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

North York Moors Special Area of Conservation (SAC)
Site code: UK0030228

North York Moors – Natural England

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About this document

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

This site overlaps with another European Site (the North York Moors SPA) and you should also refer to the separate European Site Conservation Objectives (including Supplementary Advice where available) provided for this site here.

This advice replaces a draft version dated 25 September 2017 following the receipt of comments from the site's stakeholders.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	North York Moors Special Area of Conservation (SAC)
Location	North Yorkshire
Site Maps	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1st April 2005
Qualifying Features	See section below
Designation Area	44082.25 ha
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	North York Moors SSSI
Relationship with other European or International Site designations	Complete overlap with the North York Moors SPA. The designated boundary of the North York Moors SPA can be viewed by searching the MAGIC website

Site background and geography

The North York Moors contain the largest continuous tract of heather moorland in England. The site is of national importance for its mire and heather moorland vegetation communities and of international importance for its breeding bird populations, particularly merlin and golden plover.

The SAC, which lies entirely with the North York Moors National Park, is situated in north-east Yorkshire and lies between the towns of Whitby and Scarborough to the east; Pickering and Helmsley to the south; Northallerton and Stokesley to the west and Loftus and Guisborough to the north. The moors are generally low-lying with the majority of the plateaux elevated to between 150 m and 300 m. The maximum elevation is 545m on Urra Moor in the west. The elevation decreases towards the south and east. The site lies within a well-defined upland area which forms the North York Moors and Cleveland Hills National Character Area (NCA).

The site consists of the four main moorland blocks within the North York Moors National Park. There are also five smaller outlying areas that lie close to, but do not join, the main blocks. The largest continuous moorland block is centrally placed within the site and consists of a series of moorland plateaux intersected by valleys. The block is delineated by Bilsdale to the west, Newtondale to the east and Eskdale to the North. The south side is marked by the edge of the moors as they grade into the lowland of the Vale of Pickering. The other three moorland blocks are separated from the central block by valleys and are situation to the west, north and east of it. The western block stretches from Bilsdale to Kepwick and Thimbleby Moors which mark the western edge of the moors and the site. The northern block is separated off from the central block by the Esk valley and lies between the northern edge of the National Park and the River Esk. The eastern block is separated by the narrow valley of Newtondale and stretches to the eastern edge of Brow Moor where the site boundary lies within half a mile of the north

east coast. The smaller outliers are scattered around the edges of the main moorland blocks and are generally low lying.

Vegetation Communities:

The vegetation displays a transition between blanket bog and dry heath land and supports diverse and extensive upland plant communities. The moorland plateaux are dominated by dry heath on the central and western moors and wet heath and mire communities on the northern and eastern moors. The plateaux are defined by a number of valleys, the sides of which support extensive strands of bracken and small areas of native woodland. Acid grasslands occur along some of the moorland edges.

Moorland plateaux:

Dry heath covers over half the site and forms the main vegetation type on the western, southern and central moors where the soil is free draining and only a thin peat layer exists. The dry heath is dominated by heather *Calluna vulgaris* and wavy hair-grass *Deschampsia flexuosa* almost to the exclusion of other species, although bilberry *Vaccinium myrtillus* becomes more dominant on the steeper slopes. Bell heather *Erica cinerea* is also found on well drained areas throughout the site, often fringing the sides of tracks and roads. On slopes where bracken *Pteridium aquilinum* has been controlled by spraying, bilberry predominates and cowberry *Vaccinium vitis-idaea* is also frequent.

Wet heath is the second most extensive vegetation type on the site and is predominantly found on the eastern and northern moors where the soil is less free draining. On Fylingdales and Goathland Moors wet heath is the dominant vegetation type, with dry heath being largely confined to the driest soils on the hill tops and ridges. Areas of wet heath tend to be dominated by heather with cross-leaved heath *Erica tetralix* becoming dominant in wetter areas. Purple moor-grass *Molinia caerulea* and heath rush *Juncus squarrosus* are also common within this community. In the wettest stands bog mosses *Sphagnum compactum* and *S. tenellum* and *Dicranum* moss *Dicranum scoparium* occur.

Blanket mire occurs in small amounts along the main watershed of the high moors where deep peat has accumulated. These areas are dominated by heather and cross-leaved heath with frequent hare's-tail cotton grass *Eriophorum vaginatum* and common cotton grass *E. angustifolium*. The largest area of blanket mire occurs at the northern end of Bransdale.

