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

North Pennine Dales Meadows Special Area of Conservation (SAC)
Site Code: UK0014775

Date of Publication: 11 February 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to North Pennine Dales Meadows SAC.

This advice should therefore be read together with the SAC Conservation Objectives available here.

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

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

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

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

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

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

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

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

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

About this site

European Site information

Name of European Site	North Pennine Dales Meadows Special Area of Conservation (SAC)
Location	Cumbria, Durham, Lancashire, North Yorkshire, Northumberland
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	497.09 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)	Arkle Beck Meadows, Whaw SSSI Ashes Pasture and Meadows SSSI Askrigg Bottoms SSSI Aules Hill Meadows SSSI Barrow Burn Meadows SSSI Bell Sykes Meadows SSSI Borrow Beck Meadows SSSI Bowber Head and Piper Hole Meadows SSSI Bowlees and Friar House Meadows SSSI Bretherdale Meadows SSSI Catton Lea Meadow SSSI Cautley Thwaite Meadows and Ecker Secker Beck SSSI Cliff Beck Meadow, Buttertubs SSSI Cornriggs Meadows SSSI Deepdale Meadows SSSI Deepdale Meadows, Langstrothdale SSSI Durtrees Burn Grassland SSSI Far High House Meadows SSSI Fothering Holme SSSI Gingerfields SSSI Gowk Bank SSSI Grains O' Th' Beck Meadows SSSI Grassington Hospital Grounds SSSI Greenhaugh Meadow SSSI Hannah's Meadows SSSI Harker's House Meadows SSSI Heatheryburn Bank SSSI High Knock Shield Meadow SSSI Knarsdale Meadows SSSI Langcliff Cross Meadow SSSI Low Redford Meadows SSSI Mere Beck Meadows SSSI Middle Crossthwaite SSSI Middle Side & Stonygill Meadows SSSI Mill Holme Meadow, Thwaite SSSI Muker Meadows SSSI Myttons Meadows SSSI New Close, Calvert Houses SSSI New House Meadows, Malham SSSI Oughtershaw and Beckermonds SSSI Peckriding Meadows SSSI Pry and Bottom Meadows, Mid-Mossdale SSSI Raisbeck Meadows SSSI Richmond Meadows SSSI Rigg Farm and Stake Hill Meadows SSSI Sandybeck Meadow SSSI Scar Closes, Kisdon Side SSSI Stephen Ings, Crackpot SSSI Swindale Meadows SSSI Thorneyburn Meadow SSSI Town End Meadows, Little Asby SSSI Upper Wharfedale SSSI Walden Meadows SSSI West Newlandside Meadows SSSI West Park Meadows SSSI Wet Sleddale Meadows SSSI White Ridge Meadow SSSI Wilson Place Meadows SSSI Yockenthwaite Meadows SSSI
Relationship with other European or International Site designations	North Pennine Moors SAC; North Pennine Moors SPA; River Eden SAC; Moor House - Upper Teesdale SAC; Ingleborough Complex SAC (c.400m); Border Mires Kielder Butterburn SAC (<100m)

Site background and geography

The North Pennine Dales Meadows SAC is a series of isolated fields within the higher parts of the enclosed valley bottoms of several north Pennine and Cumbrian valleys. The site is also part of National Character Area Profiles: 5. Border Moors and Forests (NE467), 8. Cumbria High Fells (NE343), 10. North Pennines (NE428), 17. Orton Fells (NE478), 18. Howgill Fells (NE537), 21. Yorkshire Dales (NE399), 33. Bowland Fringe and Pendle Hill (NE372) and 34. Bowland Fells (NE365).

The SAC is comprised of 58 component Sites of Special Scientific Interest (SSSI), which are located across the counties of Cumbria, Durham, Lancashire, North Yorkshire and Northumberland. It contains the major part of the remaining UK resource of mountain hay meadows and purple moor grass meadows, supporting a characteristic herb-rich vegetation unique to the Pennines and other upland areas of Northern England. The grasslands included within the site exhibit very limited effects of agricultural improvement and show good conservation of structure and function.

