



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

**Ingleborough complex Special Area of Conservation (SAC)
Site Code: UK0012782**



Natural England 2014

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Ingleborough Complex SAC.

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

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	Ingleborough Complex Special Area of Conservation (SAC)
Location	North Yorkshire
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	5769.28 ha
Designation Changes	None
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)	Ingleborough SSSI Oxenber and Wharfe Woods SSSI Whernside SSSI
Relationship with other European or International Site designations	None

Site background and geography

Ingleborough is associated with various acidic and basic strata, together with drift and peat which obscure the rocks over large areas. This provides a wide range of vegetation types. Where limestone occurs at the surface, there is calcareous grassland dominated by blue-moor grass *Sesleria albicans*, while elsewhere blanket-bog is dominated by hare's-tail cottongrass *Eriophorum vaginatum*. Where flushing occurs the blanket-bog becomes floristically richer with sundew *Drosera rotundifolia*, cranberry *Vaccinium oxycoccos* and bog asphodel *Narthecium ossifragum*.

It has the most extensive series of limestone pavements in the UK, varying from moderate altitude to montane in character (300-640 m). The pavements range from those where grazing is completely excluded (Colt Park Wood), to some where grazing is restricted (pavements amidst cattle-grazed pastures) and others within common land intensively grazed by sheep. Characteristic species include, lily-of-the-valley *Convallaria majalis*, marsh hawk's-beard *Crepis paludosa*, wall lettuce *Mycelis muralis*, lesser meadow-rue *Thalictrum minus* and mountain melick *Melica nutans*. Among the ferns, green spleenwort *Asplenium viride*, brittle bladder-fern *Cystopteris fragilis* and hard shield-fern *Polystichum aculeatum* occur on most pavements. Rigid buckler-fern *Dryopteris submontana* and limestone fern *Gymnocarpium robertianum* are widespread. Dog's mercury *Mercurialis perennis* and wood sorrel *Oxalis acetosella* occur on most pavements. Amid stands of calcareous grassland it has the only large stands of juniper on limestone pavements at high altitude in the UK. The scrub is of the relatively species-poor type typical of these situations.

Spring-fed flush fens are extensive across Ingleborough, commonly associated with calcareous grassland types, but also found amidst acid grasslands and heathland communities. They are often

species-rich communities, in which rare or locally distributed species such as bird's-eye primrose *Primula farinosa*, black bog-rush *Schoenus nigricans* and few-flowered spike-rush *Eleocharis quinqueflora*. Crevice communities occur on extensive limestone scars and are characteristic of the area. The flora has a mix of northern and southern species, including purple saxifrage *Saxifraga oppositifolia*, yellow saxifrage *S. aizoides*, alpine meadow-grass *Poa alpina*, hoary whitlowgrass *Draba incana*, lesser meadow-rue *Thalictrum minus* and wall lettuce *Mycelis muralis*. The flora has a mix of northern and southern species, reflecting the range of altitudes and aspects over which the habitat occurs.

Physical Characteristics

Ingleborough is Britain's finest karst area, the characteristic limestone landforms having been produced largely under glacial conditions. It is particularly noted for extensive dry stone pavements, dry valleys and gorges, shakeholes and sinkholes.

The Ingleborough drainage is radial, with surface streams on the summit massif feeding a ring of sinks at the limestone margins. These drain underground via a number of cave systems to an outer ring of risings which are at or close to the base of the limestone. Soils occurring on the limestone scarps and pavements are generally shallow, free draining humic rendzinas. These soils are well leached and acidic. Where depth down to the limestone rock is greater (up to 30cm) mesotrophic brown earths with moderate crumb structure are present.

Cultural Landscape

There are many features of archaeological interest on Ingleborough, primarily as very low impact land management over many centuries has provided an excellent environment for the preservation of historic remains. The earliest evidence on humans in the area comes from bones with cut-marks found at Victoria Cave elsewhere in Upper Ribblesdale dated to approx. 12,300 BC. Subsequently in the Neolithic there is pollen evidence that human activity brought woodland expansion in check as areas were cleared to favour grazing where animals were easier to hunt. Ingleborough's landscape has a range of field patterns characterised by drystone walls. Within the area there is evidence for a number of settlements in the Iron Age and Romano-British Period. One of the greatest influences on the pre-modern landscape was in the Medieval and particular the great monastic grange farms and even by modern farming standards intense periods of transhumance grazing. Wharfedale and Ingleborough were mainly in the domain of Furness Abbey with Fountains and the smaller Sawley Abbey having some lands on the Ribblesdale flanks. Human activities over the last 50 years have revolved around farming and more recently the use of the land for tourism-based activities.

Ingleborough National Nature Reserve

Ingleborough National Nature Reserve (NNR) covers an impressive 1,012 hectares on some of the northern, north-eastern and eastern slopes surrounding Ingleborough. The NNR supports over 40 National Vegetation Classification (NVC) plant communities. These include four calcareous grassland types, six neutral grassland types, eight upland types, nineteen mire communities, one heathland community and two woodland communities. Four Red Data Book (nationally rare) plants occur on the NNR; Lady's mantle *Alchemilla glaucescens*, English sandwort *Arenaria norvegica* ssp. *anglica*, prickly sedge *Carex muricata* ssp. *muricata* and Teesdale violet *Viola rupestris*. In addition to all of the plant life there is a host of animal species that includes good populations of the northern brown argus butterfly *Aricia artaxerxes*, plus many UK BAP, Red Data and Nationally Notable/Scarce moth, beetle, spider and fly species. Recent surveys have confirmed that the NNR is of international importance for its grassland fungi assemblage and one of the top five sites in England for this feature. Ingleborough NNR has also been an important site in the very successful Limestone Country Project. The benefits of grazing the limestone country habitats with traditional cattle breeds that were highlighted by this project can be seen in practice on the reserve. Ingleborough NNR continues to be an important study site for universities and environmental research organisations and is part of Natural England's [Long Term Monitoring Network](#). The NNR is 96% Open Access land with a network of well-used public rights of way including the Pennine Bridleway and Three Peaks footpath.

Ingleborough Complex SAC is part of the National Character Area Profile: 21. Yorkshire Dales ([NE399](#)).

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.

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

The relationship between juniper *Juniperus communis* stands and other types of vegetation is complex. In some cases the stands have no characteristics to separate them from typical examples of heath or calcareous grassland vegetation, except for the abundance of juniper. These are often relatively recent stands. However, at some sites, particularly where the juniper has been present for a longer period, a more distinctive assemblage of species occurs. Here the juniper is associated with other shrubs, shade-tolerant herbs, grazing-sensitive tall herbs, bryophytes and ferns.

The main ecological variation occurs between stands on calcareous substrates (principally chalk and limestone but sometimes calcareous drift) and those found on acid substrates. Calcareous types are mainly found in the southern part of the UK, while acid types are mainly found in northern areas.

In northern England 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. However, at sites where the juniper has been established for longer, the community corresponds to NVC 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*.

In the north, 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.

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

Festuco-Brometalia grasslands are found on thin, well-drained, lime-rich soils associated with chalk and limestone. They occur predominantly at low to moderate altitudes in England and Wales, extending locally into upland areas in northern England, Scotland and Northern Ireland. Most of these calcareous grasslands are maintained by grazing. A large number of rare plants are associated with this habitat. The invertebrate fauna is also noteworthy, and includes many rarities.

This Annex I category includes various forms of calcareous grassland referable in European terms to the *Mesobromion* and *Xerobromion* alliances. All forms of *Festuco-Brometalia* grassland comprise mixtures of grasses and herbs, in which there is at least a moderate representation of calcicolous species. The structural and floristic characteristics of the habitat are strongly influenced by climatic factors and management practices, in particular the intensity of grazing. The main sub-types of these grasslands in the UK correspond to the following NVC types:

CG2 *Festuca ovina* – *Avenula pratensis* grassland

CG9 *Sesleria albicans* – *Galium sternerii* grassland

On the limestones of northern England, grasslands dominated by *Sesleria albicans* are locally abundant. CG9 *Sesleria* – *Galium* grassland is more widespread, and occurs at moderate-high altitudes on Carboniferous Limestone in the Pennines and Lake District. The sub-montane character of the vegetation is shown by the reduced frequency of *Mesobromion* species, and the presence of limestone bedstraw *Galium sternerii* and other northern/upland species; some stands are enriched with arctic-alpine rarities. Similar *Sesleria*-dominated grasslands are also found in Northern Ireland.

