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

Woolmer Forest Special Area of Conservation (SAC)
Site Code: UK0030304

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Date of Publication: January 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Woolmer Forest 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	Woolmer Forest Special Area of Conservation (SAC)
Location	Hampshire
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	666.68 ha
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Woolmer Forest SSSI
Relationship with other European or International Site designations	The site is a significant component of the Wealden Heaths Phase II Special Protection Area (SPA)

Site background and geography

Woolmer Forest SAC is a large expanse of lowland heathland with associated habitats including valley mire, oligotrophic ponds, wet woodland, secondary woodland, acid grassland, scrub and conifer plantations. Situated in the western Weald, near Bordon in north Hampshire, the site is underlain by both Folkestone and Sandgate beds.

Woolmer Forest SAC is included within the South Downs National Character Area (NCA Profile 125) South Downs National Park, and is a significant component within a wider complex of fragmented heaths, broadly centred on the converging boundaries of Hampshire, West Sussex and Surrey. The site falls within the

Woolmer Forest SAC is of exceptional nature conservation importance. It represents one of the largest surviving tracts of lowland heathland in south-east England and it provides supporting habitat for a large number of locally and nationally important species. The site is unique in the UK in supporting natural populations of all 12 British amphibians and reptiles. All of the SAC is also classified as part of the Wealden Heaths Special Protection Area (SPA).

The entire site is owned by the Ministry of Defence and used for military training, primarily as live-firing ranges. Necessary safety considerations have implications for the management of the site.

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:

- **H3160. Natural dystrophic lakes and ponds; Acid peat-stained lakes and ponds**

Within Woolmer Forest, the H3160 feature is comprised of two distinct waterbodies, known as Cranmer Pond and Woolmer Pond, situated in the west of the site. The two ponds are very different in terms of structure, substrate and vegetation.

- **H4010. Northern Atlantic wet heaths with Erica tetralix; Wet heathland with cross-leaved heath**

Areas of wet heath occur along the valley bottoms where both cross-leaved heath Erica tetralix and purple moor-grass Molinia caerulea are abundant. These wet heath areas are also characterised by the presence of bog-mosses such as Sphagnum compactum and carnivorous plants such as round-leaved sundew Drosera rotundifolia.

- **H4030. European dry heaths**

Extensive areas of dry heathland vegetation occur on the tops of the hills and ridges. These areas are dominated by heather Calluna vulgaris and bell heather Erica cinerea, commonly with dwarf gorse Ulex minor, grasses such as wavy hair-grass Deschampsia flexuosa and sheep's-fescue Festuca ovina, and a rich diversity of lichens Cladonia spp..

- **H7140. Transition mires and quaking bogs; Very wet mires often identified by an unstable `quaking` surface**

Peat deposits supporting mires have developed in some valley bottoms and along associated seepages. The vegetation is dominated by bog-mosses, particularly *Sphagnum recurvum*, with common cottongrass *Eriophorum angustifolium*, heather, cross-leaved heath, purple moor-grass, bog asphodel *Narthecium ossifragum* and cranberry *Vaccinium myrtillus.*

- **H7150. Depressions on peat substrates of the Rhynchosporion**

This occurs as a minor feature amongst wet heath and mire habitats, in waterlogged or disturbed areas. The typically open vegetation includes species such as white beak-sedge *Rhynchospora alba*, common cottongrass, marsh clubmoss *Lycopodiella inundatum* and a range of bog-mosses.

Qualifying Species:

Not applicable

Table 1: Supplementary Advice for Qualifying Features: H3160. Natural dystrophic lakes and ponds; Acid peat-stained lakes and ponds