Hay meadows typically occur on low fertility soils. These Hay meadows provide an important link to the socio-economic and cultural past of the North Pennines. They are an entirely man-made habitat and are dependent on management by people year-in, year-out. The lack of available nutrients, coupled with the impact of both grazing and cutting means that individual species are unable to dominate as they do in more fertile or undisturbed habitats. The very richest hay meadows contain over 30 species per square metre with up to 120 species per field. Typical and some scarcer species include globeflower *Trollius europaeus*, the lady's-mantles *Alchemilla acutiloba*, *A. monticola* and *A. subcrenata*, and spignel *Meum athamanticum;* wood crane's-bill *Geranium sylvaticum*, great burnet *Sanguisorba officinalis*, pignut *Conopodium majus*, wood anemone *Anemone nemorosa*, betony *Stachys officinalis* , rough hawkbit *Leontodon hispidus*, and yellow rattle *Rhinanthus minor*. Hay meadows are also important as feeding areas for invertebrates and bats and provide valuable nesting and feeding sites for grey partridge *Perdix perdix* black grouse *Tetrao tetrix* and curlew *Numenius arquata*.

These fields are part of the agricultural landscape and economy. North Pennines hay meadows are typically grazed during the autumn/winter and early spring and are then 'shut up' (the livestock removed) in May to allow the hay crop to grow. Hay is normally made in July or August but in some cases as late as September. Cattle are then typically returned to the field to graze the 'aftermath'. Farmyard manure tends to be applied annually to restore nutrients removed with the hay crop and traditionally light applications of lime have been added to maintain neutral soil pH conditions.

As well as being partly within the AONB, part of the North Pennines Dales Meadows are also within a UNESCO Global Geopark and part of the European Geoparks Network. Further this SAC lies within the Northumberland National Park Authority and Yorkshire Dales National Park Authority. Further one of the underpinning SSSI Gowk Bank SSSI is also Gowk Bank NNR. There is one further exception to the norm where, to coincide with the SSSI designation at New House Meadows east of Malham, the SAC includes an isolated in-field limestone scar on which the notified feature is a herb-rich U17 Luzula sylvatica- Geum rivale tall herb ledge community where a number of the species overlap with those of the H6520 (MG3/M26) community.

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:

- **H6520 Mountain hay meadows**

This Annex I type comprises species-rich upland hay meadows on brown earth soils. It is a northern and sub-montane counterpart to H6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*).

In the UK this vegetation corresponds to NVC type MG3 *Anthoxanthum odoratum – Geranium sylvaticum* grassland. Various grasses, including common bent *Agrostis capillaris*, sweet vernal-grass *Anthoxanthum odoratum* and cock's-foot *Dactylis glomerata*, are prominent in the sward, and are accompanied by a range of associated species, such as wood crane's-bill *Geranium sylvaticum*, great burnet *Sanguisorba officinalis* and pignut *Conopodium majus*. Populations of rare lady's-mantle *Alchemilla* species are found in some meadows, mainly within the Upper Teesdale, Weardale, Garrigill and Allendale areas.

The floristic composition of mountain hay meadow vegetation in the UK is unlike that found in the rest of Europe.

The North Pennine Dales contain a series of isolated fields within several north Pennine and Cumbrian valleys. The site encompasses the range of variation exhibited by Mountain hay meadows in the UK and contains the major part of the remaining UK resource of this habitat type. The grasslands included within the site exhibit very limited effects of agricultural improvement and show good conservation of structure and function. A wide range of rare and local meadow species are contained within the meadows, including globeflower *Trollius europaeus*, the lady's-mantles *Alchemilla acutiloba*, *A. monticola* and *A. subcrenata*, and spignel *Meum athamanticum*.

- **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.

In the UK these grasslands are represented by two NVC types:

M24 *Molinia caerulea – Cirsium dissectum* fen-meadow
M26 *Molinia caerulea – Crepis paludosa* mire

M24 *Molinia – Cirsium* fen-meadow is the more widespread and diverse community. It comprises a heathy form found mainly in south Wales, south-west England and Northern Ireland, a form with tall herbs in the fen systems of East Anglia, and a more widespread 'typical' form widely but locally distributed in southern Britain. Some forms of *Molinia – Cirsium* fen-meadow with abundant *Cladium* are referable to Annex I type H7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae.

