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

Walton Moss Special Area of Conservation (SAC)
Site code: UK0030093

Date of Publication: 9 January 2019

About this document

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

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

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

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	Walton Moss Special Area of Conservation (SAC)
Location	Cumbria
Site Maps	The designated boundary of this site can be viewed here on the MAGiC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	286.74ha
Designation Changes	n/a
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Bolton Fell and Walton Mosses SSSI
Relationship with other European or International Site designations	n/a

Site background and geography

Walton Moss SAC comprises a 'macrotope' of intermediate mires located in the border region of North Cumbria. Only 7.25ha of the SAC is currently managed as a National Nature Reserve by Natural England, with the rest in private ownership. The annual precipitation in the nearby village of Walton is 886.8 mm.

Walton Moss lies approximately 6km north-west of Brampton and 13km north-east of Carlisle and lies within the Solway Basin National Character Area. This is a low-lying area of gently undulating low hills that grade into the coastal plain and estuarine landscape of the Solway Firth to the east and south and across the lowlands of the Dumfries coast to the north.

The area has a long history as border country, originally divided by the Roman frontier of Hadrian's Wall, which has World Heritage Site designation, and through succeeding centuries it has been a part of the disputed lands of the English–Scottish border.

Walton Moss has many features typical of a raised mire but occupies a low plateaux on rising ground at c100 metres and so has structural features of upland blanket bog. The peat spills over from the main basin forming blanket mire, and as such it is best regarded as an intermediate type of mire. The peat is underlain by boulder clay or glacial till, a mixture of stones, pebble, silt and clay laid down below ice-sheets during the last glaciations. This material is impervious and at the end of the glaciation it probably held a glacial lake or a series of interconnecting lakes. During post-glacial times the lakes have been progressively filled with peat formed from vegetation growing in towards the centre of the basin from the sides. The geomorphological setting is thus a peat filled hollow on a boulder clay surface with glacial rounded topography.

Walton Moss is a near intact raised mire with a high water table, a good cover of bog mosses (*Sphagnum spp*.) and a well preserved rand. It is one of the least damaged ombrotrophic mires remaining in England. The bog vegetation is characteristic and rich with a variety of Sphagnum species

and other bryophytes, including some nationally scarce species together with higher plants such as bog rosemary (*Andromeda polifolia*), cranberry (*Vaccinium oxycoccos*) and white beaked sedge (*Rhynchospora alba*).

Other habitats include marshy grassland and small areas of birch dominated woodland and scrub around the periphery of the moss. The fauna of the moss is not so well known through several RDB species of bird breed there and some notable butterflies and moths have been recorded. This site is also important for paleo-ecological studies.

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:

- **H7110 Active raised bogs* (priority feature)**

  Active raised bogs are peat-forming ecosystems that have developed during thousands of years of peat accumulation, to such an extent that the depth of peat isolates them from the influence of groundwater. Typically, lowland raised bogs form a raised dome of peat irrigated solely by rainfall. Such rainwater-fed ecosystems are naturally waterlogged, very acid and poor in plant nutrients and typically support a restricted range of species, some of which are otherwise abundant only in the cooler and wetter uplands of the UK

  The site supports a large area of raised mire habitat comprising key communities including M18 *Erica tetralix-Sphagnum papillosum* mire and M2a *Sphagnum cuspidatum/fallax* bog pool community. Walton Moss is the most intact raised mire in England and is unusual in that it supports the less common intermediate mire type.

  Sphagnum bog with lawns, hollows and mounds is present across the central mire expanse, which occupies most of the site. Bog-moss species present include *Sphagnum magellanicum, S. capillifolium, S. papillosum* and *S. tenellum* as hummocks; *S. cuspidatum* and *S. recurvum* in hollows. Higher plant species include bog-rosemary *Andromeda polifolia*, cranberry *Vaccinium oxycoccos*, round-leaved sundew *Drosera rotundifolia* and white beak-sedge *Rhynchospora alba*; heather *Calluna vulgaris* and cross-leaved heath *Erica tetralix* are locally abundant. Birch *Betula spp*. is occasional along the edges but is also represented as a small stand on the crown of the bog. This may be linked to atmospheric deposition of nutrients, especially nitrogen (Barkman 1992), but is also observed on other established bog habitats such as Flanders Moss SSSI.