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 H3160 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 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. The SAC feature at Woolmer Forest consists of two water bodies known as Cranmer Pond and Woolmer Pond, both situated on the western side of the site.	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: Bulbous rush *Juncus bulbosus* var *fluitans, bog-mosses Sphagnum* spp., shoreweed *Littorella uniflora*, marsh pennywort *Hydrocotyle vulgaris*, marsh St. John's-wort *Hypericum elodes*, lesser marshwort *Apium inundatum*, small water-pepper *Polygonum minus*, pillwort *Pilularia globuliferea* Natterjack toad *Epidalea calamita*, Spangled diving beetle *Graphoderus zonatus*	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; • **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,	NEWBOLD C. 2002 NATURAL ENGLAND 2017(a) NATURAL ENGLAND 2017(b)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			and species may be added or deleted, as new information about this site becomes available.	
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure non-native species categorised as 'high-impact' in the UK under the Water Framework Directive are either rare or absent but if present are causing minimal damage to the feature	Non-native species constitute a major threat to many open water systems. Impacts may be on the river habitat itself (e.g. damage to banks and consequent siltation) or directly on characteristic biota (through predation, competition and disease), or a combination of these. For example, species such as signal crayfish have been responsible for much of the decline of native crayfish through competition, habitat damage and the introduction of crayfish plague. The UK Technical Advisory Group of the Water Framework Directive produces a regularly updated classification of aquatic alien species (plants and animals) according to their level of impact. In general high impact species are of greatest concern but low or unknown impact species may be included in the target on a site-specific basis where there is evidence that they are causing a negative impact (for example high cover values or abundances). Those taxa considered likely to colonise lakes, are indicated by an 'L' in the UKTAG guidance. Examples of such high-impact species may include Water Fern, New Zealand pygmyweed and the zebra mussel. New Zealand pygmyweed *Crassula helmsii* is abundant across the floor of Woolmer Pond though apparently not having a significant adverse impact on native flora. It should however be removed when an appropriate control measure becomes available. Both ponds are naturally fishless and none should be introduced.	WATER FRAMEWORK DIRECTIVE UK TECHNICAL GROUP. 2016 NATURAL ENGLAND 2017(a)
Structure and function (including its typical species)	**Macrophyte community structure**	Maintain a characteristic zonation of fringing vegetation. Zonation, depth distribution and structure will be site specific. Colonisation at depth may be limited by poor light penetration or unsuitable sediment type.	This is a strongly characteristic structural aspect of this habitat feature. It will be a response to water transparency, sediment type and disturbance. At Cranmer Pond, the depth and dark, peat-stained nature of the water restricts the extent of fringing vegetation within the pond to dense mats of submerged bulbous rush *Juncus*	NEWBOLD C. 2002

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			bulbosus at the margins and bog-mosses *Sphagnum* spp. growing in shallower areas. Woolmer Pond is relatively shallow and subject to significant variation in water levels in the summer. The entire pond floor is vegetated with species that are tolerant of drying out.	
Structure and function (including its typical species)	**Macrophyte community structure**	Maintain a characteristic and well defined hydrosere associated with the water body where this is present	A hydrosere is a naturally-occurring plant succession which occurs in an area of standing fresh water. Over time, an area of open freshwater will naturally dry out, ultimately becoming woodland. During this change, a range of different wetland habitat types such as swamp and marsh, will succeed each other. This structure around the margins of the lake creates a buffer zone that can help protect the lake from a limited amount of sediment and nutrient inputs. It also increases habitat heterogeneity providing additional food sources and refugia. Around much of Cranmer Pond, the margins and transition areas support high quality mire and wet heath habitats. The gradually shelving margins of Woolmer Pond are maintained as short, open vegetation by cattle grazing.	NATURAL ENGLAND 2017(a)
Structure and function (including its typical species)	**Physical structure - lake shoreline**	Maintain the natural shoreline of the lake.	Inclusion of hard engineering solutions to lake management may have detrimental effects on lake ecology, replacing near-natural substrates with man-made materials. Alteration of the shoreline may also result in changes in water movements within the lake, which would have effects on patterns of sediment deposition. Neither ponds have hard-engineered or reinforced shorelines. Otherwise their structures are contrasting: Cranmer Pond has steeper shelves whereas Woolmer Pond exhibits much broader, gradually-shelving margins.	
Structure and function (including its typical species)	**Physical structure - lake substrate**	Maintain the natural and characteristic substrate for the lake. The natural substrate is predominantly peaty. Changes in plant community may result from	The distribution of sediment particle size and organic content influences the biology of the lake and will affect the suitability of within-lake habitats for invertebrates and macrophytes, and fish spawning grounds.	NATURAL ENGLAND 2017(a)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		enriched sediments without an accompanying change in water chemistry.	Increases in sediment loading from activities in the catchment area, including those on the lake shore, may result in the smothering of coarse sediments. Increased inputs of leaf litter, as a result of scrub encroachment, may also be cause for concern, as organic-rich sediments may be a poor rooting medium for macrophytes. Cranmer Pond has a peaty substrate typical of the feature type, whereas Woolmer Pond has a much sandier substrate.	
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 (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. Nitrogen deposition levels exceed the site-relevant critical load for ecosystem protection.	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). NATURAL ENGLAND 2014