M26 *Molinia caerulea – Crepis paludosa* mire occurs more locally in wet grasslands and fens in uplands and upland margins of northern England and north Wales, and as small scattered stands throughout Scotland as far north as Moray. The vegetation has a distinctive sub-montane character, manifested in

the presence of species with a northern distribution, such as marsh hawk's-beard *Crepis paludosa* and globe-flower *Trollius europaeus*.

H6410. Molinia meadows on calcareous, peaty or clayey-silt-laden soils is a qualifying feature for North Pennine Dales Meadows SAC but not the primary reason from designation.

Qualifying Species:

n/a

Table 1: Supplementary Advice for Qualifying Features: H6520. Mountain hay 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 the to the extent baseline-value of 393.02 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. H6520 Mountain hay meadows are found as an interest feature within all 58 underpinning SSSIs for North Pennine Dales Meadows SAC. These meadows have been managed at an extremely low level of agricultural intensification and show good conservation of habitat structure and function.	Natura 2000 Standard data form Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant Favourable Condition Tables (FCT) (which may be available from Natural England on request). For Swindale Meadows see "A National Vegetation Classification survey of meadows and pastures along Swindale Beck" Rigby Jerram for RSPB. 29 November 2012.
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.	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	North Pennines AONB Partnership. 2011. Hay Time – North Pennines The Fifth Year of Action. Available here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature. The spatial distribution of H6520 Mountain hay meadows are dispersed fields found from Cumbria and Northumberland down through to Lancaster and North Yorkshire.	
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: MG3 *Anthoxanthum odoratum - Geranium sylvaticum* grassland MG8 *Cynosurus cristatus - Caltha palustris* 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). There are two principal vegetation types which commonly occur within the mountain hay meadow feature within North Pennine Dales Meadows, MG3 and MG8. As this feature refers to the management unit of a 'meadow 'it is important that both the vegetation communities are included. The positive indicator list is a composite of the two individual lists for MG3-related and MG8-related vegetation.	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs (which may be available on request from Natural England).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Vegetation: proportion of herbs (including Carex spp)**	Restore the proportion of herbaceous species within the range 50%-90%	A high cover of characteristic herbs, including sedges (Carex species) is typical of the structure of this habitat type. It is worth noting that the grass: herb ratio can also fluctuate due to weather effects; for example, a wet spring may favour grasses over herbs. It also fluctuates with time as the grasses 'bulk up' prior to cutting. Therefore the target should give scope for natural variation.	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs (which may be 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 species listed below to enable each of them to be a viable component of the Annex 1 habitat; The constant and preferential plant species of the MG3 *Anthoxanthum odoratum - Geranium sylvaticum* grassland and MG8 *Cynosurus cristatus - Caltha palustris* grassland NVC communities that form a key component of the H6250 feature within this SAC.	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural species** which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential species** which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • **Site-distinctive species** which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. There are two principal vegetation types which commonly occur within the mountain hay meadow feature within North Pennine	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs (which may be available from Natural England on request). Ptyxis Ecology. 2013. Eyebright survey of Gowk Bank NNR. A Report for Natural England. Available on request. Wallace, H. & Prosser, M. 2017 A review of the National Vegetation Classification for the *Calthion* group of plant communities in England and Wales. Joint report between Bangor University, Natural England & Floodplain Meadows Partnership

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Dales Meadows; MG3 and MG8. As this feature refers to the management unit of a 'meadow 'it is important that both the vegetation communities are included.	
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. Creeping thistle *Cirsium arvense* Spear thistle *Cirsium vulgare* Curly dock *Rumex crispus* Broad-leaved dock *Rumex obtusifolius,* Ragwort *Senecio jacobaea,* Common nettle *Urtica dioica, Tufted hair grass Deschampsia cespitosa*	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. In some component SSSIs, cow parsley *Anthriscus sylvestris* is becoming an overly aggressive species. The cause may be linked to changes in hay meadow management, including a reduction in spring/aftermath grazing intensity; possibly atmospheric nitrogen deposition and problems of eutrophication or insufficient biomass removal. Further in other component SSSIs, the lack of maintenance, and deterioration of drainage systems is causing a dominance of Juncus species. This change in the plant community, is waterlogging, possibly lowering pH and consequent problems for management. The lack of management on Some meadows is causing some tree and scrub, such as blackthorn *Prunus spinosa* to begin to encroach. Use of herbicides to control 'undesirable' broad-leaved herbs such as buttercup and pernicious weeds, particularly around the edges of meadows may lead to a decline in quality of the grassland.	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs (which may be available from Natural England on request).
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation zonations/transitions H6410 Molinia meadows	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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain and where necessary restore the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. Nutrient enrichment and soil compaction may lead to an undesirable change in the composition of vegetation. Occasionally issues of acidification arise through lack of liming and gradual leaching and offtake over decades arise.	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	Supporting off-site habitat	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment. External nutrient enrichment e.g leaking septic tanks and fly-tipping may lead to damage the H6520 Mountain hay meadow feature	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with	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	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs (which may be