Grassy mires occur in small peripheral stands on most moors, but form one of the main vegetation communities on the low lying Newton Mulgrave and Ugthorpe Moors and also form large stands on lower lying areas of Danby Low Moor. These areas are often dominated by purple moor-grass with frequent tormentil *Potentilla erecta* and cross-leaved heath.

Wetter mires support the richest bog vegetation and include species such as bog asphodel *Narthecium ossifragum*, bog mosses *Sphagnum* spp., cloudberry *Rubus chamaemorus* and bog rosemary *Andromeda polifolia*. The latter two species are found only on the raised bog at May Moss.

Moorland edge:

Much of the moorland edge is dominated by bracken *Pteridium aquilinum*. These areas are generally species-poor, but in places support scarcer species such as chickweed wintergreen *Trientalis europaea* and dwarf cornel *Cornus suecica*.

Small areas of acid grassland occur on the periphery of the moorland. These grasslands are dominated by mat grass *Nardus stricta* and heath bedstraw *Galium saxatile* on the wetter areas and sheep's fescue *Festuca ovina* and common bent *Agrostis capillaris* on better drained soils. On unenclosed moorland these grasslands grade into heath with the presence of bilberry and heather.

Valley sides and streams:

Flushes occur along seepage lines and stream courses across the moors. Soft rush *Juncus effusus* and sharp-flowered rush *Juncus acutiflorus* dominate over a field layer of mosses such as *Sphagnum*

recurvum, *S. auriculatum* and *Polytrichum commune*. These flushes tend to be species-poor, but the nationally scarce creeping forget-me-not *Myosotis stolonifera* can be found in acid moorland streams and shallow pools.

There are also occasional base-rich flushes which support a variety of short sedges *Carex* spp., herbs and mosses and plants such as common butterwort *Pinguicula vulgaris*. These flushes tend to be restricted to small areas on steep valley sides where beds of limestone lie close the surface.

The flush communities make up only a small area of the site, but are an essential part of the moorland habitat particularly because they support rich invertebrate populations which are an important food source for moorland birds.

Woodland

Woodland is restricted to small areas along gills and the moorland edge is mostly dominated by oaks *Quercus* Spp., and birches *Betula* spp. These woods have a ground flora of bilberry and wavy hair-grass and occasionally common cow-wheat *Melampyrum pratense*. Along streams, narrow bands of alder *Alnus glutinosa* woodland occur with ash *Fraxinus excelsior* and herbs such as yellow pimpernel *Lysimachia nemorum*. The margins of lower moors support scrub in which common gorse *Ulex europaeus* and bramble *Rubus fruticosus* agg. are present.

Natural regeneration on some of the peripheral moors, where grazing and burning pressures are low, has resulted in the presence of scattered trees including oak, birch and, in places, Scots pine *Pinus sylvestris* over an understorey of dry heath. Juniper *Juniperus communis* is locally rare and exists only as single shrubs or small clusters in a few remote gills and moor edges where burning is absent.

About the Qualifying Features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H4030 European dry heaths**

In the UK, European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. The most common is heather *Calluna vulgaris*, which often occurs in combination with gorse *Ulex* spp., bilberry *Vaccinium* spp. or bell heather *Erica cinerea*, though other dwarf-shrubs are important locally. Nearly all dry heath habitat is semi-natural, being derived from woodland through a long history of grazing and burning.

This SAC contains the largest continuous tract of upland heather moorland in England. Dry heath covers over half the site and forms the main vegetation type on the western, southern and central moors where the soil is free-draining and has only a thin peat layer. The principal NVC type present is H9 *Calluna vulgaris – Deschampsia flexuosa,* with some H10 *Calluna vulgaris – Erica cinerea* heath on well-drained areas throughout the site, and large areas of H12 *Calluna vulgaris – Vaccinium myrtillus* heath on steeper slopes.

- **H4010 Northern Atlantic wet heaths with *Erica tetralix***

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

M16 *Erica tetralix – Sphagnum compactum* wet heath is the second most extensive vegetation type on the site and is predominantly found on the eastern and northern moors where the soil is less free-draining. Purple moor-grass *Molinia caerulea* and heath rush *Juncus squarrosus* are also common within this community. In the wettest stands bog-mosses, including *Sphagnum tenellum*, occur, and the nationally scarce creeping forget-me-not *Myosotis stolonifera* can be found in acid moorland streams and shallow pools.