Where grazing levels are reduced, *Festuco-Brometalia* swards typically become dominated by coarse grasses and plants of smaller stature become correspondingly scarcer.

- **H6410. *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); Purple moor-grass meadows**

Molinia meadows are found mainly on moist, moderately base-rich, peats and peaty gley soils, often with fluctuating water tables. They usually occur as components of wet pastures or fens, and often form mosaics with dry grassland, heath, mire and scrub communities. This habitat type includes the most species-rich *Molinia* grasslands in the UK, in which purple moor-grass *Molinia caerulea* is accompanied by a wide range of associated species, including rushes, sedges and tall-growing herbs. The more impoverished forms of *Molinia* pasture on acidic substrates are excluded from the Annex I definition.

On this site, *Molinia* is represented in two NVC types:

M25 *Molinia caerulea*-*Potentilla erecta* mire

M26 *Molinia caerulea* – *Crepis paludosa* mire

- **H7130. Blanket bogs**

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 over large expanses of undulating ground.

The blanketing of the ground with a variable depth of peat gives the habitat type its name and results in the various morphological types according to their topographical position. 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.

An important element in defining variation is the relative proportion of pools on the bog surface. In general, the proportion of surface patterning occupied by permanent pools increases to the north and west, although the precise shape and pattern of pools appears to depend on local topography as well as geographical location. Variety within the bog vegetation mirrors this pattern and is also affected by altitude. Similarly, the number of associated habitats and communities, such as springs, flushes, fens and heath, is greater in the milder, wetter and geologically and topographically more complex north and west.

Species commonly found on blanket bog are Heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, cottongrasses *Eriophorum* spp., deergrass *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.

‘Active’ is defined as supporting 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 cottongrasses *Eriophorum* spp., or purple moor-grass *Molinia caerulea* in certain circumstances,

together with heather *Calluna vulgaris* and other ericaceous species. Thus sites, particularly those at higher altitude, characterised by extensive erosion features, may still be classed as 'active' if they otherwise support extensive areas of typical bog vegetation, and especially if the erosion gullies show signs of recolonisation.

The most abundant NVC **blanket bog** types on the site are:

- M17 *Scirpus cespitosus* – *Eriophorum vaginatum* blanket mire
- M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire
- M20 *Eriophorum vaginatum* blanket and raised mire

The following NVC type also exists within this site covering a small extent:

- M21 *Narthecium ossifragum*-*Sphagnum papillosum* valley mire

In addition small pockets of blanket bog exist interspersed with the following NVC types:

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

However, please note M15 wet heath may also occur on blanket peat, but stands of *Scirpus* – *Erica* wet heath on shallower peats (<0.5 m depth) are generally referable to Annex I type **H4010 Northern Atlantic wet heaths with *Erica tetralix***.

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

Tufa formation is associated with hard-water springs, where groundwater rich in calcium bicarbonate comes to 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 and the Scottish Highlands.

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.

There are two main NVC types associated with tufa formation found on site:

- M37 *Cratoneuron commutatum* – *Festuca rubra* spring
- M38 *Cratoneuron commutatum* – *Carex nigra* spring

The former community is widely distributed, while the latter is found only at moderate to high altitudes and has a flora especially rich in rare arctic-alpine species.

- **H7230. Alkaline fens; Calcium-rich springwater-fed fens**

Alkaline fens consist of a complex assemblage of vegetation types which are 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 type on site:

- M10 *Carex dioica* – *Pinguicula vulgaris* mire

Spring-fed flush fens of NVC type M10 *Carex dioica* – *Pinguicula vulgaris* mire are extensive across Ingleborough, commonly associated with calcareous grassland types, but also found amidst acid grasslands and heathland communities. They are often species-rich communities, in which rare or locally distributed species such as bird's-eye primrose *Primula farinosa*, black bog-rush *Schoenus nigricans* and few-flowered spike-rush *Eleocharis quinqueflora*.

At most sites there are well-marked transitions to a range of other fen vegetation, predominantly, but not exclusively, to M14 *Schoenus nigricans* – *Narthecium ossifragum* mire. Alkaline fens may also occur with various types of wet grasslands (particularly various types of purple moor-grass *Molinia caerulea* grassland) and areas rich in rush *Juncus* species, as well as fen carr and, especially in the uplands, wet heath and acid bogs.

There is considerable variation between sites in the associated communities and the transitions that may occur. Such variation can be broadly classified by the geomorphological situation in which the fen occurs, namely: flood plain mire, valley mire, basin mire, hydrosere fen (i.e. as zones around open waterbodies) and spring fen. Another important source of ecological variation is altitude, with significant differences between lowland fens, which are rich in southern and continental species, and upland fens, which are rich in northern species.

- **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 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.

These rock fissure communities described from continental Europe (*Asplenieta trichomanis*). Some forms of the calcareous type, which are both found on site 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*, and green spleenwort *Asplenium viride*.

Ingleborough is one of three sites representing the Calcareous rocky slopes with chasmophytic vegetation found in northern England. Crevice communities occur on extensive limestone scars and are characteristic of the area. The flora has a mix of northern and southern species, including purple saxifrage *Saxifraga oppositifolia*, yellow saxifrage *S. aizoides*, alpine meadow-grass *Poa alpina*, hoary whitlowgrass *Draba incana*, lesser meadow-rue *Thalictrum minus*, hawkweeds, *Hieracium* spp. and small rock ferns of Genus *Asplenium*

- **H8240. Limestone pavements**

Limestone pavements are outcrops of rock, typically horizontal or gently inclined, although a few are steeply inclined. The surface has been dissolved by water over millions of years into 'paving blocks', known as clints, with a complex reticulate pattern of crevices, known as grikes, between them. A range of calcareous rock, heath, grassland, scrub and woodland NVC types can occur on limestone pavement. The vegetation of limestone pavements is unusual because of the combinations of floristic elements, including woodland and woodland edge species, such as hart's-tongue *Phyllitis scolopendrium* and dog's mercury *Mercurialis perennis*. On the clint surfaces or the upper walls of the grikes there are plants of rocky habitats, such as wall-rue *Asplenium ruta-muraria* and maidenhair spleenwort *Asplenium trichomanes*. The grikes provide a shady, humid environment favouring woodland plants.

Grazing pressure is a key factor in determining ecological variation in limestone pavements. Where grazing pressure is low, woodland may cover the pavement and woodland vegetation may mask the limestone surface. Here only the massive areas of pavement may be exposed as clearings. Where there is heavy grazing pressure, vegetation may be found only in the grikes, but, where grazing is lighter, dwarf trees, herbs and ferns may protrude from the grikes. Grikes that are about 60 cm deep provide shelter without unduly limiting light and are usually the best floristically.

Ingleborough is one of four sites in northern England representing Limestone pavements on Carboniferous limestone. It has the most extensive series of Limestone pavements in the UK, varying from moderate altitude to montane in character (300-640 m). The pavements range from those where grazing is completely excluded to some area where grazing is restricted (pavements amidst cattle-

grazed pastures) and others within common land intensively grazed by sheep. Characteristic species include baneberry *Actaea spicata* (more abundant here than elsewhere), found only here as a limestone pavement species, lily-of-the-valley *Convallaria majalis*, marsh hawk's-beard *Crepis paludosa*, wall lettuce *Mycelis muralis*, lesser meadow-rue *Thalictrum minus* and mountain melick *Melica nutans*. Among the ferns, green spleenwort *Asplenium viride*, brittle bladder-fern *Cystopteris fragilis* and hard shield-fern *Polystichum aculeatum* occur on most pavements. Rigid buckler-fern *Dryopteris submontana* and limestone fern *Gymnocarpium robertianum* are widespread but much less abundant than at Morecambe Bay Pavements. Dog's mercury *Mercurialis perennis* and wood sorrel *Oxalis acetosella* occur on most pavements.