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		the site	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. Roadside verges in upland valley landscapes, in particular, support important population of H6520 typical species. There are still some unmanaged areas within the vicinity of these Upland Hay meadows such as road side verges, river banks and steep banks within meadows and pastures that are the last remaining areas that also show this feature. These areas might be able to be used as seed sources for restoring this H6520 Mountain hay meadows.	available from Natural England on request).
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	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here Natural England, 2015a. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available here]

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			feature's long-term viability. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats and supporting habitats. This means that this site is considered to be vulnerable overall but moderately so. 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 advisable. Upland meadows are becoming wetter due to milder winters and wet summers, this may also be leading to an earlier start to the growing season having a negative impact on boreal species changes such as wood cranesbill *Geranium sylvaticum*. There may also be follow-on issues of maintenance of old tile or stone drains, not just silting up but their vulnerability to crack or collapse under the weight of modern farming machinery. Flexibility, e.g. in management and timing of grazing and "shutting up" dates, is key to maintaining the feature's ability to adapt to environmental change and local conditions.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen	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.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			(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.	
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 typically include grazing, cutting, scrub management, weed control, recreation/visitor management. Retention of suitable land use infrastructure/ patterns to enable site management e.g. pastoral hill livestock farming. The support and maintenance of traditional upland hill farms, rearing of cattle and sheep are essential for the preservation of this feature. Without these farms and the livestock this feature would be lost. Support is given to the framers of these meadows through agri-environment schemes to continue manage these fields in a semi traditional manner with a focus on low inputs (no inorganic fertiliser) and hay making. A switch from production of hay to silage or haylage may reduce the variability in cutting dates	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here NPAONB. 2014. Nectarworks Meadow Restoration Project. Available from Natural England

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Version Control N/A			
Variations from national feature-framework of integrity-guidance: This site comprises an intricate mosaic of MG3 and MG8 grassland. The attributes and targets have been amalgamated where possible. The approach for amalgamating two sets of attributes, in appropriate situations is detailed in the Lowland Grassland (ENRR 315, Vol 1) guidance. Where there is a difference in the target levels between the two NVC types (MG3 only and MG3 related/MG8 related), the MG3-related/MG8 related target has tended to be applied.			