- **H7130 Blanket bogs (*priority where active)**

These extensive peatlands have formed in areas where there is a climate of high rainfall and a low level of evapotranspiration, allowing peat to develop not only in wet hollows but over large expanses of undulating ground. Peat depth varies, with an average between 0.4 and 3 metres but depths of up to 8 metres are not uncommon.

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, e.g. saddle mires, watershed mires, valley-side mires. Other morphological types are less obviously defined.

Blanket bogs show a complex pattern of variation related to climatic factors, particularly illustrated by the variety of patterning of the bog surface in different parts of the UK. Such climatic factors also influence the floristic composition of bog vegetation.

'Active' 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 cotton-grasses *Eriophorum spp*., or purple moor-grass *Molinia caerulea* in certain circumstances, together with heather *Calluna vulgaris* and other ericaceous species. Thus sites may still be classed as 'active' if they otherwise support extensive areas of typical bog vegetation, and especially if erosion gullies show signs of re-colonisation.

At this SAC, blanket mire occurs in small amounts along the main watershed of the high moors where deep peat has accumulated. It is characterised either by M18 - *Erica tetralix – Sphagnum papillosum* raised and blanket mire, M19 - *Calluna vulgaris – Eriophorum vaginatum* blanket mire, or where more extensively damaged through drainage and burning by *Calluna* dominated swards on peats of >40cm depth.

Qualifying Species:

Not applicable

References

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

Table 1: Supplementary Advice for Qualifying Features: H4010. Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath and H4030. European dry heaths

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Maintain the total extent of the H4010 feature at 7,751ha Maintain the total extent of the H4030 feature at 24,769ha	There should be no measurable net reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. 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.	JERRAM, R. 1996. *North York Moors National Park Upland Vegetation Survey*, English Nature & North York Moors National Park. Unpublished report But modified by excluding areas on deeper peats as mapped by NATMAP Soilscapes © Cranfield University (NSRI) 2011
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H4010 and H4030 features, 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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain any areas of transition between the H4010 and H4030 features and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	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. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
	Vegetation community composition	Ensure the component vegetation communities of the features are generally referable to and characterised by the following National Vegetation Classification types; **H4010 wet heath** M16 - *Erica tetralix – Sphagnum compactum* wet heath, and/or as mosaics with H9 - *Calluna vulgaris – Deschampsia flexuosa* heath, H10 - *Calluna vulgaris – Erica cinerea* heath, M6 - *Carex echinata – Sphagnum recurvum/ auriculatum* mire or	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).	JERRAM, R. 1996. *North York Moors National Park Upland Vegetation Survey*, English Nature & North York Moors National Park. Unpublished report;

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		M25 - *Molinia caerulea – Potentilla erecta* mire. **H4030 dry heath** H9 - *Calluna vulgaris – Deschampsia flexuosa* heath, H10 - *Calluna vulgaris – Erica cinerea* heath or H12 - *Calluna vulgaris – Vaccinium myrtillus* heath;		
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Maintain or restore as appropriate an overall cover of dwarf shrubs to the H4010 and H4030 features which is typically between 25-90%	Variation in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is desirable and needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The ericaceous species heather or ling *Calluna vulgaris*, bell heather *Erica cinerea*, cross-leaved heath *Erica tetralix*, bilberry or blaeberry *Vaccinium myrtillus* and cowberry *Vaccinium vitis-idaea* are the commonest and most characteristic dwarf-shrubs. Hybrids of bilberry *Vaccinium myrtillus* and cowberry *Vaccinium vitis-idaea* can be locally abundant. *Calluna* is usually the most abundant. Crowberry *Empetrum nigrum,* another common species in some transitional heaths, is not strictly ericaceous but is often treated as an ericoid species.	JNCC, 2009: Common Standards Monitoring Guidance for Upland Habitats
	Vegetation structure: heather age structure	Maintain or restore as appropriate a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers. The height of vegetation can in many cases be as if not more important than age class.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			However, largely a mix of different heather heights constitutes a varied age class of heather on site.	
	Vegetation structure: cover of gorse	Maintain a low cover of common gorse typically at <10%	Gorse *Ulex europaeus* as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse *Ulex europaeus* may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Extensive mature stands may also be serious fire hazards.	
	Vegetation structure: tree cover	Maintain the open character of the H4010 and H4030 features, with a typically scattered and low cover of trees and scrub (<20% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food-plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole. Target levels of scrub may differ between SSSI units. Scrub/woodland in the dryer parts of valleys (gills) can be a positive adjunct to the SAC features, without prejudicing the wide-open vistas on the moorland plateaux necessary for the breeding bird features.	
Structure and function (including its typical species)	**Vegetation composition: bracken cover**	Maintain a low cover of dense bracken (typically at <5%)	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Usually, active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has also some nature conservation value, for example on sites where fritillary butterflies occur and utilise bracken litter habitat.	
	Key structural, influential	Maintain the abundance of the species listed below	Some plant or animal species (or related groups of such species) are considered to make a particularly important contribution to the structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;	JNCC, 2009. Common Standards