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	**Functional connectivity/ isolation**	Maintain the natural lack of connectivity of the water body to other water bodies	The natural isolation of some standing water bodies can provide some protection from threats such as pollution and invasive species. Hydrological isolation can also lead to unique or diverse species assemblages this may be due to genetic isolation or the absence of predators. These water bodies should have their isolated state maintained. In contrast other standing water bodies naturally rely on hydrological connectivity to other freshwater systems for water supply, and can support migratory species. Hydrological connectivity may also be important for gene flow, and habitat and species resilience. Neither pond is directly connected to any other waterbody, though both appear to be reliant on groundwater.	
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Hydrology influences lake ecosystem functioning in two ways: determining residence time (flushing) and water level fluctuations. Flushing of lakes is important for dilution and removal of nutrients and phytoplankton, and for reduction in sedimentation. The timing of different flushing rates within the year influences the biology of the lake. For example, reduced flushing in summer would encourage bloom conditions. Modifications of inflows and outlets or changes in hydrology, e.g. from flood control regimes, abstraction and gravel removal can lead to unnatural changes in lake levels. Cranmer Pond is believed to be groundwater fed through a peat-covered catchment. The water-holding properties of the peat, combined with the steep shelving and depth of the pond allow stable water levels and conditions to be maintained.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Woolmer Pond, while also groundwater reliant, has a sandy substrate which contributes to significant fluctuations in water levels, particularly in summer months. These fluctuations create the conditions which support the characteristic vegetation present.	
Supporting processes (on which the feature relies)	**Sediment load**	Maintain the natural sediment load.	Increases in siltation are likely to be harmful and could result from e.g. increased lake productivity, changes in catchment land-use, (particularly over-grazing and peat harvesting), lake level fluctuations, climatic fluctuations.	
Supporting processes (on which the feature relies)	**Water quality - acidity**	Maintain acidity to levels which reflect unimpacted conditions - values of Acid Neutralising Capacity (ANC) are typically less than pH 6.0 for dystrophic lakes and ponds.	Changes in pH can alter the entire freshwater community present within a water body affecting all trophic levels. Potential causes of a shift in pH include air pollution and direct application of lime to the water column as an acidification amelioration strategy (this should not be carried out). Acidity levels should reflect unimpacted conditions - values of Acid Neutralising Capacity (ANC) considered to avoid significant impact on characteristic biota are laid out in the site's FCT (these are the same numerical values as used to protect high ecological status under the WFD in the UK). As a guide, pH <5.0 for dystrophic lakes and ponds. Although, pH naturally fluctuates throughout the year, e.g. snow melt may lead to pulses of acid water, and increased plant biomass in summer may result in large fluctuations in pH, including daytime increases in pH values. Therefore pH is not used as a monitoring target, however its importance in affecting many in lake processes means that the pH of a water body should not be artificially altered. pH values will be lower in Cranmer Pond than in Woolmer Pond, reflecting the influence of peaty substrate at the former.	