- **H9180. *Tilio-Acerion* forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes**

Tilio-Acerion ravine forests are woods of ash *Fraxinus excelsior*, wych elm *Ulmus glabra* and lime (mainly small-leaved lime *Tilia cordata* but more rarely large-leaved lime *T. platyphyllos*). Introduced sycamore *Acer pseudoplatanus* is often present and is a common part of the community in mainland Europe, where it is native. The habitat type typically occurs on nutrient-rich soils that often accumulate in the shady micro-climates towards the bases of slopes and ravines. Therefore it is found on calcareous substrates associated with coarse scree, cliffs, steep rocky slopes and ravines, where inaccessibility has reduced human impact. It often occurs as a series of scattered patches grading into other types of woodland on level valley floors and on slopes above, or as narrow strips along stream-sides. More extensive stands occur on limestone and other base-rich rocks.

This habitat type is ecologically variable, particularly with respect to the dominant tree species. To the north and west, ash and wych elm assume increasing importance in the canopy, and lime may be completely absent. Floristic differences due to variations in slope, aspect and nature of the substrate add to the diversity of the habitat. The ground flora can be very varied, but the following elements are usually present: fern banks (particularly hart's-tongue *Phyllitis scolopendrium*, soft shield-fern *Polystichum setiferum* and buckler-ferns *Dryopteris* spp.); stands of ramsons *Allium ursinum* in the moister zones; dog's mercury *Mercurialis perennis* and enchanter's-nightshade *Circaea* spp. on drier but still base-rich soils; wood avens *Geum urbanum*, and natural 'disturbance communities' comprising common nettle *Urtica dioica*, herb-Robert *Geranium robertianum* and cleavers *Galium aparine* associated with scree and cliff-bases. A wide range of other basiphilous herbs and grasses may occur within these stands.

The main NVC types found on site are:

- W8 *Fraxinus excelsior* – *Acer campestre*-*Mercurialis perennis* woodland
- W9 *Fraxinus excelsior* – *Sorbus aucuparia* – *Mercurialis perennis* woodland

Tilio-Acerion forests provide a habitat for a number of uncommon vascular plants, including, dark-red helleborine *Epipactis atrorubens*, violet helleborine *Epipactis purpurata*, wood fescue *Festuca altissima*, purple gromwell *Lithospermum purpureocaeruleum* and herb-Paris *Paris quadrifolia*. Many sites support notable bryophytes, in particular calcicoles associated with base-rich rock outcrops. Some localities have important assemblages of epiphytic lichens

Table 1: Supplementary Advice for Qualifying Features: H5130. *Juniperus communis* formations on heaths or calcareous grassland

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Restore the total extent of the feature the baseline-value of 0.49 hectares.	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. 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.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Juniper on heaths or calcareous grasslands H5130 is located principally in relic populations throughout Ingleborough Complex SSSI.	
Extent and distribution of the feature	Spatial distribution of the feature within the site	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	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. <i>Juniperus communis</i> is found in growing within a complex mosaic within heath edge, calcareous grassland and mostly low grade or karstic Pavement. The Upper valley areas have a denser cover of <i>Juniperus communis</i>. This is regionally (if not nationally) important and a management priority.	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type W19 <i>Juniperus communis</i> spp. <i>communis</i> – <i>Oxalis acetosella</i> woodland	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. 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).	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Restore the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; <i>Juniper Juniperus communis</i>	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		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> Common dog-violet <i>Viola riviniana</i> Wood sorrel <i>Oxalis acetosella</i> Broad buckler-fern <i>Dryopteris dilatata</i> ,	SAC (see also the attribute for 'vegetation community composition'). • Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. Ingleborough had the only large stands of juniper on limestone at high altitude in the UK. The scrub is of the relatively species-poor type due to these growing conditions and location.	This attribute will be periodically monitored as part of Natural England's site condition assessments Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	Vegetation: undesirable species	Restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread.	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants. Undesirable species include: Bracken <i>Pteridium aquilinum</i>; Rhododendron <i>Rhododendron spp</i>; Great willowherb <i>Epilobium hirsutum</i>, Yorkshire fog <i>Holcus lanatus</i>, Creeping thistle <i>Cirsium arvense</i>, Spear thistle <i>Cirsium vulgare</i>, Common nettle	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<i>Urtica dioica</i>	
Structure and function (including its typical species)	Vegetation structure: canopy cover	Restore an appropriate balance between scrub canopy of open field layer, with no more than 33-66% comprising closed juniper scrub. There should be at least 0.4 ha of dense juniper in total.	The majority of juniper populations on site are relic populations with little to no regeneration and active fruiting. 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.	
Structure and function (including its typical species)	Vegetation structure - age class	Restore a 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). At least 10% of the juniper bushes should bear fruit (include fruit at all stages of ripening).	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. Although an abundance of mature plants, there is a low proportion of fruiting and pioneer growth. There is limited natural regeneration on Moughton Common but this was first noted pre-confirmation of <i>Phytophthora austrocedri</i> outbreak. There is currently no action to restore a mixed age structure population due to the presence of <i>Phytophthora</i>. Anecdotal evidence from botanists surveying other species on Moughton Common suggest regeneration is still occurring (2018) but whether in sufficient numbers to offset losses of old plants is unclear. Similarly it is not known at this stage if the younger plants are resistant or still vulnerable to the disease.	Ingleborough Complex SAC Site Improvement Plan, Natural England ,Available here
Structure and function (including its typical species)	Vegetation community transitions	Restore expected patterns] of natural vegetation zonations/transitions	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.	Ingleborough Complex SAC Site Improvement Plan, Natural England ,Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Physical structure: ground disturbance	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.	
Structure and function (including its typical species)	Supporting off-site habitat	Restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature: Relic or lone plants found within Yorkshire Dales	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.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	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.	
Structure and function (including its typical species)	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of	Graham, F (2007) Conservation of Juniper in the Yorkshire Dales National Park, Conservation and Monitoring Report no. 5. YDNP Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of its supporting habitats. This means that this site is considered to be vulnerable overall but are a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable. However, this assessment is for the site as a whole and not focused specifically on any one habitat or species. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The fungus-like pathogen <i>Phytophthora austrocedrae</i> has been recorded as infecting the main populations of the juniper SSSI/SAC feature and causing die back. Typically between 40 and 60% of bushes at stands based on visual estimates are either now already dead or show significant foliage browning/die back. There is no realistic means of maintaining biosecurity or disease containment/ control measures given open access and multiple relatively remote access points	Understanding the threat caused by <i>Phytophthora austrocedrae</i> in Juniper populations in Britain, Forest research, 2015. Available here Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England [Available at http://publications.naturalengland.org.uk/publication/4954594591375360].
Supporting processes (on which the	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the	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	More information about site-relevant Critical Loads and Levels for this SAC is available by using

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	the 'search by site' tool on the Air Pollution Information System here.
Supporting processes (on which the feature relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. For this feature, conservation measures include grazing, cutting, scrub management, weed control. Retention of suitable land use infrastructure/patterns to enable site management e.g. pastoral livestock farming. Management is in place on the site to control grazing levels	Graham, F (2007) Conservation of Juniper in the Yorkshire Dales National Park, Conservation and Monitoring Report no. 5. YDNP Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			and needs to be regularly monitored. Further some young plants are protected with tree guards. No seed collection or planting of new Juniper is currently being undertaken as it is likely that any new planting would quickly become infected by <i>Phytophthora austrocedrae</i>	
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	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.	
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: All targets set to restore due to the current impact of <i>Phytophthora austrocedrae</i> within the site.				

