition of this feature.</p> <p>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.</p>			

Table 9: Supplementary Advice for Qualifying Features: H7230. Alkaline fens; ‘Calcium-rich spring water-fed fens’

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 H7230 feature at approximately 65 hectares.	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>Due to difficulty in surveying exact extent of this feature this figure may be either over calculated or under calculated.</p>	<p>Area data obtained from the 8 SSSIs where this feature is present.</p> <p>Habitat information for component SSSIs within Northumberland and Durham: NATURAL ENGLAND. 2002. N2K NVC Survey. Unpublished data. (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in Cumbria: NATURAL ENGLAND. 1999. NVC Survey of Appleby Fells. Unpublished data. (Available from Natural England on request.)</p> <p>O'REILLY, J. 2011. Geltsdale Farm and RSPB NVC data. Unpublished data. (Available from Natural England on request).</p> <p>RSPB. 1999. Upland Vegetation Condition Assessment, Unpublished data, (Available from Natural England on request.)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>request.)</p> <p>RSPB. 1995. NVC Survey. Unpublished data, (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in North Yorkshire:</p> <p>NATURAL ENGLAND. 2004. North Pennines Survey. Unpublished data. (Available from Natural England on request.)</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H7230 feature, including where applicable its component vegetation types, across the site	<p>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.</p> <p>H7230 alkaline fens is dependent upon irrigation by alkaline water coming either from chalk rich ground waters or percolating through</p>	<p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p> <p>This attribute will be</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			the drift. The alkaline fens are often situated below alkaline seepages and flushes and therefore by definition very restricted in spatial extent. Thus, the exact spatial extent that this feature encompasses is difficult to accurately define.	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 H7230 feature are referable to and characterised by the following National Vegetation Classification type (s): M10 <i>Carex dioica</i> – <i>Pinguicula vulgaris</i> mire is dominant with some M9 <i>Carex rostrata</i> – <i>Calliergon cuspidatum/giganteum</i> mire, M12 <i>Carex saxatilis</i> mire, M37 <i>Cratoneuron commutatum</i> – <i>Festuca rubra</i> spring and M38 <i>Cratoneuron commutatum</i> – <i>Carex nigra</i> spring	See notes for this attribute in table 1 above.	
	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 H7230 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). Less than 1% of the alkaline fen area is composed of undesirable species. Therefore, currently this is not a concern but should be regularly monitored as small fluctuations in hydrology can contribute changes in species distribution.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Presence/cover of woody	Maintain a low cover of woody species of not more than 10%	Native trees and shrubs occur naturally on bog and fen surfaces but an abundance of scrub and trees on bogs and fens is sometimes	This attribute will be periodically monitored as

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	species	<p>scrub/tree cover.</p> <p>No woody species in flushes or springs; low-growing <i>Salix spp.</i>, acceptable more than 5m from edge of spring/flush feature.</p>	<p>regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects.</p> <p>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.</p> <p>This habitat is only found very localised and scattered. Less than 10% of the alkaline fen area is composed of scrub / tree species. Therefore, currently this is not a concern but should be regularly monitored and cut back if levels increase.</p>	<p>part of Natural England's site condition assessments</p>
	Browsing and grazing by herbivores	<p>Maintain or restore as appropriate levels of grazing</p>	<p>These habitat features are often preferentially grazed and may be vulnerable to significant overgrazing pressure associated with the management of the wider local landscape.</p> <p>Locally, cattle grazing (without sheep) allow this habitat greater flowering and seeding productivity, as well as providing niches for seed set into the lightly poached mire surface. Such management is underway on Geltsdale and Glendue Fells.</p> <p>Some level of grazing is likely to be crucial for the maintenance of the <i>Saxifraga hirculus</i> population which occurs in this habitat.</p>	
	Exposed substrate	<p>Maintain the exposure of the substrate at appropriate levels (typically between 5-25%) across the H7230 feature.</p>	<p>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. The open nature and sometimes skeletal nature of the substrate supporting these features requires a higher upper threshold than for some other wetlands.</p> <p>For any 4m² area within a flush, less than 25% of the ground cover of each spring or flush should be disturbed bare ground. This is true for all recorded areas of flush but due to the scattered nature and small scale of this feature it is difficult to ascertain exact condition.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Although not enough to affect site condition, Bollihope, Pikestone, Eggleston and Woodland Fells, for example, has had areas of alkaline flush disturbed through track and vehicle movement.	
	Integrity of tufa features	Ensure that <1% of the vegetation in which tufa is visible is showing signs of damage or disturbance	Tufa is a fragile soft porous rock composed of calcium carbonate which is deposited as lime-rich subterranean water issues out from springs and chemically interacts with the air. It is easily damaged or disturbed. Currently there is no concern over the condition of the tufa on this SAC.	
	Key structural, influential and site-distinctive species	Maintain or restore as appropriate the abundance of the species listed below to enable each of them to be a viable component of the H7230 habitat; Any moss or liverwort; Sedges <i>Carex</i> spp Saw-sedge <i>Cladium mariscus</i> , Sawgrass <i>Eleocharis</i> spp, Blunt flowered rush <i>Juncus subnodulosus</i> ; False sedge <i>Kobresia simpliciuscul</i> ; Bog bean <i>Menyanthes trifoliata</i> ; Purple moor-grass <i>Molinia caerulea</i> ; Yellow saxifrage <i>Saxifraga azoides</i> ; Blue-moor grass <i>Sesleria albicans</i> ; Marsh saxifrage <i>Saxifraga hirculus</i>	See notes for this attribute in table 1 above. For this feature, appropriate (i.e. those indicating a low nutrient status environment appropriate management regime) bryophytes and vascular plant species taken from core community constants and preferentials. Also included are scarce species associated with the habitat, e.g. <i>Lycopodiella inundata</i> , <i>Rhynchospora fusca</i> . This Annex 1 habitat is not well-defined and can include a wide range of 'transitional' wetland vegetation. <i>Saxifraga hirculus</i> occurs in this habitat.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Hydrology	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the H7230 feature within the site, including a high piezometric head and	See notes for this attribute in table 1 above. Drainage on this SAC should be considered active if it has altered, or is likely to alter, or remove the original vegetation and facilitate the removal of water from the site. Overall the required drainage for this feature is met across the SAC.	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)
		permanently high water table (allowing for natural seasonal fluctuations).		
	Water chemistry	Maintain the low nutrient status of irrigating water, ensuring it is rich in base ions, particularly calcium.	UKTAG (2012) provides threshold values for nitrate concentration in groundwater's 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. There is currently no available data on water chemistry for this SAC.	
	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 notes for this attribute in table 1 above. 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. Due to the vulnerability this feature has external influences such as from changes in water chemistry and pollution (i.e. agricultural run-off) which all affect the flora and conversely the condition of this feature. The ability for this feature to adapt to local changes with therefore likely be on a localised case by case basis.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	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	See notes for this attribute in table 1 above.	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 below the site-relevant Critical Load or Level values given for this feature of the site on the Air	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	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