Supporting processes (on which the feature relies)	**Water quality - algae**	Maintain chlorophyll concentrations to a level which complies with 'high' ecological status	Chlorophyll is the pigment used for photosynthesis by plants, and the concentration of chlorophyll in the water column during the growing season therefore provides a good measure of the abundance of phytoplankton. Phytoplankton is an important	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			driver of structure and function in lakes and high phytoplankton levels (algal blooms) are usually associated with nutrient enrichment. Characteristic and representative algal cover may be significant, but excessive growths of uncharacteristic, filamentous algae on lake substrate or macrophytes are indicative of nutrient enrichment. UKTAG Lake Assessment Methods: Phytoplankton. Chlorophyll a and Percentage Nuisance Cyanobacteria. Available online at: http://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Biological%20Method%20Statements/lake%20phytoplankton.pdf	
Supporting processes (on which the feature relies)	**Water quality - dissolved oxygen**	Maintain dissolved oxygen levels >7mg/l.	As for species in terrestrial environments, dissolved oxygen (DO) is required for respiration by aquatic organisms. Anthropogenic activities leading to phytoplankton blooms and increased loadings of organic matter to lakes can cause decreases in the concentration of dissolved oxygen available to support the species present. Mean dissolved oxygen refers to DO being measured at 0.5m intervals throughout the entire water column where the water column is not stratified and measurements taken at 0.5 m intervals below the thermocline only where stratification occurs.	
Supporting processes (on which the feature relies)	**Water quality - nitrogen**	Maintain total nitrogen concentrations to a level which is less than 1.5mg/l	There is an increasing understanding that some standing waters are sensitive to nitrogen (N) enrichment and eutrophication may be driven by increases in N, but site-specific information is usually required to determine whether N or P is more important. Where P levels are significantly above their target values and there is evidence that the lake is N limited (for example by N levels falling to negligible levels in summer), N targets should be set in addition to P targets.	
Supporting processes (on which the	**Water quality - other pollutants**	Maintain water quality to 'good' chemical status (i.e. compliance with relevant Environmental	A wide range of pollutants may impact on habitat integrity depending on local circumstance. Good chemical status includes a list of EQSs for individual pollutants that are	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		Quality Standards).	designed to protect aquatic biota with high levels of precaution.	
Supporting processes (on which the feature relies)	**Water quality - phosphate**	Maintain stable nutrient levels appropriate for lake type. Water is normally acidic and poor in available nutrients. .	Increased loadings of P to a water body are likely to lead to higher algal biomass in the water column, which in turn can have significant impacts on the standing water ecosystem through, for example, competition with vascular plants for nutrients and light, changes in pH, oxygen depletion and production of toxins. Decreasing dissolved oxygen and increasing ammonia levels are associated with death and decay of algal blooms, as is a release of toxins from toxin-producing species. Suggested guideline for mean annual total phosphorus level of < 10 µg l^{-1}	NATURAL ENGLAND/ ENVIRONMENT AGENCY 2014
Supporting processes (on which the feature relies)	**Water transparency**	Maintain the clarity of water at an appropriate level	Water transparency is the major determinant of the depth of colonisation by macrophytes, therefore, it should not be reduced. Increased nutrient loads leading to increased algal growth will reduce water transparency, disturbance of the sediment by water sports and bottom feeding fish such as carp and bream also increase turbidity and reduce water transparency. Increased sediment loads to a lake would also have this effect. Water in dystrophic lakes and ponds should be stained by dissolved humic material, and will usually be visibly brown.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: **'Structure and function – Fisheries'** deleted from list as this activity does not occur on the site **'Structure and function – Macrophyte community structure** - …fringing vegetation' deleted from list as duplication from the row above **'Supporting processes – Supporting off-site habitat'** deleted from list as the feature is not reliant on off-site habitat.				