  Within this SAC, 'active' vegetation mainly corresponds with National Vegetation Classification type M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire, with M2 *Sphagnum cuspidatum/recurvum* bog pool community.

- **H7120 Degraded raised bogs still capable of natural regeneration**

  Degraded raised bogs typically occur where there has been widespread disruption, usually by humans, to the structure and function of the peat body. This can involve changes to the hydrology, vegetation, and physical structure of the bog, leading to desiccation, oxidation and loss of species or changes in the balance of the species composition. In contrast to the H7110 Active raised bogs, peat is not currently forming in degraded bog. The vegetation of degraded bog contains several, but not all, of the species typical of active raised bogs, but the relative abundance and distribution of individual species differs.

  Degraded raised bogs are considered capable of natural regeneration where the hydrology can be repaired and where, with appropriate rehabilitation management, there is a reasonable expectation of re-establishing vegetation with peat-forming capability within 30 years.

Some peat-cutting has taken place in the south-east and south-west of the moss, lowering the surface by about 1.5 m, and it is here that the bog is degraded. This area supports M17a *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire, M25b *Molinia caerulea-Potentilla erecta* mire and M6 *Carex echinata-Sphagnum fallax/denticulatum* mire.

The degraded areas tend to be dominated by purple moor-grass *Molinia caerulea* with common cottongrass *Eriophorum angustifolium* and the bog-moss *Sphagnum cuspidatum* colonising pools. In drier areas a bog heath community is present with moribund heather *Calluna vulgaris* dominating. Small areas of birch-dominated woodland or scrub are present around the margins of the site. Rush pasture is also present on the margins, with species such as the rushes *Juncus effusus, J. conglomeratus, J. acutiflorus, J. squarrosus* and *M. caerulea*.

This predominantly active bog is surrounded by rough pasture, and there may be up to 149 ha of archaic peatland surrounding the site on thin blanket peat.

At this SAC, degraded bog mainly corresponds with National Vegetation Classification type M17 *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire with M6c *Carex echinata-Sphagnum fallax/denticulatum* mire with the edges supporting areas of M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, M6 *Juncus – Sphagnum falla*x mire with small stands of W2b *Salix – Betula – Phragmites* woodland. The objective of restoration is to recover these communities towards M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire with a functioning lagg community.

Qualifying Species:

Not applicable.

References

BARKMAN, J.J. (1992) Plant communities and synecology of bogs and heath pools in the Netherlands. *Fens and Bogs in the Netherlands: Vegetation, History, Nutrient Dynamics and Conservation* (ed. J.T.A. Verhoeven), pp. 173–235. Kluwer Academic Publishers, Dordrecht, the Netherlands

JERRAM, R. (2013). Walton Moss National Vegetation Classification Survey.

RODWELL, J.S. (ed.) 1991. *British Plant Communities. Volume 1. Woodlands and scrub*. Cambridge University Press.