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Pollution Information System (APIS).		System (APIS). JNCC, 2011. Alkaline Fen Condition Technical Note III
	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature.	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site condition assessments ENGLISH NATURE, 2005. Views about the management of SSSIs . NATURAL ENGLAND, 2014. Site Improvement Plan: North Pennines Group (SIP154). Available at http://publications.naturengland.org.uk/publication/6534899699810304
Version Control n/a				
Variations from national feature-framework of integrity-guidance: Large stands of the fen feature intermediate with rush pasture or <i>Nardus</i> grassland may occur especially in areas with drift over solid limestone geology. Selection of such intermediates has been representative across this SAC rather than exhaustive; also some examples of alkaline fens may be extremely small (1m ²) and, if not geographically significant, these may have been omitted.				

Table 10: Supplementary Advice for Qualifying Features: H8110. Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladan*); Acidic scree

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 current extent of the H8110 feature	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Spatial distribution of the feature within the site	Maintain or restore as appropriate the distribution and configuration of the H8110 feature, including where applicable its component vegetation types, across the site	<p>See notes for this attribute in table 1 above.</p> <p>The exact distribution of H8110 siliceous scree is currently unavailable due to the spare and scattered occurrence of this habitat, often found in fairly inaccessible areas. Further this habitat type is frequently found to cover small areas <4m².</p>	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the H8110 feature are referable to and characterised by the following National Vegetation Classification type:</p> <p>U21 <i>Cryptogramma crispa</i> - <i>Deschampsia flexuosa</i> community</p>	<p>See notes for this attribute in table 1 above.</p> <p>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).</p> <p>This feature consists of a pioneer vegetation of open, rocky ground, usually on steep slopes at moderate altitudes. The vegetation is normally sparse and fragmented, but may thicken up in places, and is dominated by ferns and mosses, with fine-leaved grasses moderately frequent. Scattered herbs, dwarf-shrubs and patches of lichens may also occur. Siliceous screes and boulder fields can occur over a wide range of altitudes.</p> <p>The characteristic parsley fern (<i>Cryptogramma crispa</i>) may become sparse or absent at high altitudes. A variety of other NVC communities</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			may occur in fragmentary form where the scree is more stable. There may be other community types present as part of this feature that are not currently described by the NVC.	
	Vegetation community transitions	Maintain the pattern of natural vegetation zonation/transitions	<p>Grass covered screes occur as sparse tufts within a matrix of <i>Festuca-Agrostis-Galium</i> grassland U4. <i>Cryptogramma-Deschampsia</i> vegetation may eventually be replaced by grassland as screes become more stable and soil accumulates.</p> <p>However, in many places, the community appears to be held as an arrested succession by sheep grazing. Siliceous scree of the montane to snow levels can occur in close association with Annex I type 8220 Siliceous rocky slopes with chasmophytic vegetation, while stabilised block screes may support a range of vegetation types including other Annex I types.</p>	
	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 H8110 feature	<p>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).</p> <p>Data on invasive species is unavailable due to the sparse and scattered occurrence of this habitat, often found in fairly inaccessible areas.</p>	
	Cover of trees and scrub	Maintain scrub and tree cover at less than 25% of ground cover	<p>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 grassland vegetation. Usually active management of bracken and scrub is required to reduce or contain its cover. Although bracken and scattered native trees and scrub can naturally occur as part of this community, if they become dominant they can compromise the interest of this feature and key species will disappear.</p> <p>Data on scrub and tree species is unavailable due to the sparse and scattered occurrence of this habitat, often found in fairly inaccessible areas.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	Undesirable species	Maintain the frequency/cover of undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread	<p>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.</p> <p>Data on undesirable species is unavailable due to the sparse and scattered occurrence of this habitat, often found in fairly inaccessible areas.</p>	