Table 2: Supplementary Advice for Qualifying Features: H6210. Semi-natural dry grassland and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature to be found extensively throughout the SAC to at least 700ha.	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 explanatory notes for this attribute in Table 1. H6210 Semi-natural dry grassland and scrubland facies: on calcareous substrates occurs as 3 separate entries on the SAC Criteria Sheet: Carboniferous Limestone Grassland, Sub-montane calcareous grassland and montane calcareous grassland. This habitat occurs widespread throughout all three underpinning SSSIs As this habitat is found in patches or mosaics, the exact extent cover is currently undefined. The following extent data is available for this feature: Ingleborough SSSI - 692.79 ha of calcareous grassland Oxenber and Wharfe Woods SSSI – 7.49ha of CG9 Whernside SSSI - undefined	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) This attribute will be periodically monitored as part of Natural England's site condition assessments
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: CG2 <i>Festuca ovina</i> – <i>Avenula pratensis</i> grassland CG9 <i>Sesleria albicans</i> – <i>Galium sternerii</i> grassland CG10 <i>Festuca ovina</i>-<i>Agrostis capillaris</i>-<i>Thymus praecox</i> grassland	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations). The CG9b blue moorgrass grassland community (<i>Sesleria albicans</i>-<i>Galium sternerii</i>) is widespread on the thinner drier soils, and where conditions are damper the CG9c community (<i>Carex pulicaris</i>-<i>Carex panicea</i>) with bird's-eye primrose and butterwort occurs. On deeper soils CG10 sheep's fescue grasslands (<i>Festuca ovina</i>-<i>Agrostis capillaris</i>-<i>Thymus praecox</i>) which are often very flower rich is more common. Where the ground is irrigated by lime-rich water are found M10b flushes (<i>Carex dioica</i>-<i>Pinguicula vulgaris</i> – <i>Briza media</i>-<i>Primula farinosa</i>).	NATURAL ENGLAND (2018) Ingleborough National Nature Reserve Management Plan Available from Natural England on request
Structure and function (including its	Vegetation: proportion of herbs	Maintain the proportion of herbaceous species within the range 30%-90%	A high cover of characteristic herbs, including sedges (<i>Carex</i> species) is typical of the structure of this habitat type.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)	(including <i>Carex</i> spp)		A low percentage of herb cover may be a result of inappropriate grazing management, localised dominance by Moor Grass <i>Sesleria</i> sp, or the aspect of the land (such as northern facing slopes or natural mosaic habitats of neutral grassland) There is a notable drop out of all the larger or bulkier herbs with altitude with the likes of salad burnet and common rockrose being virtually unknown above 400 metres above sea level.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: The constant and preferential species of the CG2, CG9 and CG10 grassland NVC communities that comprise the H6210 feature within this SAC.	See explanatory notes for this attribute in Table 1.	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread. The percentage of vegetation cover made up, collectively, of <i>Bellis perennis</i> and/or <i>Ranunculus repens</i> should be less than 25%. Less than 1%, collectively, of vegetation cover should consist of undesirable species	There will be a range of undesirable or uncharacteristic species which, if allowed to colonise and spread, are likely to have an adverse effect on the feature's structure and function, including its more desirable typical species. These may include invasive non-natives such as <i>Cotoneaster</i> spp, or coarse and aggressive native species which may uncharacteristically dominate the composition of the feature. Weed encroachment, especially thistles, is reaching the limit of the acceptable threshold and on a local basis only, rabbits need controlling to prevent over grazing. Undesirable species include: False oat-grass <i>Arrhenatherum elatius</i>; Creeping thistle <i>Cirsium arvense</i>; Spear thistle <i>Cirsium vulgare</i>; Large docks (excluding <i>Rumex acetosa</i>) perennial ryegrass <i>Lolium perenne</i>; Common ragwort <i>Senecio jacobaea</i>; Common stinging nettle <i>Urtica dioica</i>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation transitions	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. Where CG9 is transitional with neutral grassland and woodland communities <i>Sesleria</i> cover or frequency may be acceptable as low or Occasional rather than Frequent on parts of the site. Where this typical but nationally scarce grass is naturally dominant the CG9 grassland may not meet attributes such as percentage of thatch, vegetation height, diverse structure at the micro-scale and species diversity, ditto any localised land that is relatively inaccessible for stock grazing.	Ingleborough Unit 61 Site Check Report, Natural England 2015. Available on request from Natural England.
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Supporting off-site habitat	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	See explanatory notes for this attribute in Table 1.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	See explanatory notes for this attribute in Table 1. 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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See explanatory notes for this attribute in Table 1	Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Supporting processes (on which the feature relies)	Air quality	Maintain and restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1. Control and reduce effects of Nitrogen deposition.	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 (here).
Supporting processes (on which the feature relies)	Conservation measures	Maintain and restore as appropriate the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Difficulties arise due to the conflicting requirements of each feature which are often found in mosaics and require differing optimal management requirements. Undergrazing is a concern for this habitat due to fenced off areas excluding livestock for the management of other habitats such as limestone pavements. Further overgrazing by rabbits is a concern in other parts of the site.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here
Version Control N/A				
Variations from national feature-framework of integrity-guidance: The objectives for some of the attributes listed above include both 'maintain' and 'restore' targets. This is because this SAC is an extensive complex of geographically-separate component sites which currently vary in their condition status. Overall, both objectives will currently be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.				

Table 3: Supplementary Advice for Qualifying Features: H6410. *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); Purple moor grass meadows.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature across the site at current levels.	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 explanatory notes for this attribute in Table 1. 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. H6410. <i>Molinia</i> meadows have been recorded in all three underpinning SSSIs. However, due to the frequent transitional to rush pasture and blanket bog, there is currently no extent figures for the entire site.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) This attribute will be periodically monitored as part of Natural England's site condition assessments
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types M25 <i>Molinia caerulea-Potentilla erecta</i> mire M26 <i>Molinia caerulea – Crepis paludosa</i> mire	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; The constant and preferential species of the M25 and M26 fen communities that comprise the H6410 within the SAC.	See explanatory notes for this attribute in Table 1. This habitat may occur in almost inseparable mosaics with M23 <i>Juncus effusus-acutiflorus</i> or basic flushes- see transitions below.	
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread.	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.	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)
			Undesirable species include: Creeping thistle <i>Cirsium arvense</i> ; Spear thistle <i>Cirsium vulgare</i> ; Common sorrel <i>Rumex acetosa</i> ; Creeping buttercup <i>Ranunculus repens</i> ; Common nettle <i>Urtica dioica</i>	
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation transitions into and from flush, rush pasture and blanket bog habitats.	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. Frequently this habitat is seen as a transitional habitat into the following NVC habitats: M10 <i>Carex dioica</i> – <i>Pinguicula vulgaris</i> mire M23 <i>Juncus effusus/acutiflorus</i> – <i>Galium palustre</i> rush-pasture	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat. For this feature, soil P index should typically be index 0 (< 9 mg l⁻¹)	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Water quality	Where the feature is dependent on surface water and/or groundwater, [maintain OR restore] water quality and quantity to a standard which provides the necessary conditions to support the feature	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	
Structure and function (including its typical species)	Hydrology: Water table	Maintain a hydrological regime that provides a sub-surface water table during the summer (range - 2 to -48 cm below ground level) and a winter water table $\pm$ at the surface. Inundation should be absent or only occasional to a minor degree in winter	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 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 as precise tolerances are not known, further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	
Structure and function (including its typical species)	Maintaining integrity of hydrological catchment	Maintain the full range of hydrological/hydrogeological aspects of a site's catchment that contribute to its functioning and the maintenance of the feature	The movement, quality and distribution of water within a site's wider catchment and outside of the site's boundary will affect its ability to support this wetland habitat feature. Catchment size will vary. A site's water table and other hydrological aspects may be affected by changes in the use of the land surface, water abstraction, flood alleviation, development and mineral extraction in the wider catchment.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See explanatory notes for this attribute in Table 1.	Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England [Available at].
Supporting processes (on which the feature relies)	Air quality	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	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. Conservation measures for this feature typically include grazing, cutting, scrub management, weed control, recreation/visitor management. Also covered is maintenance of surface drainage features such as drains, grips, gutters and foot drains. Retention of suitable land use infrastructure/patterns to enable site management e.g. pastoral livestock farming.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Getting the correct grazing regime and livestock for example cattle is key to managing H6410 Molinia meadows.	
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 4: 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 the total extent of the habitat feature at or to [adviser to insert feature extent baseline-value of 577.04 hectares.	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. See explanatory notes for this attribute in Table 1. The estimate of blanket bog is greatest in Ingleborough SSSI with 466.91ha and the remainder 110.13ha of blanket bog is on Whernside SSSI. However, this habitat type is also recorded in mosaics with H6410 Molinia meadows. Therefore this figure may be under or over recorded.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) Natura 2000 – Standard Data Form, 2015, JNCC. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	Natural England Commissioned Report NECR086. 2011. A review of techniques for monitoring the success of peatland restoration. Available here NATURAL ENGLAND (2018) Ingleborough National Nature Reserve Management Plan Available from Natural England on request