Table 2: Supplementary Advice for Qualifying Features: H4010. Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Restore the total extent of the H4010 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 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. There are more opportunities for expansion of open heath that could be realised, wet heaths being a component of those habitats.	
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the H4010 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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			and more specialist species associated with the Annex I habitat feature. There are more opportunities for expansion of open heath that could be realised, wet heaths being a component of those habitats.	
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 high taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be the most vulnerable sites overall and are likely to require the most adaptation action, most urgently. A site based assessment should be carried out as a priority. This means that action to address specific issues is likely, 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	NATURAL ENGLAND 2015.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			cases, change will be inevitable so appropriate monitoring would be advisable.	
Structure and function (including its typical species)	**Functional connectivity with wider landscape**	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and 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. Woolmer Forest SAC is an important component of the Wealden Heaths Phase II Special Protection Area (SPA). Maintaining the functionality of heathland and other supporting semi-natural habitats within the local landscape is essential for the conservation objectives of the SPA.	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the H4010 Annex 1 habitat: Heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, purple moor-grass *Molinia caerulea*, round-leaved sundew *Drosera*	See notes for this attribute in table 1 above.	ENGLISH NATURE 2005 EPR 2003

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		rotundifolia; bog-mosses such as *Sphagnum compactum*. Assemblage of native reptiles including smooth snake *Coronella austriaca.*		
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the feature are broadly referable to and characterised by the following National Vegetation Classification types: M16 *Erica tetralix – Sphagnum compactum* wet heath and, or as mosaics with, wet grassland such as M25 *Molinia caerulea – Potentilla erecta* mire	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	EPR 2003
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain any areas of transition between this and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	Transitions/ zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
Structure and function (including its typical	**Vegetation structure: cover of dwarf shrubs**	Maintain an overall cover of dwarf shrub species which is typically between 25-75%	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)			animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heather) but purple moor-grass *Molinia caerulea* can become dominant in some stands of wet heath. An increase in abundance of *Molinia caerulea* at the expense of heathers may be promoted by a range of factors including frequent uncontrolled fires, nutrient input and/or lapse of grazing or cutting management.	
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Cover of common gorse is low, typically at less than 10%.	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands can increase fire risk.	
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Maintain a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers. The scale that this structure is assessed at is important. Whilst it is desirable that this structure occurs at a small scale within	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			some stands, it may also be acceptable for larger areas to be fairly even-aged, so that different ages are represented more at a landscape, or site-level.	
Structure and function (including its typical species)	**Vegetation: undesirable species**	Maintain the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread:	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. Undesirable species include: Rhododendron *ponticum*, gaultheria *Gaultheria shallon*, Japanese knotweed *Fallopia japonica*,, creeping thistle *Cirsium arvense*, marsh thistle *C. palustre*, foxglove *Digitalis purpurea*, soft rush *Juncus effusus*, creeping buttercup *Ranunculus repens*, ragwort *Senecio jacobaea*, dock *Rumex obtusifolius*, nettle *Urtica* spp.,	
Structure and function (including its typical species)	**Vegetation structure: tree cover**	Restore the open character of the H4010 feature, with a scattered cover of trees and scrub at or below 10% in each continuous block of wet heath.	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food-plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover may be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole The 2017 condition review highlights the issue of encroaching trees, particularly pine, across extensive areas of open wet heath.	NATURAL ENGLAND 2017(a)
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	See notes for this attribute in Table 1 above.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Level values given for this H4010 feature of the site on the Air Pollution Information System (www.apis.ac.uk).		Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	**Conservation measures**	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore] the structure, functions and supporting processes associated with the H4010 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. Management agreements are in place to address issues of pine encroachment and facilitate wet heath restoration.	
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as necessary), maintain the natural hydrological regime to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	
Supporting processes (on which the feature relies)	**Soils, substrate and nutrient cycling**	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. This Annex 1 habitat has essentially raw soils with little humus and low nutrient status.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The soils at Woolmer Forest are underlain by both Folkestone and Sandgate beds, and are characterised as coarse, infertile and acidic in nature. The soils are typically free-draining, although in localised areas such valley bottoms and along spring-lines, water tables may be permanently or seasonally high.	
Supporting processes (on which the feature relies)	**Water quality**	Where the H4010 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, i.e. high winter water table, very low nutrient status, low base-status and low pH	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. Changes in vegetation characteristics, such as vigorous excess growth of *Molinia* or invasive scrub/willow growth, may be the first sign of adverse changes in water quality and should be a trigger for site-specific investigations.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: 'Structure and function – Vegetation composition: bracken cover' has been deleted from list as not representative of wet heaths on the site.				