	Grazing	Maintain grazing pressure affecting the H8110 feature at very low levels	<p>This interest feature can sustain low levels of grazing which can assist in keeping habitat in an open condition and preventing a build-up of more stable vegetation communities. However, too high levels can damage the feature.</p> <p>Within the North Pennine Moors this habitat occurs mostly at higher altitudes around cliff faces, rock ledges, gorges and boulder fields. These are more inaccessible to grazing animals and are largely unmanaged. Therefore grazing pressures on this habitat within this SAC are not thought to be a concern.</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England
	Physical structure: ground disturbance	Ensure significant areas of disturbed scree are not present. Where present, the affected areas should not exceed 1% of the total feature, and be considered a temporary stage.	<p>Whilst this is a habitat where vegetation cover can be sparse, significant disturbance of the scree by herbivores or humans can cause damage.</p> <p>Natural erosion such as rock-fall and landslips can eliminate populations of cliff plants in a single incident, though there is nothing that can be done to prevent this.</p> <p>Data on build-up of scree is unavailable due to the sparse and scattered occurrence of this habitat, often found in fairly inaccessible areas.</p>	
	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	Siliceous screes are made up of siliceous rocks such as quartzite, granite and sandstone. 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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		H8110 habitat.	<p>recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.</p> <p>Data on soil type is currently unavailable due to the sparse and scattered occurrence of this habitat, often found in fairly inaccessible areas.</p>	
	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	<p>Siliceous scree normally occurs as a distinct and important part of part of the wider uplands landscape alongside woodlands, a variety of acid grasslands and heath communities.</p> <p>Areas of scree are fairly extensive, with diverse plant communities within the higher altitudes of the North Pennines. Cross Fell in Moorhouse - Upper Teesdale is a southern outlier of high-altitude gritstone scree, with a flora including rare lichens and some widespread montane vascular plants. This area supports the closest area of H8110 to this SAC.</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England
	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	<p>See notes for this attribute in table 1 above.</p> <p>Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	
	Key structural, influential and distinctive species	<p>Maintain the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat:</p> <p>Parsley fern <i>Cryptogramma crispa</i>, Wavy-hair grass <i>Deschampsia flexuosa</i>, Sheep's / red fescue <i>Festuca ovina / rubra</i>, Heath bedstraw <i>Galium saxatile</i>, Rusty swan-neck moss <i>Campylopus flexuosus</i>,</p>	See notes for this attribute in table 1 above.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Bank haircap moss <i>Polytrichum formosum</i>		
Supporting processes (on which the feature relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (APIS).	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	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 (APIS).
	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the H8110 feature	See notes for this attribute in table 1 above. Although rock-based, this is a fragile habitat and susceptible to human activity and land management change. Low levels of grazing help to maintain the interest of this feature which would otherwise be lost through increase in grass species and woodland colonisation. Threats to the habitats include removal of grazing, heavy trampling, nitrogen deposition, recreation (scree-running), and vehicle use.	ENGLISH NATURE, 2005. Views about the management of SSSIs . NATURAL ENGLAND, 2014. Site Improvement Plan: North Pennines Group (SIP154). Available at http://publications.naturalengland.org.uk/publication/6534899699810304
Version Control n/a				
Variations from national feature-framework of integrity-guidance: This habitat contains localised populations, often scattered over large expanses and often in fairly inaccessible locations. Therefore, the exact locations and condition of this habitat within this SAC is often unavailable. Future surveying work is required to gain a more comprehensive understanding of its distribution and condition.				