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

Table 1: Supplementary Advice for Qualifying Features: H7110. Active raised 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 140ha of the H7110 feature	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. 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. For this feature, the term 'Bog' is taken here to be the peat deposit together with typical bog vegetation, irrespective of the precise nature and condition of that vegetation. 'Lagg fen' comprises both peat deposit and vegetation, irrespective of nature and condition.	NATURAL ENGLAND (2014) Site Improvement Plan Walton Moss (SIP256). Available at: http://publications.naturalengland.org.uk/publication/5913783809605632?category=6329101765836800 JERRAM, R (2013) Walton Moss National Vegetation Classification Survey.
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the H7110 feature are referable to and characterised by the following National Vegetation Classification types: M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire M2 *Sphagnum cuspidatum/ recurvum* bog pool community	Maintaining or restoring these distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. Maintaining the M18 and M2 communities, with transitions between them and restoration of the lagg (or marginal fen) could include the following vegetation communities; M6 *Carex echinata-Sphagnum recurvum/auriculatum* mire; M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture; W4c *Betula pubescens-Molinia caerulea* woodland, *Sphagnum* spp. sub-community and W2b *Salix – Betula – Phragmites* woodland	JERRAM, R (2013) Walton Moss National Vegetation Classification Survey.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Structural diversity**	Restore the full range of typical structural features associated with the H7110 feature at this site, e.g. vegetation cover, surface patterning and hydrological zonation	A raised bog with appropriate hydrology will possess a domed structure comprising the mire expanse (the centre), the rand (sloping edge) and the lagg (marginal fen with groundwater influence). Active raised bogs in particular show varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the result of previous damage). These can occur at macro and micro scales across the habitat and include alternative aquatic and terrestrial surface features, such as pools and hummocks, and terrestrial features such as ridges and hollows. These features will support distinctive patterns of bog vegetation, and so will be sensitive to changes in topography and hydrology. These can be modified or disrupted by activities such as drainage, burning, grazing, vehicular access and peat digging.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	Key structural, influential and distinctive species	Restore the abundance of the species listed below to enable each of them to be a viable component of H7110 Active Raised Bog habitat; 1. Mixed assemblage of peat-forming bryophytes (predominantly *Sphagnum* spp), cooton-grasses (Cyperaceae) Dwarf shrubs (mainly Ericaceae) 2. Greater Sundew *Drosera anglica* 3. Adder *Vipera berus* 4. Large heath butterfly *Coenonympha tullia* 5. Breeding assemblage of wading birds including curlew, snipe and redshank	Some plant or animal species (or related groups of such species) 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; - 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. For this feature, the vegetation of the mire expanse should comprise an inter-mix of typical bryophytes (predominantly Sphagnum spp), grasses and dwarf shrubs, with no one group dominating at the expense of others on 'active' sites.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Hydrology**	At a site level, maintain natural hydrological processes to provide the conditions necessary to sustain the H7110 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. Significant restoration has been undertaken across this site to restore the hydrological functionality through. The historical drainage has altered the vegetation communities but this is anticipated to change to those more indicative of active bog as the hydrology stabilises.	LABADZ & BUTCHER (2005) Wetlands Framework Research Project: Hydrology of Walton Moss. Environment Agency
Structure and function (including its typical species)	**Water chemistry**	Maintain the surface water and groundwater supporting the hydrology of the rain-fed bog at a low nutrient status.	This habitat type is predominantly rain-fed and should be naturally low in nutrients to sustain its characteristic bog communities and associated typical species. Any sources of water which contributes to supporting the bog habitat, including the margins of the bog and the lagg (the peripheral zone around the bog), should similarly be lacking in nutrients.	
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 H7110 Active lowland raised bog habitat.	Changes to natural peat properties may affect the ecological structure, function and processes associated with this Annex I feature. The typical substrate for this feature is acidic and nutrient/mineral-poor peat with a water content of over 85%. Peat is distinguished from other soil types by its high content of organic matter, which results from plant growth and waterlogging combining to reduce decomposition rates and allow a build-up, over time, of semi-decomposed plant material to form peat. Peat is naturally lacking in nutrients with typically low values of calcium, phosphate, nitrate and pH. The peat-forming vegetation and zone of peat deposition (‘acrotelm’) overlies up to 8 metres of consolidated peat (‘catotelm’). To maintain the catotelm/peat body, the peat should be saturated, anaerobic, acidic and nutrient-poor and water movement should be minimal. Any activities that lower the water table will expose the peat to oxygen, increase nutrient levels or change the acidity. Any of these impacts will be detrimental.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain the H7710 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 H7110 feature will be most resilient when its hydrology and topography approach that found on undamaged sites, its vegetation is actively peat-forming and the bog is unconstrained to spread or contract vertically or laterally. The overall vulnerability of this particular SAC to climate change has been assessed by Natural England as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats. 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.	NATURAL ENGLAND (2015) Climate Change Theme Plan and National Biodiversity Climate Change Vulnerability Assessments (NBCCVAs). Available at: http://publications.naturalengland.org.uk/publication/4954594591375360