Table 2: 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 to a feature extent baseline-value of 7.37 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. The H6410. *Molinia* meadows feature has been recorded within about 13% of underpinning SSSIs. However, a dedicated *Molinia* survey has never been carried out within the SAC, Therefore it is likely that further stands are await 'discovery' and the true extent of this rare and highly fragmented vegetation type may be over or underestimated. Further, difficulty in separating this habitat with its scattered nature from transitional habitats means again that the true extent may be under or overestimated. In addition this habitat is extremely susceptible to hydrological, management and climate changes so the current extent figure is likely to need regular monitoring to remain current.	Natura 2000 Standard data form Available here This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs For Swindale Meadows see "A National Vegetation Classification survey of meadows and pastures along Swindale Beck" Rigby Jerram for RSPB. 29 November 2012.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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. H6410. *Molinia* meadows was recorded in small patches within the following underpinning SSSIs: Ashes Pasture and Meadows SSSI; Bowber Head and Piper Hole Meadows SSSI; Gowk Bank SSSI; Oughtershaw and Beckermonds SSSI; Pry and Bottom Meadows, Mid-Mossdale SSSI; Sandybeck Meadow SSSI; Swindale Meadows SSSI, Town End Meadows, Little Asby SSSI and Wilson Place Meadows SSSI. H6410. *Molinia* meadows have frequently been recorded scattered within or at the edge of H6520. Mountain hay meadows.	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs.
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types:	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		M26 *Molinia caerulea-Crepis paludosa* 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. 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).	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat The constant and preferential plant species of the M26 *Molinia caerulea-Crepis paludosa* mire NVC community which forms a key component of the H6410 feature within this SAC.	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural species** which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential species** which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • **Site-distinctive species** which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. Due to the geographical spread, topographical variation and management of this SAC, there is variation between presence	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs. Natural England, 2016. Favourable Conservation Tables – Pry and Bottom Meadows Mid-Mossdale SSSI. Available from Natural England Averis A., Averis B., Birks J., Horsfield D., Thompson D. & Yeo M. 2004. An illustrated guide to British upland vegetation. JNCC. Rodwell J.S. (Ed). 1992. British Plant Communities, Volume 3: Grasslands and montane communities. Cambridge University Press. Cambridge.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			and abundance levels of notable species from site to site.	
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. Creeping thistle *Cirsium arvense;* Spear thistle *Cirsium vulgare;* Common sorrel *Rumex acetosa;* Cow parsley *Anthriscus sylvestris*; Creeping buttercup *Ranunculus repens;* Common nettle *Urtica Dioica* No more than 10% cover: Tufted hair grass *Deschampsia cespitosa*	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. Due to the geographical, topographical and management of this SAC, there is variation between the extent and spread of undesirable species. Cow parsley and scrub notably blackthorn *Prunus spinose* are a concern locally for a limited number of sites. Rushes *Juncus spp* (notably soft rush *Juncus effuses*) can be a characteristic component of the communities; however, and increase in cover of these species can indicate insufficient management by grazing or cutting.	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs. North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain the pattern of natural vegetation zonations/transitions Areas of transitions to H6520 Mountain Hay Meadows	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. The main NVC habitat for this feature is M26 *Molinia caerulea-Crepis paludosa* mire and transitions are found between this NVC and the following: MG3 *Anthoxanthum odoratum - Geranium sylvaticum* northern hay meadow*; MG8 Cynosurus cristatus - Caltha palustris* flood pasture*; M23 Juncus effusus/acutiflorus - Galium palustre* rush pasture and *M25 Molinia caerulea - Potentilla erecta* mire.	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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. Soil compaction due to heavy machinery and stock is also causing hydrological changes and species composition changes. Excessive applications of nutrients and associated run off may lead to undesirable changes in vegetation composition.	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here
Structure and function (including its typical species)	**Water quality**	Where the feature is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature.	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	
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 ± 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,	North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here O'Reilly. J. 2011. An analysis of survey data from upland hay meadows in the North Pennines AONB - Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Failure and deterioration of drainage systems can result in increased dominance of rushes and a reduction in species diversity. In addition to changes in field drainage, the effects of climate change through the climate becoming wetter due to milder winters and wet summers. This may also impact H6410 Molinia meadows (O'Reilly 2010).	Commissioned Report NECR069. Available from here.
Structure and function (including its typical species)	**Supporting off-site habitat**	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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**	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	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats and supporting habitats. This means that this site is considered to be vulnerable overall but moderately so. 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 advisable.	Natural England, 2015a. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available here]

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	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. Appropriate management for this feature may include maintenance of surface drainage features such as drains,	This attribute will be periodically monitored as part of Natural England's site condition assessments and recorded within the relevant FCTs. North Pennine Dales Meadows SAC Site Improvement Plan, Natural England, Available here JNCC. 2007. Conservation status assessment for: H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). Second Report by the

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			grips, gutters and foot drains. Retention of suitable land use infrastructure/patterns to enable site management e.g. pastoral livestock farming. The correct grazing regime and livestock is key to managing H6410 *Molinia* meadows. Control of scrub encroachment and to a lesser degree rushes, tufted hair grass and locally cow parsley is important to ensure that these species and habitats do not become dominant at the expense of other noteworthy key species.	United Kingdom under Article 17 on the implementation of the Directive from January 2001 to December 2006.
Version Control N/A				
Variations from national feature-framework of integrity-guidance: N/A				