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	and/or distinctive species	to enable each of them to be a viable component of both Annex 1 habitats; Characteristic plant species (see explanatory notes for full list)	– *Structural* species which form a key part of the habitat's structure or help to define an Annex I habitat on a site (see also the attribute for 'vegetation community composition'). – *Influential* species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat). – *Site-distinctive* species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular site. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. Characteristic plant species include: Common heather *Calluna vulgaris,* Crowberry *Empetrum nigrum,* Bell heather *E. cinerea,* Crossleaved heath *E. tetralix,* Bog myrtle *Myrica gale,* Creeping willow *Salix repens,* Blueberry sp. *Vaccinium* spp. Carnation sedge *Carex panicea,* Spike rush *Eleocharis* spp., *Common cotton-grass Eriophorum angustifolium,* Sharp flowered rush *Juncus acutiflorus,* Jointed rush *Juncus articulatus,* Purple moor-grass *Molinia caerulea,* Deer-grass *Trichophorum cespitosum,* Bog asphodel *Narthecium ossifragum,* Tormentil *Potentilla erecta.*	Monitoring Guidance for Upland Habitats. JERRAM, R. 1996. *North York Moors National Park Upland Vegetation Survey*, English Nature & North York Moors National Park. Unpublished report Unpublished monitoring data (2005 to 2016) held by Natural England.
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. Some of the listed species are native constituents of woodland/scrub, for which see Vegetation structure: tree cover attribute notes above. Undesirable species include: Rhododendron *Rhododendron ponticum*, Salal *Gaultheria shallon,* Japanese knotweed *Fallopia japonica,* Fool's-water-cress *Apium nodiflorum,*	JNCC, 2009. Common Standards Monitoring Guidance for Upland Habitats.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Creeping thistle *Cirsium arvense,* Common foxglove *Digitalis purpurea,* Willowherbs *Epilobium* spp. (excl. *E. palustre*), Floating Sweet-grass *Glyceria fluitans,* Soft rush *Juncus effusus,* Heath rush *J. squarrosus,* Hemlock Water Dropwort *Oenanthe crocata,* Reeds *Phragmites* spp., Creeping buttercup *Ranunculus repens,* Japanese knotweed *Fallopia japonica, ,* Ragwort *Jacobaea vulgaris,* Broad-leaved dock *Rumex obtusifolius,* Cattail *Typha* spp., Nettle *Urtica* spp. Common alder *Alnus glutinosa,* Birch *Betula* spp., Blackthorn *Prunus spinosa,* Pine *Pinus* spp., Blackberry *Rubus* spp., Oak *Quercus* spp. Acrocarpous mosses; *Phytophthora* disease	
Structure and function (including its typical species)	**Functional connectivity with wider landscape**	Maintain or restore as appropriate the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis. Whilst no specific data is currently available, critical linkages are likely to involve hydrological connections (streams/flushes/springs) outside of the SAC boundary. In addition, non-designated habitats adjacent to the SAC, including coniferous habitats and habitats with greater structure such as native woodlands and woodland edges that can provide non-breeding habitat for invertebrates/birds are likely to enhance the wet heath within the SAC.	
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain or restore the H4010 and H4030 features ability, and that of its supporting processes, to adapt	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation	NATURAL ENGLAND, 2015. Climate Change Theme Plan and National Biodiversity

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		or evolve to wider environmental change, either within or external to the site	and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. This SAC has been assessed as being of *medium* vulnerability to climate change, taking into account the sensitivity, fragmentation, topography and management of its habitats (Natural England, 2015). These sites are considered to be vulnerable overall but moderately so. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be required. No specific data held. However, resilience of wet heath relies on the habitat being maintained in the best condition possible (see other attributes/targets), and this will require consideration of the management and condition of hydrological features inside and outside of the SAC, as well as the maintenance of the infra-structure required to enable this anthropogenic habitat to be maintained through active management.	Climate Change Vulnerability Assessments (NBCCVAs). Available at http://publications.naturalengland.org.uk/publication/4954594591375360
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 or restore the structure, functions and supporting processes associated with the H4010 and H4030 features	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.	NATURAL ENGLAND, 2014. Site Improvement Plan: North York Moors (SIP156) ENGLISH NATURE, 2005. A statement of English Nature's views about the management of North York Moors Site of Special Scientific Interest