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Fragmentation of blanket bog is common with areas drying out through drainage, and burning encouraging a species-poor community dominated typically by <i>Calluna vulgaris</i> or <i>Molinia caerulea</i>. True bog species become fragmented or are lost. Hydrological fragmentation of the bog system can also occur. Management of H7130. Blanket bogs including assuring the correct grazing regime is in place is challenging due to the fragmented land ownership across the landscape. Due to differing management practices including grazing pressures this has resulted in some fragmentation of blanket bog.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: M2 <i>Sphagnum cuspidatum</i> / <i>recurvum</i> bog pool community M17 <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire M20 <i>Eriophorum vaginatum</i> blanket and raised mire	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations). As blanket bog 'blankets' extensive areas it is not surprising that the habitat supports a range of different vegetation communities. Transitions can occur between bog pools, wetter Sphagnum lawns, through to more mixed terrestrial bog communities associated with both hummocks and hollows. At its margins (normally on the steeper slopes), blanket bog communities will gradually be lost and replaced by wet heath and dry heath communities. Blanket bog communities can be heavily influenced by land management, notably drainage, managed rotational burning and grazing. In these situations typical blanket bog	NATURAL ENGLAND (2018) Ingleborough National Nature Reserve Management Plan Available from Natural England on request

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Note: Blanket bog vegetation can sometimes become established on peats shallower than 0.4m. Although grazing pressure has been reduced and areas of blanket bog have been fenced off there are still historically overgrazed sections of bog throughout the site. In some areas moorland gripping (drainage) has added to the damage. The restoration of these vegetation communities is being taken forward over specific areas of the site through reduction or exclusion of grazing livestock. Seed bank investigations have indicated that dwarf shrub recovery on many areas is unlikely without the introduction of plants and/or seed.	
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum herbicides).	
Structure and function (including its typical species)	Presence/cover of woody species	Maintain a low cover (<10% of the area) of scrub or trees within stands of H7130.	Native trees and shrubs which can tolerate permanently waterlogged conditions can occur naturally on bog and fen surfaces. An abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because water is lost by evapotranspiration from the trees and, as the tree canopies develop and close, water is further prevented from reaching the	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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.	
Structure and function (including its typical species)	Vegetation composition: undesirable species	The following undesirable competitive species should be absent or rare (individually and collectively less than 1% of vegetation cover);	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 Undesirable species include: Common bent-grass <i>Agrostis capillaris</i>, Yorkshire fog <i>Holcus lanatus</i> Bracken <i>Pteridium aquilinum</i> Creeping buttercup <i>Ranunculus repens</i> Monitoring and appropriate management needs to be in place to prevent encroachment of Bracken <i>Pteridium aquilinum</i> within localised areas on site.	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.
Structure and function (including its typical species)	Structural diversity	Maintain or restore as appropriate the full range of typical structural features associated with the feature at this site, e.g. vegetation cover, surface patterning and hydrological zonations	Bogs in particular show varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the result of previous damage). These can occur at different macro and micro scales across the habitat and include alternative aquatic and terrestrial surface features, such as pools and hummocks, and terrestrial features such as ridges and hollows. These features will support distinctive patterns of bog vegetation, and so will be sensitive to changes in topography and hydrology. These can be modified or disrupted by activities such as drainage, burning, grazing, vehicular access and peat digging. These are likely to be missing or poorly represented in degraded blanket bog systems. These components may include areas with noticeably uneven structure, at a spatial scale of around 1 m² or less. The unevenness should be the result of Sphagnum hummocks, lawns and hollows, or mixtures of well-developed cotton-grass	NATURAL ENGLAND (2018). Ingleborough National Nature Reserve Management Plan. Available from Natural England on request.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			tussocks and spreading bushes of dwarf-shrubs. Transitions from blanket bog into flushes and acid grassland occur throughout the site party as a result of natural gradation and partly as a result of historic land management including overgrazing.	
Structure and function (including its typical species)	Physical structure: ground disturbance (and peat erosion)	Significant areas of disturbed and eroding bare ground should not be present. Where present, any affected areas should typically not exceed 1% of the total feature, and be considered only as a temporary stage.	Bare ground and eroding peat not only affects the hydrology of bog systems and its associated biodiversity but can also have wider environmental impacts on e.g. water quality. There will also be a carbon loss from the system. Some areas of the SAC have small eroded gullies with bare peat and areas which have been previously gripped (drained) to varying success. However, the majority of these have now been blocked and vegetation is slowly remedying the situation. However, on site, there are still some evidence of erosion (small number of peat hags).	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungi: bacteria ratio, to within typical values for the habitat. For this feature the peat substrate should consist of both acrotelm and catotelm layers.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. Peat is a soil distinguished from other soil types by its high content of organic matter (30%-100%). The organic matter content results form a combination of plant growth and waterlogging, the latter reducing oxygen diffusion to levels which are so slow that decomposition of the dead plant matter uses up this oxygen faster than it can be supplied. Consequently conditions rapidly become anaerobic, which reduces decomposition rates and the semi-decomposed plant material builds up over time to form peat. An active blanket bog should be made up of two layers, an acrotelm and a	Country Project Ingleborough Complex SAC 2006 Resurvey. Available from Natural England on request.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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.	
Structure and function (including its typical species)	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 explanatory notes for this attribute in Table 1. Blanket bog covers just over 10% of the SAC total area. The natural hydrological conditions need to be present in each hydrological unit of blanket bog to prevent habitat degradation.	Natura 2000 – Standard Data Form, 2015, JNCC. Available here Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Restore the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; The constant and preferential species of the M2, M17, M19 and M20 mire NVC communities that comprise the H7130 feature.	See explanatory notes for this attribute in Table 1.	Country Project Ingleborough Complex SAC 2006 Resurvey. Available from Natural England on request.
Supporting processes (on which the feature relies)	Air quality	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Pollution Information System (www.apis.ac.uk).		
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary) restore the natural hydrological processes to provide consistently near-surface water levels 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. For this feature, various land management activities may impact on and interrupt natural hydrological processes and water levels, including artificial drainage, managed burning, wildfires; track construction; afforestation; and compaction by trampling and vehicular use. The loss of the acrotelm layer normally reflects significant changes to the hydrology of the bog. An increase in the cover of heather on the bog surface will also indicate a drying out of the bog, and can lead to further drying out through an increase in sub-surface peat pipes. Fire influences the near-surface hydrological functioning of peatland. This leads to enhanced overland flow and higher streamflow peaks and, in combination with a removed vegetation cover, can exacerbate surface erosion. The majority of grips on site have been blocked.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or	This attribute will be periodically monitored as part of Natural England's site condition assessments Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			management agreements. The potential spread of <i>Phytophthora</i> species which infect <i>Vaccinium</i> and/ or other dwarf shrub species onto the site is a concern. This is a potential threat mainly to the blanket bog community through reduction or loss of one or more dwarf shrub species which are usually present as part of this habitat. The principal management measures on this site are: • 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. • 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. • Monitor disease and any invasive species. Species diversity targets for this site are still low with a lack of species. Erosion, overgrazing and vehicle access are the main concerns on this site. Seed bank observations have indicated that dwarf shrub recovery is unlikely without the reduction of grazing and introduction of seed and or plants of heather <i>Calluna vulgaris</i> and other dwarf shrub species.	
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 5: 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 total extent of the H7220 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 explanatory notes for this attribute in Table 1. Please note that this feature is very poorly mapped on SACs, SSSIs and in the wider countryside. The JNCC description of this feature is limited to uplands. Within Ingleborough Complex SAC, H7220 Petrifying springs with tufa formation (Cratoneurion) is only recorded as present within Ingleborough SSSI.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) This attribute will be periodically monitored as part of Natural England's site condition assessments