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for H7110 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. The site's designated habitats, raised bogs, are very sensitive to atmospheric nitrogen (N). Current N deposition in the wider area is estimated to be 180% of the critical load of the most sensitive habitat. The level of exceedance may also be underestimated, for some areas of the site, given the proximity of likely local emission sources. Diffuse agricultural activities are the main source of atmospheric N for this site. Local agricultural sources, in particular cattle farming, contribute significantly to the deposition at Walton Moss, but a substantial proportion of the total N deposited is also estimated to originate from long-range N deposition.	NATURAL ENGLAND (2015) Case Study A: Atmospheric nitrogen profile for Walton Moss SAC ((IPENS049A). Available at: http://publications.naturalengland.org.uk/file/6134296340332544

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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 H7110 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.	NATURAL ENGLAND (2014) Site Improvement Plan Walton Moss (SIP256). Available at: http://publications.naturalengland.org.uk/publication/5913783809605632?category=6329101765836800 ENGLISH NATURE, 2005. Bolton Fell & Walton Mosses SSSI Views about Management. https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/200855.pdf NATURAL ENGLAND. Walton Moss NNR Management Plan 2017-2022.

english

Variations from national feature-framework of integrity-guidance:

The attribute ‘Spatial distribution of the feature within the site’ is not applicable to this site as the bog is confined to deep peat. Only the lagg is within the influence of groundwater.

The attribute ‘Invasive, non-native and/or introduced species’ is not applicable on this site as there are no invasive species present within the SAC

The attribute ‘Supporting off-site habitat’ is not applicable on this site as there are no habitats dependent upon the management of the SAC

The attribute ‘Functional connectivity with wider landscape’ is not applicable on this site since the whole hydrological functioning unit has been included within the designation of the wider SSSI and therefore the SAC is supported within this boundary.

Table 2: Supplementary Advice for Qualifying Features: H7120. Degraded raised bogs still capable of natural regeneration