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				(SSSI).
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal/bacterial ratio, within typical values for the H4010 and H4030 habitats.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. This Annex 1 habitat has essentially raw soils with little humus and low nutrient status. No specific site based information held on the soils that underpin wet heath within the SAC, although typically they will be damp soils, either on shallow peats or gleyed mineral soils.	
	Air quality	Restore the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for these features of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. The critical load for nitrogen at this SAC is currently being exceeded (July 2017). Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	NATURAL ENGLAND, 2015. Site categorisation for nitrogen measures - Case Study F: Atmospheric nitrogen profile for North York Moors SAC. Improvement Programme for England's Natura 2000 Sites (IPENS) – Planning for the Future IPENS049, More information about site-relevant Critical Loads and Levels for this SAC is available at www.apis.ac.uk.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	**Water quality**	Maintain or restore water quality and quantity to a standard which provides the necessary conditions to support the H4010 feature.	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	No site specific data held.
	Hydrology	At a site, unit and/or catchment level (as necessary), maintain the natural hydrological regime to provide the conditions necessary to sustain the H4010 feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	No site specific data held.
Version Control Advice last updated: **25th February 2019** following stakeholder comments. V**egetation structure: heather age structure** attribute, heather age class and height description included within the supporting and explanatory notes; **Vegetation structure: tree cover** attribute, clarification of scrub target levels added to supporting and explanatory notes.				
Variations from national feature-framework of integrity-guidance: None. The targets for some attributes listed above include both ‘maintain’ or ‘restore’ objectives. Overall, both objectives will be applicable to the SAC but these will differ between locations within the site depending on its particular circumstances. Natural England will able to provide further advice on request.				