Table 11: Supplementary Advice for Qualifying Features: H8210. Calcareous rocky slopes with chasmophytic vegetation; ‘Plants in crevices in base-rich rocks’

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 current extent of the H8210 feature.	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature.</p>	This attribute will be periodically monitored as part of Natural England’s site condition assessments
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H8210 feature, including where applicable its component vegetation types, across the site	<p>See notes for this attribute in table 1 above.</p> <p>The exact distribution of H8210 Calcareous rocky slopes with chasmophytic vegetation is currently unavailable due to the spare and scattered occurrence of this habitat, often found in small areas or within mosaics of limestone grassland.</p> <p>Some calcareous cliffs are recent in origin as a result of quarrying and thus have a poorly-developed character; also rocks and screes may often only be partially exposed in the drift and peat covered North Pennines making this feature challenging to identify fully.</p>	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the H8210 feature are broadly referable to and characterised by the following National Vegetation Classification type:</p> <p>OV40 <i>Asplenium viride-Cystopteris fragilis</i></p>	<p>The type of plant community that develops is largely determined by the base-status of the rock face, such as limestone and calcareous schists. Ferns and mosses are the most prominent plant constituents. Depending on the situation, the vegetation may range from being quite sparse to quite dense, but it is usually fragmented and limited in extent. It can occur over a wide range of altitudes.</p> <p>Both forms of chasmophytic vegetation in the UK correspond to the rock fissure communities described from continental Europe (<i>Asplenieta trichomanis</i>).</p>	
	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	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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		H8210 feature	<p>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).</p> <p>There is currently no available data on whether there are any specific invasive species encroaching into this habitat type. However, the SSSI units that this feature occurs have no records of any invasive species.</p>	England's site condition assessments
	Cover of trees and scrub	Maintain scrub and tree cover to less than 25% of the ground cover	<p>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 grassland vegetation. Usually active management of bracken and scrub is required to reduce or contain its cover. Although bracken and scattered native trees and scrub can naturally occur as part of this community, if they become dominant they can compromise the interest of this feature and key species will disappear.</p> <p>There is currently no available data on whether there are any concerns from scrub or tree species encroaching into this habitat type. However, the areas where this feature has been recorded have no records of any concerns with scrub or tree species. Further, due to the locations where this habitat feature is most commonly found within drift or limestone grassland, scrub and tree species are likely to be sparse.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Physical structure: ground disturbance	Ensure there are no significant areas of disturbed rocky slope. Where present, the affected areas should not exceed 1% of the total feature, and should be considered as a temporary stage.	Whilst this is a habitat where vegetation cover can be sparse, significant disturbance of the rocky slopes by herbivores or humans can cause damage.	
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil or substrate types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, within typical values for the H8210 habitat.	<p>Chasmophytic vegetation consists of plant communities that colonise the cracks and fissures of rock faces. The type of plant community that develops is largely determined by the base-status of the rock face. Calcareous sub-types develop on lime-rich rocks such as limestone and calcareous schists.</p> <p>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</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>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.</p> <p>There is currently no available data on soil quality for this SAC.</p>	
	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 notes for this attribute in table 1 above.	
	Key structural, influential and distinctive species: flora and fauna	<p>Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat;</p> <p>Green spleenwort <i>Asplenium viride</i> Maidenhair spleenwort <i>Asplenium trichomanes</i> Wall-rue fern <i>Asplenium rotundifolium</i> Harts tongue fern <i>Phyllitis scolopendrium</i> Sheep's fescue <i>Festuca ovina</i> Comb-moss <i>Ctenidium molluscum</i>, Rock pocket-moss <i>Fissidens cristatus</i> Frizzled crisp-moss <i>Tortella tortuosa</i></p>	See notes for this attribute in table 1 above.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level	<p>See notes for this attribute in table 1 above.</p> <p>The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).</p>	More information about site-relevant Critical Loads and Levels

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		values given for this feature of the site on the Air Pollution Information System (APIS).		for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (APIS).
	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	<p>See notes for this attribute in table 1 above.</p> <p>Calcareous rocky slopes normally occur as a distinct and important part of part of the wider uplands landscape alongside calcareous scree, woodlands, and variety of grassland communities. This mosaic can be very important and the rocky slopes can act as refugia for those plants that require increased humidity and shade, and those that are intolerant of heavy grazing pressure.</p> <p>Moor House Upper Teesdale has the closest vegetation type to this feature. There are three sites representing Calcareous rocky slopes with chasmophytic vegetation in the north of England. Crevice communities occur on extensive limestone scars, especially along the Pennine escarpment and around the summits of hills. Cliff crevice vegetation occurs extensively and to an altitude of 760m.</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England
	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	Although rock based this fragile habitat and susceptible to human activity. Threats to the habitats include heavy grazing and trampling, nitrogen deposition, recreation (rock climbing). Rock ledges can act as important refugia for many plants that are intolerant to heavy grazing. Fencing and/or stock management to lower grazing levels may allow these plants to expand their distribution on the site.	<p>ENGLISH NATURE, 2005. Views about the management of SSSIs.</p> <p>NATURAL ENGLAND, 2014. Site Improvement Plan: North Pennines Group (SIP154). Available at http://publications.naturalengland.org.uk/publication/65348996998103</p>

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			04
Version Control: n/a			
<p>Variations from national feature-framework of integrity-guidance: The H8210 habitat is highly localised in occurrence within the North Pennine Moors and found in small scattered areas, often within mosaics of other habitat, principally on areas of drift or within limestone grassland and frequently in fairly inaccessible locations. This habitat needs further surveying to quantify extent and condition.</p>			