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**	Avoid further degradation of the extent of the H7120 feature, whilst restoring all hectares of the H7120 feature to H7110 Active Raised Bogs	There should be no measurable increase in the extent and area of this feature, and in most cases, the full extent of the feature should be restored to H7110 Active Raised Bogs. Approximately 100ha of Walton Moss SAC has previously undergone some form of alteration resulting in damage to the peat forming vegetation. The damage has now been repaired and these formally damaged areas are in recovery. For this feature, 'Bog' is taken here to be the peat deposit together with typical bog vegetation, irrespective of the precise nature and condition of that vegetation. 'Lagg fen' comprises both peat deposit and vegetation, irrespective of nature and condition	
Structure and function (including its typical species)	**Soils, substrate and nutrient cycling**	Avoid further degradation of the peat substrate of the H7120 feature and restore the properties of the underlying peat type, including its structure, bulk density, total carbon, pH, soil nutrient status and fungal/bacterial ratio, to within typical values for H7110 Active Raised Bog habitat.	Changes to natural properties of the bog's peat body may affect the ecological structure, function and processes associated with this Annex I feature. The typical substrate for this feature is acidic and nutrient-poor peat. Peat is distinguished from other soil types by its high content of organic matter, which results from plant growth and waterlogging combining to reduce decomposition rates and allow a build-up, over time, of semi-decomposed plant material to form peat. Peat is naturally lacking in nutrients with typically low values of calcium, phosphate, nitrate and pH. The surface of an active raised bog should be made up of two distinct layers; an acrotelm and a catotelm. The thin upper layer, or ‘acrotelm’, is typically up to 30cms deep and 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 (typically up to 10 metres), which comprises broken down plant material and is always below the water table. The surface acrotelm layer of degraded raised bogs affected by past drainage or burning may be replaced with a single layer of damaged catotelm (‘haplotelm’).	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Vegetation community composition**	Restore the component vegetation communities of the H7210 feature to those resembling and characterised by the following National Vegetation Classification type(s) typical of H7110 Active Raised Bog • M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire and M2 *Sphagnum cuspidatum/Sphagnum recurvum* bog pool community (mire expanse and rand) • M4 *Carex rostrata-Sphagnum recurvum* mire • M6 *Carex echinata-Sphagnum recurvum/auriculatum* mire • M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture • M25 *Molinia caerulea-Potentilla erecta* mire • M27 *Filipendula ulmaria-Angelica sylvestris* mire • W5 *Alnus glutinosa – Carex paniculata* woodland • W6 *Alnus glutinosa – Urtica dioica* woodland (lagg)	This habitat feature when restored will comprise a number of associated semi-natural and natural vegetation types associated with H7110 Active Raised Bog and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and hydrology) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Restoring degraded bog vegetation to characteristic and distinctive H7110 active bog vegetation types will be important to restoring the overall habitat feature. This will also help to conserve their typical plant species (including the constant and preferential species of a vegetation community), and therefore those of the SAC feature, at appropriate levels (recognising natural fluctuations). Degraded raised bog on this site is currently characterised by an impoverished vegetation mainly dominated by purple moor-grass *Molinia caerulea* and lacking significant cover of bog mosses *Sphagnum* spp. These communities will have low representation as the site is recovers to H7110 Active Raised Bogs. The component wetland types of active raised bog will comprise the bog expanse, the sloping margins of the bog (or 'rand') (although this may not always be mappable) and lagg fen. The bog expanse will typically be characterised by ombrotrophic vegetation (such as M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire and M2 S*phagnum cuspidatum/recurvum* bog pool community). It should comprise an intimate mix of typical bryophytes (predominantly Sphagnum spp), grasses/sedges and dwarf shrubs, with no one group dominating at the expense of others on 'active' sites. Sphagnum should predominate on hyper-oceanic sites, while its cover may be slightly lower on eastern sites with lower rainfall. The bog rand will typically consist of communities of drier peat and the lagg fen by vegetation associated with swamp and fen habitats.	NATURAL ENGLAND (2014) ISAT Whole Site Survey