Table 2: 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 H7130 feature of 4,207 ha	See notes for this attribute in Table 1 above	JERRAM, R. 1996. *North York Moors National Park Upland Vegetation Survey*, English Nature & North York Moors National Park. Unpublished report; But also includes additional areas on deeper peats as mapped by NATMAP Soilscapes © Cranfield University (NSRI) 2011.
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H7130 feature, including where applicable its component vegetation types, across the site	See notes for this attribute in table 1 above. Fragmentation of blanket bog is common with areas drying out through drainage, and burning encouraging a species-poor community dominated typically by Calluna vulgaris or Molinia caerulea. True bog species become fragmented or are lost. Hydrological fragmentation of the bog system can also occur.	
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the H7130 feature are referable to and characterised by the following National Vegetation Classification types; M18 *Erica tetralix – Sphagnum papillosum* raised and blanket mire M19 *Calluna vulgaris – Eriophorum vaginatum* blanket 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, the habitat supports a range of different vegetation communities on peats 0.4m or deeper. Transitions in mire community types 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 replaced by wet heath and dry heath communities. Blanket bog communities can be heavily influenced by land management activities. In these situations, typical blanket bog communities are replaced by a variety of more degraded mire vegetation, dry heath or acid grassland. Where these vegetation types occur on deeper peats, they normally comprise bog in unfavourable state and restoration back to blanket bog in favourable condition should be the objective. Note: Blanket bog vegetation can sometimes become established on peats shallower	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			than 0.4m.	
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 H7130 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 such species are established, the measures to control them may also impact negatively on the features of interest (e.g. use of broad spectrum herbicides).	JNCC, 2009. Common Standards for Monitoring Guidance - Upland Habitats.
	Presence /cover of woody species	Maintain a low cover of scrub or trees within stands of H7130 (<10% of the area).	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 bog surface by interception. This can reduce the amount of water reaching the bog surface. Birch *Betula spp*., Pine *Pinus sp*, Willow *Salix sp* and Rhododendron *Rhododendron ponticum* (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces. This excludes dwarf birch *Betula nana* and bog myrtle *Myrica gale* which should be retained if present.	
	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 *Agrostis capillaris*, Yorkshire fog *Holcus lanatus*, common reed *Phragmites australis*, bracken *Pteridium aquilinum,* creeping buttercup *Ranunculus repens*.	
Structure and function (including its typical species)	**Structural diversity**	Maintain or restore as appropriate the full range of typical structural features associated with the H7130 feature at this site, e.g. vegetation cover, surface patterning and hydrological zonation.	Bogs in particular show distinctive but varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the result of management activity). 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	JNCC: Common Standards Monitoring Guidance for Upland Habitats, 2009.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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 tussocks and spreading bushes of dwarf-shrubs.	
	Physical structure: ground disturbance (and peat erosion)	Ensure significant areas of disturbed and eroding bare ground are either absent or where present, are temporary and typically do not exceed 1% of the total extent of the H7130 feature	Excessive areas of bare ground and eroding peat are not naturally associated with this bog feature. This can adversely affect the hydrology of bog systems and its associated biodiversity but can also have wider environmental impacts, for example, on catchment water quality. There will also be a carbon loss from the system.	JNCC: Common Standards Monitoring Guidance for Upland Habitats, 2009.
	Soils, substrate and nutrient cycling	Maintain or restore as appropriate the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungi/bacteria ratio, to within typical values for the H7130 habitat. For this feature the peat substrate should consist of both acrotelm and catotelm layers.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. Peat is a soil distinguished from other soil types by its high content of organic matter (30%-100%). The organic matter content results form a combination of plant growth and waterlogging, the latter reducing oxygen diffusion to levels which are so slow that decomposition of the dead plant matter uses up this oxygen faster than it can be supplied. Consequently conditions rapidly become anaerobic, which reduces decomposition rates and the semi-decomposed plant material builds up over time to form peat. An active blanket bog should be made up of two layers, an acrotelm and a catotelm. The thin (5-75cm) upper layer or 'acrotelm' consists of living plant material and is a zone of fluctuating water table, where relatively rapid plant decomposition occurs. Below this is the 'catotelm', a much thicker layer of peat (up to 10m), consisting of broken down plant material, and which is always below the water table. Degraded	See Yorkshire Peat Partnership surveys for the North York Moors (http://www.yppartnership.org.uk/)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			blanket bogs may have lost the acrotelm layer, leaving a layer of damaged catotelm ('haplotelm') at the surface.	
Structure and function (including its typical species)	**Adaptation and resilience**	Restore the H7130 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See notes for this attribute in Table 1 above. Rotational burning, drainage and atmospheric deposition of pollutants can all compromise this feature's ability to adapt, especially in response to the effects of climate change.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and National Biodiversity Climate Change Vulnerability Assessments (NBCCVAs). Available at http://publications.naturalengland.org.uk/publication/4954594591375360
	Key structural, influential and/or site distinctive species	Maintain or restore as appropriate the abundance of the typical species listed in the explanatory notes to enable each of them to be a viable component of the Annex 1 habitat;	See notes for this attribute in Table 1 above. Key species include: *Sphagnum* spp., Common heather *Calluna vulgaris*, Blueberry *Vaccinium* spp, Hare's-tail cotton-grass *Eriophorum* spp., Deer-grass *Trichophorum cespitosum,* Bog-rosemary *Andromeda polifolia,* Round leaved sundew *Drosera rotundifolia,* Crowberry *Empetrum nigrum*.	JNCC: Common Standards Monitoring Guidance for Upland Habitats, 2009. Unpublished Natural England monitoring data, 2005-2016.
Supporting processes (on which the feature relies)	Air quality	Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information	See notes for this attribute in Table 1.	NATURAL ENGLAND, 2015. Site categorisation for nitrogen measures - Case Study F: Atmospheric nitrogen profile for North York Moors

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		System (www.apis.ac.uk).		SAC. Improvement Programme for England's Natura 2000 Sites (IPENS) – Planning for the Future IPENS049, 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).
	Hydrology	At a site, unit and/or catchment level (as necessary), maintain the natural hydrological processes to provide consistently near-surface water levels necessary to sustain the H7130 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. The blanket bog feature is sensitive to the effects of land management activities which may impact on and interrupt natural hydrological processes and water levels 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 also 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.	See Yorkshire Peat Partnership surveys for the North York Moors (http://www.yppartnership.org.uk/).
Supporting processes	**Conservation measures**	Maintain or restore as appropriate the	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(on which the feature relies)		management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the H7130 feature	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.	
Version Control Advice last updated: n/a				
Variations from national feature-framework of integrity-guidance: Not applicable The targets for some attributes listed above include both 'maintain' or 'restore' objectives. Overall, both objectives will be applicable to the SAC but these will differ between locations within the site depending on its particular circumstances. Natural England will able to provide further advice on request.				