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	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	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types. M37 <i>Cratoneuron commutatum</i> – <i>Festuca rubra</i> spring M38 <i>Cratoneuron commutatum</i> – <i>Carex nigra</i> spring	See explanatory notes for this attribute in Table 1. 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. The petrifying spring habitat is highly localised in occurrence within the Ingleborough Complex SAC, but where it does occur it is species-rich with abundant bryophytes, sedges and herbs.	
Structure and function	Invasive, non-native and/or	Ensure invasive and introduced non-native species are either	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	introduced species	rare or absent, but if present are causing minimal damage to the feature	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). 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.	
Structure and function (including its typical species)	Presence/cover of woody species	Maintain a low cover of woody species in flushes or springs; low <i>Salix sp</i> acceptable more than 5m from edge of spring/flush feature.	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. This habitat is only found very localised and scattered, with little known little data available on condition or threats such as presence / cover of species.	
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain appropriate levels of grazing	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.	
Structure and function (including its typical species)	Exposed substrate	Maintain a low cover of exposed substrate of between 5% & 25% across feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions. The open nature and sometimes skeletal nature of the substrate supporting these features requires a higher, upper	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			threshold than for some other wetlands.	
Structure and function (including its typical species)	Integrity of tufa features	Ensure that no more than 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. The springs where tufa may be found may be the only source of surface water for grazing livestock required for the management of other features; this may lead to concentration of poaching around the spring areas. The need to minimise disturbance to tufa needs to be balanced with requirements of livestock. In addition the locations that most strongly match the NVC communities M37 and M38 attributable to the H7220 feature on this site appear to exhibit limited tufa deposition.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; The constant and preferential species of the M37 and M38 NVC communities that comprise the H7220 feature.	See explanatory notes for this attribute in Table 1. 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.	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants (2002), report to English Nature in 5 volumes, 2002. Available on request from Natural England.
Structure and function (including its typical species)	Hydrology	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	See explanatory notes for this attribute in Table 1. Exploratory digs relating to caving can result in changes to local hydrology.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Water chemistry	Maintain the 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.	
Structure and function (including its typical species)	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 explanatory notes for this attribute in Table 1.	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Structure and function (including its typical species)	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.	Include only where applicable. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
supporting processes (on which the feature relies)	Air quality	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).		Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature.	See explanatory notes for this attribute in Table 1.	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: 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 6: Supplementary Advice for Qualifying Features: H7230. Alkaline fens; Calcium-rich springwater-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 28.85 hectares.	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. See explanatory notes for this attribute in Table 1. H7230 Alkaline fens has been recorded in each of the three underpinning SSSIs. However, due to difficulty in surveying exact extent of this feature this figure may be either over calculated or under calculated.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) Natura 2000 – Standard Data Form, 2015, JNCC. Available here
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	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. H7230 alkaline fens is dependent upon irrigation by alkaline water coming either from chalk rich ground waters or percolating through the drift. The alkaline fens are often situated below alkaline seepages and flushes and therefore by definition very restricted in spatial extent. On Ingleborough Complex SAC, alkaline flushes are limited to a few tens of square metres around 2 or 3 small springs only. Natural hydrology and isolation prevents these developing further.	NATURAL ENGLAND (2018). Ingleborough National Nature Reserve Management Plan. Available from Natural England on request.
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type:	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).	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		M10 <i>Carex dioica</i> – <i>Pinguicula vulgaris</i> mire	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.	
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). 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
Structure and function (including its typical species)	Presence/cover of woody species	Maintain a low cover of woody species of not more than 10% scrub/tree cover. No woody species in flushes or springs; low <i>Salix</i> sp acceptable more than 5m from edge of spring/flush feature.	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. 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 known to be a concern but should be regularly monitored and cut back if levels increase.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain appropriate levels of grazing,	These habitat features are often preferentially grazed and may be vulnerable to significant overgrazing pressure associated with the management of the wider local landscape.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)				
Structure and function (including its typical species)	Exposed substrate	Maintain the exposure of the substrate to appropriate levels, which will typically be between 5% & 25% across feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions. The open nature and sometimes skeletal nature of the substrate supporting these features requires a higher upper threshold than for some other wetlands. Moderate poaching of springs and alkaline fen may be highly beneficial through the creation of small pockets of bare ground and pools in hoof prints providing a locus for <i>Pellia endiviifolia</i> and small liverworts on the sides of poach marks, and areas for vegetative reproduction by <i>Palustriella</i> sp, <i>Scorpidium</i> sp and <i>Cratoneuron filicinum</i> in the pools. Poaching also creates bare ground for seeds to germinate and fragments of bryophytes and vascular plants are readily moved from flush to flush attached to hooves and in mud	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Integrity of tufa features	Ensure that no more than 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. The springs where tufa may be found may be the only source of surface water for grazing livestock required for the management of other features; this may lead to concentration of poaching around the spring areas. The need to minimise disturbance to tufa needs to be balanced with requirements of livestock.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat. The constant and preferential	See explanatory notes for this attribute in Table 1. 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 preferential. Also include scarce species associated with the habitat, e.g. <i>Lycopodiella inundata</i>,	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		species of the M10 NVC communities that comprise the H7230 feature on this site	<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.	
Structure and function (including its typical species)	Hydrology	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site, including a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations).	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Wheeler et al. (2009) provide range and mean for summer & winter water levels for those wetland NVC types constituting Annex 1 habitats. This provides a rough guide to appropriate levels, but it is critical that individual sites and their needs are considered as there is considerable variation within the NVC communities listed and recorded water levels.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here Wheeler, BD, Shaw, SC, & Tanner, KA (2009). Wetland Framework for Impact Assessment at Statutory Sites. EA Science report. McBride et al (2011) Fen Management Handbook
Structure and function (including its typical species)	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 groundwaters for different wetland types. The threshold values will mainly be used in the characterisation of GWDTE status for the WFD, primarily as a risk screening tool, to assess if sites are 'at risk' or 'not at risk' from groundwater mediated nutrient pressure. Due to the complex cycling of nutrients within many GWDTE, these threshold values are less well suited for application within sites but rather just to groundwater that is directly feeding the site.	
Structure and function (including its typical species)	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 explanatory notes for this attribute in Table 1.	Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	See explanatory notes for this attribute in Table 1.	This attribute will be periodically monitored as part of Natural England's site condition assessments
supporting processes (on which the feature relies)	Air quality	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk). Alkaline Fen Condition Technical Note III, 2011. JNCC
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	See explanatory notes for this attribute in Table 1.	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: N/A				