Table 12: Supplementary Advice for Qualifying Features: H8220. Siliceous rocky slopes with chasmophytic vegetation; Plants in crevices on acid rocks

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	<p>Maintain the current extent of the H8220 feature</p> <p>The extent of this feature is currently unquantified due to the small scattered nature of the species contained within his feature.</p>	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.</p> <p>See notes for this attribute in table 1 above.</p> <p>This habitat feature is fairly rare throughout the site, only occurring in a select number of localised areas.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Spatial distribution of the feature within the site	<p>Maintain the distribution and configuration of the H8220 feature, including where applicable its component vegetation types, across the site</p>	<p>See notes for this attribute in table 1 above.</p> <p>There is currently no available data on the exact spatial distribution of this feature as it is found covering small areas, often scattered across the site or contained within mosaics of other habitats such as acid grassland or on exposed, base-poor rock and screes at relatively low to moderate altitudes.</p>	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the H8220 feature are broadly referable to and characterised by the following National Vegetation Classification type(s):</p> <p>U18 <i>Cryptogramma crispa</i> – <i>Athyrium distentifolium</i> snow-bed community (rare on high altitude)</p> <p>U21 <i>Cryptogramma crispa</i> - <i>Deschampsia flexuosa</i> (dominant)</p>	<p>See notes for this attribute in table 1 above.</p> <p>Siliceous rock crevice vegetation is poorly covered by the NVC, although some forms can be referred to U21 <i>Cryptogramma crispa</i> – <i>Deschampsia flexuosa</i> community, which can occur on scree or boulders. This is pioneer vegetation of open, rock ground, usually on steep slopes which comprises mixtures of bryophytes, such as <i>Amphidium mougeotii</i> and <i>Racomitrium spp.</i>, and vascular plants, such as wavy hair-grass <i>Deschampsia flexuosa</i> and fir clubmoss <i>Huperzia</i>.</p> <p>Until such time as better information is available on community types, vegetation composition and indicator species, the attributes and targets are of necessity brief and aim to ensure that the habitat remains open and is impacted relatively lightly by human activities.</p>	<p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p>
	Vegetation community	<p>Maintain restore the pattern of natural vegetation</p>	<p>The presence of calcareous bands within otherwise mainly siliceous rocks often brings the two types together on the same rock outcrop. As a result,</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	transitions	zonations/transitions	<p>Calcareous rocky slopes with chasmophytic vegetation (Annex I type 8210) may occur in close association with Siliceous rocky slopes with chasmophytic vegetation, and some sites are listed for both types.</p> <p>This SAC contains both habitat features H8210 Calcareous rocky slopes with chasmophytic vegetation and H8220 Siliceous rocky slopes with chasmophytic vegetation.</p>	
	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 H8220 feature	<p>See notes for this attribute in table 5 above.</p> <p>There is currently no available data on whether any specific invasive species are encroaching into this habitat type. However, the SSSI units that this feature occurs have no records of any invasive species.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Cover of trees and scrub	Maintain scrub and tree cover to less than 25% of the ground cover	<p>The unpalatable nature and density of scrub and bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic grassland vegetation. Usually active management of bracken and scrub is required to reduce or contain its cover. Although bracken and scattered native trees and scrub can naturally occur as part of this community, if they become dominant they can compromise the interest of this feature and key species will disappear.</p> <p>There is currently no available data on whether any specific scrub or tree species are encroaching into this habitat type. However, the SSSI units that this feature occurs have no records of any invasive species.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Physical structure: ground disturbance	Ensure there are no significant areas of disturbed slope. Where present, the affected areas should not exceed 1% of the total H8220 feature, and be considered a temporary stage.	<p>Whilst this is a habitat where vegetation cover can be sparse, significant disturbance by herbivores or humans (rock climbing) can cause damage.</p> <p>There is currently no available data as to whether there is any disturbance of bare ground.</p>	
	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	<p>See notes for this attribute in table 1 above.</p> <p>For this feature the soil is rarely more than discontinuous raw humus derived from the decaying fern (<i>Cryptogramma crispera</i>) fronds. <i>Cryptogramma crispera</i> seems unable to colonise very fine or loose scree, but can be very common on more stable slopes. This habitat is especially</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		H8220 habitat.	associated with hard volcanic rocks. It also occurs on sedimentary rocks in the North Pennines and the Cheviot Hills. There is currently no available data specifically on soil quality for this SAC	
	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 notes for this attribute in table 1 above.	
	Key structural, influential or distinctive species: flora and fauna	Maintain the abundance of the species listed below to enable each of them to be a viable component of the H8220 habitat; Black rock-moss <i>Andreaea rupestris</i> Paradox campylopus moss <i>Campylopus paradoxus</i> Stiff sedge <i>Carex bigelowii</i> Parsley fern <i>Crytogramma crispa</i> Wavy hair grass <i>Deschampsia flexuosa</i> Sheep's fescue <i>Festuca ovina</i> Health bedstraw <i>Galium saxatile</i> Fir clubmoss <i>Huperzia selago</i> Bank haircap moss <i>Polytrichum formosum</i> Green Mountain Fringe-moss <i>Racomitrium fasciculare</i> Woolly Fringe-moss <i>Racomitrium languginosum</i>	See notes for this attribute in table 1 above.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for the H8220 feature of the site on the Air	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Pollution Information System (APIS).		the Air Pollution Information System (APIS).
	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	<p>See notes for this attribute in table 1 above.</p> <p>Siliceous rocky slopes normally occur as a distinct and important part of part of the wider uplands landscape alongside siliceous scree, woodlands, and variety of grassland communities. This mosaic can be very important and the rocky slopes can act as refugia for those plants that require increased humidity and shade, and those that are intolerant of heavy grazing pressure.</p> <p>Acidic rock outcrops and scree are well-scattered across the North Pennine Moors and support vegetation typical of Siliceous rocky slopes with chasmophytic vegetation. Moorhouse Upper Teesdale has the closest example of other areas of Siliceous rocky slopes (H820).</p>	<p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>
	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the H8220 feature	<p>See notes for this attribute in table 1 above.</p> <p>Although rock based this is a fragile habitat and susceptible to human activity. Threats to the habitats include heavy grazing and trampling and nitrogen deposition.</p>	<p>ENGLISH NATURE, 2005. Views about the management of SSSIs.</p> <p>NATURAL ENGLAND, 2014. Site Improvement Plan: North Pennines Group (SIP154). Available at http://publications.naturalengland.org.uk/publication/6534899699810304</p>
Version Control				
n/a				
Variations from national feature-framework of integrity-guidance:				
The H8220 habitat is highly localised in occurrence within the North Pennine Moors and found in small scattered areas, often within mosaics of other habitat and in fairly				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
inaccessible areas. This habitat needs further surveying to quantify extent and condition.			