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Structural diversity**	Restore the full range of structural features (e.g. vegetation cover, surface patterning and hydrological transitions) typically associated with H7110 Active Raised Bog to the H7120 feature at this site.	Development of structural features is an indicator of hydrologically suitable conditions for restoration to the Active Raised Bogs feature. Active raised bogs in particular show varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the result of previous damage). These can occur at both macro and micro scales across the habitat and include alternative aquatic and terrestrial surface features, such as bog pools and hummocks, ridges and hollows. These features will support distinctive patterns of bog vegetation, and so will be sensitive to changes in topography and hydrology. These can be modified or disrupted by activities such as drainage, burning, grazing, vehicular access and peat digging.	
Structure and function (including its typical species)	**Key structural, influential and distinctive species**	Restore the abundance of the species listed below to enable each of them to be a viable component of H7110 Active Raised Bog habitat [See species list for the H7110 feature in Table 1]	See the notes for this attribute in Table 1	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Hydrology**	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the water levels and conditions necessary to prevent further degradation of the H7120 feature within the site and to enable its restoration to H7110 active raised bog	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site. The restoration of this structural attribute of the H7120 degraded bog feature will be a key element of its recovery to H7110 active raised bog. The hydrology of degraded raised bog fails to support the processes and vegetation of active raised bog, which is the desired feature on this part of the site. Low and/or fluctuating water levels in the peat leads to oxidation and loss (wastage) of the peat along with loss of ability of the peat body to retain rainwater and accumulate peat. Bog species adapted to waterlogged, acidic and nutrient-poor conditions will be lost. 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 surface of an active raised bog has low nutrient, waterlogged or high water table conditions. An abundance of the bog-mosses *Sphagnum papillosum, S. capillifolium, S.tenellum and S. magellanicum* will often indicate good hydrological conditions. Typically, the hydrology of the H7120 habitat feature has already been degraded but is considered capable of recovery. Further detrimental changes to the hydrology of a degraded raised bog can lead to further desiccation, oxidation and a further loss of species and will undermine the aim to restore this feature to active raised bog. This target is currently generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	LABADZ & BUTCHER (2005). Wetlands Framework Research Project: Hydrology of Walton Moss. Environment Agency
Structure and function (including its typical species)	**Water chemistry**	Maintain the surface water and groundwater supporting the hydrology of the feature at a low nutrient status.	Due to its position above the ground water table, the mire expanse and rand of this habitat type obtain their water from precipitation, which interacts with the bog's vegetation to produce naturally low nutrient levels which sustain its characteristic bog communities and associated typical species. Any sources of water which contributes to supporting the bog habitat, including the margins of the bog and the lagg (the peripheral zone around the bog), should similarly be lacking in nutrients.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Adaptation and resilience**	Avoid further degradation of the H7120 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 the notes for this attribute in Table 1 Ensuring that the site has a fully-functioning hydrology and active bog surface will help to mitigate the intensity of these potential changes.	NATURAL ENGLAND (2014) Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate (NE546): 16 Blanket Bog & 12 Lowland Fens. Available at: http://publications.naturalengland.org.uk/publication/5629923804839936 CLARK, J.M., GALLEGO-SALA, A.V., ALLOTT, T.E.H., CHAPMAN, S.J., FARWELL, T., FREEMAN, C., HOUSE, J.I., ORR, H.G., PRENTICE, I.C. AND SMITH , P. (2010). Assessing the vulnerability of blanket peat to climate change using an ensemble of statistical bioclimatic envelope models. *Climate Research* 45, 131-150 CAPORN, S.J.M. AND EMMETT, B.A. 2009. Threats from air pollution and climate change to upland systems. In *Drivers of Environmental Change in uplands* (Bonn, A., Allott, T., Hubacek, K. And Stewart, J.Eds), Routledge. Abingdon. Oxon

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See the notes for this attribute in Table 1	NATURAL ENGLAND (2015) Case Study A: Atmospheric nitrogen profile for Walton Moss SAC ((IPENS049A). Available at: http://publications.naturalengland.org.uk/file/6134296340332544
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 restore the structure, function and supporting processes necessary for restoration to H7110 Active Raised Bog	Active and ongoing conservation management is needed to prevent further degradation of the H7120 Degraded Raised Bog feature at this site, and, more importantly, to restore it to H7110 Active Raised Bog habitat. Usually, raised bog restoration measures will aim to elevate and stabilise the underlying water table and re-establish waterlogged conditions, so the bog can re-grow and regain its characteristic structural features (e.g. bog pools) and its typical plant assemblages. 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 the 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 Walton Moss (SIP256). Available at: http://publications.naturalengland.org.uk/publication/5913783809605632?category=6329101765836800 ENGLISH NATURE, 2004. Bolton Fell & Walton Mosses SSSI Views about Management. https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/2000855.pdf NATURAL ENGLAND. Walton Moss NNR Management Plan 2017-2022.
Version Control Advice last updated: N/A				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Variations from national feature-framework of integrity-guidance: The attribute 'Spatial distribution of the feature within the site' is not applicable to this site as the bog is confined to deep peat. Only the lagg is within the influence of groundwater. The attribute 'Invasive, non-native and/or introduced species' is not applicable on this site as there are no invasive species present within the SAC The attribute 'Supporting off-site habitat' is not applicable on this site as there are no habitats dependent upon the management of the SAC The attribute 'Functional connectivity with wider landscape' is not applicable on this site since the whole hydrological functioning unit has been included within the designation of the wider SSSI and therefore the SAC is supported within this boundary.			