Table 7: 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.	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 explanatory notes for this attribute in Table 1. The extent of this feature is difficult to define accurately due to the small scattered nature of the species contained within this feature and that much of its extent is in the vertical dimension having limited plan area on a map. In the SAC context it is intended to be a more or less montane community but the associated NVC communities occur at all altitudes and can even occur on artificial surfaces. H8210. Calcareous rocky slopes with chasmophytic vegetation is found within Ingleborough SSSI in both its montane and lower altitude forms and in lower altitude form only on Whernside SSSI. Whilst there is a limestone scar in Oxenber and Wharfe Woods SSSI it is mostly shaded by the H9180 Tilio-Acerion forests feature and does not support an appropriate flora.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) Natura 2000 – Standard Data Form, 2015, JNCC. Available here This attribute will be periodically monitored as part of Natural England's site condition assessments
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	See explanatory notes for this attribute in Table 1. The exact distribution of H8210 Calcareous rocky slopes with chasmophytic vegetation is currently unavailable due to the sparse and scattered occurrence of this habitat, often found in small areas or within mosaics of limestone grassland.	UK Biodiversity Action Plan Priority Habitat Descriptions, Inland Rock Outcrop and Scree Habitats, 2008, JNCC
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: OV39 <i>Asplenium trichomanes</i>-<i>Asplenium ruta-muraria</i>	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. Both forms of chasmophytic vegetation in the UK correspond to the rock fissure communities described from continental Europe	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002. Available on request from Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		OV40 <i>Asplenium viride</i> - <i>Cystopteris fragilis</i>	(<i>Asplenietea trichomanis</i>). Some forms of the calcareous type correspond to NVC types OV39 <i>Asplenium trichomanes</i> – <i>Asplenium ruta-muraria</i> community and OV40 <i>Asplenium viride</i> – <i>Cystopteris fragilis</i> community, but other forms are not described by the NVC. The vegetation is characterised by bryophytes such as <i>Tortella tortuosa</i>, <i>Anoetangium aestivum</i> and <i>Ctenidium molluscum</i>. Associated vascular plants include brittle bladder-fern <i>Cystopteris fragilis</i>, and green spleenwort. A rare habitat in England with an estimated 300ha.	
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation transitions within H8210 Calcareous rocky slopes with chasmophytic vegetation	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 H8240 Limestone pavements.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides).	
Structure and function (including its typical species)	Vegetation composition: trees and scrub	Maintain scrub and tree cover to less than 25% of the ground cover	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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			they become dominant they can compromise the interest of this feature and key species will disappear.	
Structure and function (including its typical species)	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.	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	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. Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	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 explanatory notes for this attribute in Table 1.	Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat;	See explanatory notes for this attribute in Table 1.	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 constant and preferential species of the OV38 and OV39 NVC communities that comprise the H8210 feature on this site		
Supporting processes (on which the feature relies)	Air quality	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	See explanatory notes for this attribute in Table 1. 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. 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.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	Although rock based this a 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 an 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.	
Version Control N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 8: Supplementary Advice for Qualifying Features: H8240. Limestone pavements

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature to the extent baseline-value of approximately 692.45 hectares. The extent of this feature can be difficult to accurately map as it often occurs in a mosaic with calcareous grassland.	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 explanatory notes for this attribute in Table 1. Decline in the area of the feature will be evident by damage to the pavements and removal of pavement clints. Damaged pavement is distinctively white and lichen free, shows irregular surface features, infilled grikes and rubble or broken stone.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) This attribute will be periodically monitored as part of Natural England's site condition assessments Natura 2000 – Standard Data Form, 2015, JNCC. Available here
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature. Limestone pavements have additional protection measures to	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			prevent stone removal. Fragmentation has been a serious issue in the past through stone removal, less so now, but given the limited extent of this feature even small scale illegal removal can be a problem. Increase in wooded extent can cause fragmentation of more open communities.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: Community mosaic present	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations). A range of calcareous rock, heath, grassland, scrub and woodland NVC types can occur on limestone pavement. The NVC does not include limestone pavement vegetation per se but a number of NVC types may be present, usually in fragmentary form. The most distinctive to this habitat is probably OV38 <i>Gymnocarpium robertianum</i> - <i>Arrhenatherum elatius</i> community. Other types include OV39 <i>Asplenium trichomanes</i> - <i>A. ruta-muraria</i> community OV40 <i>Asplenium viride</i> - <i>Cystopteris fragilis</i> community CG9 <i>Sesleria albicans</i> - <i>Galium sternerii</i> grassland CG10 <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus praecox</i> grassland CG13 <i>Dryas octopetala</i> - <i>Carex flacca</i> heath W9 <i>Fraxinus excelsior</i> - <i>Sorbus aucuparia</i> - <i>Mercurialis perennis</i> woodland. Limestone pavements have two characteristic forms: wooded and open. Where a dense canopy cover results in mosses covering the clint tops the pavement is considered to be wooded. Different targets apply for wooded and open	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			pavements. In some cases a pavement feature may contain a mosaic of both types.	
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation transitions	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. The vegetation of limestone pavements is unusual because of the combinations of floristic elements, including woodland and woodland edge species, such as hart's-tongue <i>Phyllitis scolopendrium</i> and dog's mercury <i>Mercurialis perennis</i>. On the clint surfaces or the upper walls of the grikes there are plants of rocky habitats, such as wall-rue <i>Asplenium ruta-muraria</i> and maidenhair spleenwort <i>Asplenium trichomanes</i>. The grikes provide a shady, humid environment favouring woodland plants. The dwarf shrub communities occurring on top of the limestone pavements at Scar Close are very unusual and will be managed through stock exclusion to allow development of the dwarf shrub islands together with scrub woodland and ungrazed communities of the specialist limestone crevice species.	NATURAL ENGLAND (2018). Ingleborough National Nature Reserve Management Plan. Available from Natural England on request.
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Non-native species may include exotic pines and beech. With the arrival and rapid spread of ash die-back, <i>Hymenocyphus fraxineus</i>, sycamore <i>Acer</i>	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<i>pseudoplatanus</i> is now considered an acceptable naturalised species, especially as it can tolerate the exposed mid-altitude nature of the majority of pavements on the SAC. Overgrazing by rabbits is one of the major problems on H8240. Limestone pavements. In addition the high visitor number to the limestone pavements may pose some threat due to spread of invasive plant seeds on footwear and clothing from external areas.	
Structure and function (including its typical species)	Vegetation composition:	Maintain the cover of dense bracken at or to less than 10% of the feature	The spread of bracken <i>Pteridium aquilinum</i> is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Bracken encroachment is affecting limestone pavements within Ingleborough Complex SAC although on a local basis only. If the affected pavement has a good fern flora it may ecologically more desirable to accept the situation than treat it. Whilst the rarer fritillaries are absent here dark green fritillary appears to be successfully expanding its range. Especially an issue on some of the limestone pavements within Oxenber and Wharfe Woods SSSI	Thom.T .2009. Yorkshire Dales Limestone Country Project: LIFE2002NAT/UK/8539REV After-LIFE Conservation Action Plan for Limestone Country Available here
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain or restore as appropriate the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants. Weed encroachment, especially thistles, is reaching the limit of the acceptable threshold within many sections of pavement. Further on a localised case by case basis, ragwort would benefit from control.	NATURAL ENGLAND (2018) Ingleborough National Nature Reserve Management Plan Available from Natural England on request Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Undesirable species may include Creeping thistle <i>Cirsium arvense</i> ; Spear thistle <i>Cirsium vulgare</i> , Bramble <i>Rubus fruticosus</i> , Common stinging nettle <i>Urtica dioica</i> . Ragwort <i>Senecio jacobaea</i>	
Structure and function (including its typical species)	Wooded pavement: vegetation structure and distribution.	On wooded pavements, maintain the presence of seedlings, saplings, mature trees and shrubs comprising site-native species in wooded areas, with open space typically present over 10-30% of the pavement vegetation by area.	Structural variation will often be a result of woodland management but can also be natural as an inherent feature of the structure and the function of the pavement itself. Yew or juniper stands can be (and should be) dense and continuous. Overgrazing by sheep, deer and rabbits may have a negative impact upon tree and shrub species on these limestone pavements. A lack of nearby trees in some localities, may limit the potential for tree regeneration. <i>Hymenocyphus fraxineus</i> (ash die-back) has been noted on ash regeneration on some limestone pavements within the SAC; young ash trees are particularly vulnerable to this disease. The presence of scrub and woody cover needs to be balanced with the need to protect archaeological interests within the site which may be damaged by the establishment of trees or scrub	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Open pavement	On open pavements, maintain scrub and woody cover at between 5% and 25% of the pavement feature	A proportionate amount of scrub and woody cover (including Juniper which is largely absent from this site) increases the structural variety of pavement vegetation, provides more vegetation edge for plant species and results in higher invertebrate interest. The presence of scrub and woody cover needs to be balanced with the need to protect archaeological interests within the site which may be damaged by the establishment of trees or scrub	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the	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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		habitat.	soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See explanatory notes for this attribute in Table 1. A major threat to limestone pavement has been quarrying and removal of surface limestone for use as decorative rockery stone. This threat has now been addressed through protective legislation (Limestone Pavement Orders).	Thom.T .2009. Yorkshire Dales Limestone Country Project: LIFE2002NAT/UK/8539REV After-LIFE Conservation Action Plan for Limestone Country Available here Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; The constant and preferential species of the NVC communities that comprise the H8420 feature present within the SAC. See explanatory notes for further information. Vascular plant assemblage including: dark-red helleborine <i>Epipactis atrorubens</i> and alpine cinquefoil <i>Potentilla crantzii</i>	See explanatory notes for this attribute in Table 1. Limestone pavement may support a variety of NVC communities, usually in fragmentary form. The vegetation of the limestone pavements can exist in a continuous gradation from a barren 'stony desert' with plants only surviving in the deepest grikes, to mature ash woodland with a rich and diverse ground flora. The most distinctive vegetation community associated with this habitat is OV38 <i>Gymnocarpium robertianum</i> - <i>Arrhenatherum elatius</i> community. Other community types present may include OV39 <i>Asplenium trichomanes</i> - <i>A. ruta-muraria</i> community OV40 <i>Asplenium viride</i> - <i>Cystopteris fragilis</i> community CG9 <i>Sesleria albicans</i> - <i>Galium sternerii</i> grassland CG10 <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus praecox</i> grassland, W9 <i>Fraxinus excelsior</i> - <i>Sorbus aucuparia</i> - <i>Mercurialis perennis</i> woodland.	
Supporting processes	Air quality	Maintain or restore as appropriate, the concentrations	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(on which the feature relies)		and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).		for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature	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. Although rock based this is a fragile habitat and susceptible to human activity. Threats to the habitats include heavy grazing, nitrogen deposition, rock extraction and increase in non-native and undesirable species. Management measures will differ between open, scrubby and wooded pavement. Grazing is one of the main conservation measures used on the H8240 limestone pavements. Cattle grazing is often more appropriate as they rarely venture onto the rocky pavement areas leaving these in a lightly grazed state while grazing other vegetation communities within the habitat mosaics. H8240 often occurs within a mosaic of other habitats and the management of these areas need to be considered on a case by case basis depending upon the demands of the species and habitats present.	NATURAL ENGLAND (2018). Ingleborough National Nature Reserve Management Plan Available from Natural England on request
Version Control N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 9: Supplementary Advice for Qualifying Features: H9180. *Tilio-Acerion* forests of slopes, screes and ravines; Mixed woodland on base-rich soil associated with rocky slopes.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of H9180. <i>Tilio-Acerion</i> forests of slopes, screes and ravines within the entire site.	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 explanatory notes for this attribute in Table 1. For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil. Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland. H9180. <i>Tilio-Acerion</i> forests of slopes, screes and ravines is very localised throughout the site, often growing in fairly inaccessible locations resulting in limited available survey data.	Natural England (Various) Definitions of Favourable Condition for underlying component SSSIs. (Available on request from Natural England) This attribute will be periodically monitored as part of Natural England's site condition assessments
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological	NATURAL ENGLAND (2018) Ingleborough National Nature Reserve Management Plan Available from Natural England on request