Table 13: Supplementary Advice for Qualifying Features: H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; ‘Western acidic oak woodland’

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 H91A0 feature at approximately 450 hectares.	<p>See notes for this attribute in table 1 above.</p> <p>This woodland type is found in patches within other woodland stands so this estimated figure may be over or under estimated.</p> <p>This woodland habitat is found to be sparsely distributed within the North Pennines SAC, mostly located on the steep sides of narrow ravines or ‘gills’. Relatively few woodland areas remain, and although most SSSIs have some parcels of woodland remaining they are all small and fragmented in nature. Geltsdale and Glendue Fells SSSI has an outstanding area of relict wood-pasture, as well as the largest area of newly-planted native woodland. However, the SAC woodland habitat type for this area is ‘old oak woodland with <i>Blechnum</i> and <i>Ilex</i>’, which is characteristic of steep rocky hillsides and an important habitat for oceanic bryophytes and lichens. This woodland type is more restricted still within a broader woodland classification.</p> <p>Given the very high biodiversity associated with this habitat type, and its spatially poor representation in the North Pennines, expansion of this habitat along with a more natural woodland edge is a key restoration target.</p>	<p>Area data obtained from the 10 SSSIs where this feature is present.</p> <p>Habitat information for component SSSIs within Northumberland and Durham:</p> <p>NATURAL ENGLAND. 2002. N2K NVC Survey. Unpublished data. (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in Cumbria:</p> <p>NATURAL ENGLAND. 1999. 1999 NVC Survey of Appleby Fells. Unpublished data. (Available from Natural England on request.)</p> <p>O'REILLY, J. 2011. Geltsdale Farm and RSPB NVC data. Unpublished data.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				<p>(Available from Natural England on request).</p> <p>RSPB. 1999. Upland Vegetation Condition Assessment, Unpublished data, (Available from Natural England on request.)</p> <p>RSPB. 1995. NVC Survey. Unpublished data, (Available from Natural England on request.)</p> <p>Habitat information for component SSSIs in North Yorkshire:</p> <p>NATURAL ENGLAND. 2004. North Pennines Survey. Unpublished data. (Available from Natural England on request.)</p> <p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				Available from Natural England
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H91A0 feature, including where applicable its component vegetation types, across the site	See notes for this attribute in table 1 above. The largest stands of H91A0. Old sessile oak woods are found in Lovely Seat - Stainton Moor and East Nidderdale Moors with small areas of planting occurring on all underpinning SSSIs.	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 H91A0 feature are referable to and characterised by the following National Vegetation Classification type: <i>W17 Quercus petraea – Betula pubescens – Dicranum majus</i> woodland	See notes for this attribute in table 1 above.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Canopy cover	Maintain an appropriate tree canopy cover across the H91A0 feature, which will typically be between 40-90% of the site	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 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.	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)
			<p>The majority of oak stands on this SAC are found interspersed within other woods of beech, birch and rowan with an extensive canopy cover. However, in areas of single stand oak the lack of regeneration has resulted in a few sparse mature trees with limited overall canopy extent.</p>	
	Open space	Maintain areas of permanent/temporary open space within the H91A0 woodland feature, typically to cover approximately 10% of area	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.</p> <p>Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.</p> <p>Overgrazing, resulting in the low natural regeneration of trees and shrubs, has been the greatest concern 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, often along gills, 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.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the H91A0 feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	<p>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.</p> <p>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.</p>	
	Decaying wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, (typically between 30 - 50 m ³ per	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.	This attribute will be periodically monitored as part of Natural England's