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature. H9180. <i>Tilio-Acerion</i> forests of slopes, screes and ravines is very localised throughout the three underpinning SSSI, often being restricted to inaccessible areas of limestone pavement.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: A mosaic of W8 <i>Fraxinus excelsior</i> - <i>Acer campestre</i> - <i>Mercurialis perennis</i> woodland W9 <i>Fraxinus excelsior</i> – <i>Sorbus aucuparia</i> – <i>Mercurialis perennis</i> woodland	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature.	Craven Limestone Complex cSAC and Ingleborough Complex cSAC NVC survey and condition assessment. Bullens Consultants, report to English Nature in 5 volumes, 2002.
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the 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	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)
			and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.	
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10% of area	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history and past management and the landscape context. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.	
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type,	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)
			old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.	
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically relatively undisturbed mature/old growth stands or a scatter of large trees allowed to grow to over-maturity/death on site (e.g. a minimum of 10% of the woodland or 5-10 trees per ha). A minimum of 3 fallen lying trees >20 cm diameter per ha and 4 trees per ha allowed to die standing.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question. Signs of seedlings growing through to saplings to young trees is at a current density to maintain canopy density over a 10 yr period (or equivalent regrowth from coppice stumps). No more than 20% of areas regenerated by planting. All planting material of locally native stock only and no planting in sites where it has not occurred in the last 15 years.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Structure and function (including its typical species)	Vegetation structure - shrub layer	Maintain an understorey of shrubs cover 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 should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			management and the landscape context.	
Structure and function (including its typical species)	Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc.).	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the resilience of the feature by ensuring a diversity of site-native trees (at least 4 site native tree species) e.g. ash/ small-leaved lime/ aspen/ alder/ sycamore/ rowan/ bird cherry/ birch) is present across the site.	See notes for this attribute in Table 1. Within Ingleborough Complex SAC, there is potential loss of the main native tree species by <i>Chalara</i> (ash die-back).	This attribute will be periodically monitored as part of Natural England's site condition assessments Natural England, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy etc.), and tree seedlings and sapling common in gaps.	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.	NATURAL ENGLAND (2018) Ingleborough National Nature Reserve Management Plan Available from Natural England on request Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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.	
Structure and function (including its typical species)	Regeneration potential	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate ;	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The 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. On site, there are some existing areas of woodland that are protected and livestock excluded to promote regeneration. In addition there is a general policy across the NNR section of the site to increase the overall area of woodland, which will be achieved through natural regeneration wherever possible, but may be supplemented with planting of local provenance stock. The establishment of <i>Hymenoscyphus fraxineus</i> ash die back, throughout the SAC may impact on the viability of ash regeneration as spore density is greatest within a metre or two of the ground. Loss of young saplings is often the first sign the disease is firmly established on a site.	NATURAL ENGLAND (2018). Ingleborough National Nature Reserve Management Plan Available from Natural England on request
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; The constant and preferential species of the W8 and W9	See the explanatory notes for this attribute above in Table 1	This attribute will be periodically monitored as part of Natural England's site condition assessments UK Biodiversity Action Plan Priority Habitat Descriptions for Upland Mixed Ash Woodlands.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		woodland NVC communities that comprise the H9180 feature within this SAC		2008. UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock). Available here
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Such species can include Rhododendrons, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species. There has been post 1850 historic planting of larch and other non-native tree species, including scots pine, sycamore, beech and hornbeam. With the arrival and rapid spread of ash die-back, <i>Hymenocyphus fraxineus</i>, sycamore <i>Acer pseudoplatanus</i> is now considered an acceptable naturalised species.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. 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. Functional connectivity of this feature depends partially upon management practices. There is a future risk of land abandonment particularly on woodland parcels which are smaller or difficult to manage, or on rough ground, due to practicalities of management.	Ingleborough Complex SAC Site Improvement Plan, Natural England, Available here
Supporting processes (on which the feature relies)	Air quality	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		site	assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. This is included as disruption/damage to hydrological processes could be caused by activities at some distance from the site boundary. e.g. through extraction of ground or surface waters; diverting or damming river channels; pollution of water source; channel alignment that disrupts natural geomorphological processes; tunnelling etc.	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control N/A				
Variations from national feature-framework of integrity-guidance: N/A				