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		hectare of standing or fallen timber or 3-5 fallen trees >30cm per hectare, and >10 standing dead trees per hectare)	<p>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.</p> <p>East and West Nidderdale and Geltsdale for example support a high proportion of dead wood.</p>	site condition assessments
	Tree age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	<p>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.</p> <p>Lack of age structure was a concern throughout the SAC with very few sapling and seedlings present. Changes in grazing pressure such as fencing off areas of woodland to encourage natural regeneration and replanting accessible areas should be encouraged where appropriate.</p> <p>Further, replacing sheep with cattle have been trialled to prevent excessive grazing of tree seedlings and to open up scrub or overgrown areas to tree seedling growth. Roe deer browsing is also an issue affecting recruitment of new trees.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Shrub layer	Maintain an understorey of 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 reflects what is 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.	
	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	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)
			the integrity of the site (pollution/ nutrient enrichment etc.).	
	Adaptation and resilience	Maintain the resilience of the H91A0 feature by ensuring a diversity (at least 2 species) of site-native trees (e.g. sessile oak, birch, holly) across the site.	See notes for this attribute in table 1 above. 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.	
	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, bark stripping and a heavily grazed sward. All 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 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 cattle has been trialled to prevent excessive grazing of tree seedlings and to open up niches for seed establishment	
	Regeneration potential	Maintain or restore as appropriate the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by	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	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)
		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	<p>every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.</p> <p>Through fencing off areas from stock, appropriate deer management and some replanting, the regeneration potential of tree species and desired understory herbs is increasing. Thus, for example some planting 15 years ago has been reasonably successful, however, levels of natural regeneration remain very low with active management still required for fence repairs and bracken control.</p>	
	Tree and shrub species composition	<p>Maintain a canopy and understorey of which 95% is composed of site native trees and shrubs.</p> <p>Common alder <i>Alnus glutinosa</i> <i>Betula spp.</i> Common hazel <i>Corylus avellana</i> Common Ash <i>Fraxinus excelsior</i> Common elder <i>Sambucus nigra</i> Rowan <i>Sorbus aucuparia</i></p>	<p>Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).</p> <p>Overall, most areas of woodland support high levels of native tree and shrub species with bracken encroachment one of the major concerns.</p>	
	Key structural, influential and distinctive species: flora and fauna	<p>Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat;</p> <p>Common bent <i>Agrostis capillaris</i> Sweet vernal grass <i>Anthoxanthum odoratum</i> Hard-fern <i>Blechnum spicant</i> Wavy hair-grass <i>Deschampsia flexuosa</i> Greater folk-moss <i>Dicranum majus</i> Sheep's fescue <i>Festuca ovina</i> Health bedstraw <i>Galium saxatile</i></p>	<p>See notes for this attribute in table 1 above.</p> <p>Other species include bluebell, <i>Hyacinthoides non-scripta</i> which are found frequently within some of the woodlands within the SAC.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Creeping soft-grass <i>Holcus mollis</i> Glittering wood-moss <i>Hylocomium splendens</i> Heath Plait-moss <i>Hypnum jutlandicum</i> Common holly <i>Ilex aquilinum</i> Woodrush <i>Luzula spp.</i>, Wood sorrel <i>Oxalis acetosella</i> Tormentil <i>Potentilla erecta</i> Waved Silk-moss <i>Plagiothecium undulatum</i> Red-stemmed Feather-moss <i>Pleurozium scheberi</i> Bilberry <i>Vaccinium myrtillus</i></p>		
	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 H91A0 feature	<p>See notes for this attribute in table 5 above.</p> <p>There have been some concerns over nearby conifer plantations self-seedling into this H91A0. There have been no other concerns over invasive species encroaching this habitat type.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
	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 H91A0 habitat.	<p>See notes for this attribute in table 1 above.</p> <p>There is currently no specific data on soil condition of this feature within this SAC.</p>	
	Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort to an un-compacted condition	<p>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.</p> <p>Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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 (APIS).	See notes for this attribute in table 1 above. The critical load for nitrogen deposition is currently being exceeded for this feature (APIS accessed July 2018).	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 (APIS).
Version Control: n/a				
Variations from national feature-framework of integrity-guidance: n/a				

Table 14: Supplementary Advice for Qualifying Features: S1528. *Saxifraga hirculus*; Marsh saxifrage

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Maintenance of open sward	Maintain the vegetation containing Marsh Saxifrage in an open, sparsely-vegetated condition.	<p>A range of 'natural' and 'anthropogenic' factors may help in maintaining habitat patches at an early-successional stage. Many factors that may be advantageous 'in moderation' could be detrimental in larger doses, but determining 'safe' and 'unsafe' levels may be difficult and are probably site-specific (dependent on topography, exposure, substrate, etc.).</p> <p>Aim should be to maintain open vegetation, so any shift towards more closed/tall/rank communities should be avoided as far as possible.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Grazing pressure	Where vegetation is not kept open by other means (exposure, ground instability, storm events, etc.), maintain a grazing regime which is light and extensive in nature, with cattle the dominant grazing animal.	<p>Low levels of grazing likely to be acceptable, but this should not be viewed as a primary way of keeping habitat patches open - in any case, grazing not an option on many. Intensive grazing likely to be damaging.</p> <p>Heavy grazing can be tolerated for short periods but lack of flowering and physical damage to vegetation by livestock may lead to population and/or genetic attrition. Grazing pressure should be sufficiently light (or seasonally adjusted) to allow flower production and seed output. Grazing down to 5 cm will be tolerated by vegetative plants but loss of all flowers is likely. Swards above c. 25 cm may eventually result in population declines through competition.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments
Population (of the feature)	Population abundance	Maintain the current abundance of the Marsh Saxifrage population	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK.</p> <p>Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period. The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures stated are the best available.</p> <p><i>Saxifraga hirculus</i> undergo significant population fluctuations, and population size estimates may not be helpful in assessing condition. Unless there are fewer than 100 individuals (when an individual count is generally possible) on the site, counts of functional individuals should be made or assessed in the categories (101-300; 301-1000; 1001-3000; 3001-10 000; more than 10 000). Population extent is useful when it is difficult to define functional individuals. The full population extent on this SAC is yet to be determined.</p>	
	Meta-population size and structure	Maintain both the geographical extent/limits of each meta-population of Marsh Saxifrage and the number of colonies/sites contained within it.	<p>Each colony in relation to its nearest neighbours and other colonies will form groups or clusters which function as a larger meta-population. Some (usually outlying and very small) populations may 'come and go'. Natural losses are acceptable, but the aim should be to ensure that, over the medium to long term, local losses are more or less offset by re/colonisation at other sites.</p> <p>These populations exist on Bollihope Moor, Cotherstone Moor and Lune Forest in Lunedale, all in County Durham.</p>	
	Flowering/ fruiting	Maintain flowering and fruting performance of the Marsh	Even just one flowering/fruited plant will often be found to have 10-15 flowering stems producing potentially prodigious quantities of seed (5,000-	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	performance	<p>Saxifrage population, with at least some plants flowering/fruited each year.</p> <p>At each site the minimum requirement should be >20 flowering stems present at least once in each 5-year monitoring cycle.</p>	<p>20,000 seeds on a large multi-stemmed plant). Weather conditions (winter storms, cold spring or summer drought) can limit seed production in any one year, but poor fruiting in two or three in every five is unlikely to be a problem.</p> <p><i>Saxifraga hirculus</i> requires open, unshaded conditions.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	<p>Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with Marsh Saxifrage feature and/or its supporting habitats.</p>	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p>	<p>ENGLISH NATURE, 2005. Views about the management of SSSIs.</p> <p>NATURAL ENGLAND, 2014. Site Improvement Plan: North Pennines Group (SIP154). Available at http://publications.naturalengland.org.uk/publication/6534899699810304</p>
Supporting habitat: extent and distribution	Distribution of supporting habitat	<p>Maintain the distribution and continuity of the Marsh Saxifrage population and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site</p>	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.</p> <p>Moor House and Cross Fell, Appleby Fells and Upper Teesdale SSSIs also contain this species in more dense populations (over 270,000 plants and accounting for 90% of the UK population) than present on North Pennine Moors, reflecting the higher number of areas where the majority of base-rich flushes are present.</p>	<p>PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England</p> <p>JNCC. Species account for <i>S1528 Marsh saxifrage</i>. Available here</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Alkaline fens are the key habitat for the support of this species.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of supporting habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning.</p> <p>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.</p> <p>The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	
Supporting habitat: structure/function	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, within typical values for the supporting habitat	<p>See notes for this attribute in table 1 above.</p> <p>There is currently no available data on the soil conditions on site for this species.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support Marsh Saxifrage	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p>Some of the underpinning SSSI units with this feature have base-rich flushes or calcareous grassland but do not contain marsh saxifrage. This</p>	PENNY ANDERSON ASSOCIATES AND ENGLISH NATURE, 2005. North Pennines Conservation Objectives Strategy. Available from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>may reflect the preference of marsh saxifrage for shale-dominated spring lines that have specific hydro-chemical conditions, or perhaps a lack of comprehensive data on this species.</p> <p>Hydrological and chemical composition of the local environment appear critical and all modifications (e.g. drainage, nutrient input) should be avoided.</p>	
Version Control				
n/a				
Variations from national feature-framework of integrity-guidance:				
n/a				