Table 3: Supplementary Advice for Qualifying Features: H4030. European dry heaths

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Restore the total extent of the H4030 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 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. There are more opportunities for expansion of open heath that could be realised, dry heaths being a component of those habitats.	
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the H4030 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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			and more specialist species associated with the Annex I habitat feature. There are more opportunities for expansion of open heath that could be realised, dry heaths being a component of those habitats.	
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain the H4030 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See notes for this attribute in table 2 above	NATURAL ENGLAND 2015
Structure and function (including its typical species)	**Functional connectivity with wider landscape**	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site.	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and 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. Woolmer Forest SAC is an important component of the Wealden Heaths Phase II Special Protection Area (SPA). Maintaining the functionality of heathland and other supporting semi-natural habitats within the local landscape is essential for the conservation objectives of the SPA.	

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.	See notes for this attribute in table 2 above	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the H4030 Annex 1 habitat: Heather *Calluna vulgaris*, bell heather *Erica cinerea*, dwarf gorse *Ulex minor*, bilberry *Vaccinium myrtillus*, tormentil *Potentilla erecta*, lichens *Cladonia* spp., wavy-hair grass *Deschampsia flexuosa*, sheep's fescue *Festuca ovina.* Assemblage of native reptiles and amphibians including smooth snake *Coronella austriaca*, sand lizard *Lacerta agilis* and natterjack toad *Epidalea calamita* Assemblages of nationally-rare and scarce heathland invertebrates.	See notes for this attribute in table 1 above.	ENGLISH NATURE 1994 EPR 2003 NATURAL ENGLAND 2017(a)
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the feature are broadly referable to and characterised by the following National Vegetation Classification types: H1 *Calluna vulgaris – Festuca*	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	EPR 2003

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		ovina lichen heath*;* H2 *Calluna vulgaris – Ulex minor* heath with transitions to acid grasslands including U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* and U2 *Deschampsia flexuosa* grasslands.	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)	**Vegetation community transitions**	Maintain any areas of transition between this and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
Structure and function (including its typical species)	**Vegetation composition: bracken cover**	Maintain a cover of dense bracken which is low, typically at less than 5%.	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Usually active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has also some nature conservation value, for example on sites where fritillary butterflies occur and utilise bracken litter habitat.	
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Maintain an overall cover of dwarf shrub species which is typically between 25-90% (except in areas of acid grassland where grasses are naturally dominant)	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			influenced by the growing habits of its dominant species which in most cases will be ericoids i.e. plants that look like heathers.	
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Maintain cover of common gorse *Ulex europaeus* at less than 5% and the cover of dwarf gorse *U. minor* at less than 20% in each block of dry heath	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands may also increase fire risk.	
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Maintain a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers. The scale that this structure is assessed at is important. Whilst it is desirable that this structure occurs at a small scale within some stands, it may also be acceptable for larger areas to be fairly even-aged, so that different ages are represented more at a landscape, or site-level.	
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	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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		their spread:	Undesirable species include: Rhododendron *Rhododendron ponticum,* gaultheria *Gaultheria shallon,* Japanese knotweed *Fallopia japonica,* creeping thistle *Cirsium arvense,* foxglove *Digitalis purpurea,* willow-herb *Chamaerion angustifolium,* ragwort *Senecio jacobaea,* dock *Rumex obtusifolius,* nettle *Urtica dioica.*	
Structure and function (including its typical species)	**Vegetation structure: tree cover**	Restore the open character of the H4030 feature, with a typically scattered and low cover of trees and scrub (<20% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food-plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover may be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole The 2017 condition review highlights the issue of encroaching trees, particularly pine, across extensive areas of open heath.	NATURAL ENGLAND 2017(a)
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).	See notes for this attribute in Table 1 above.	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). NATURAL ENGLAND 2014
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, functions and supporting processes	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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		associated with the H4030 feature.	Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. • Maintain low nutrient levels to maintain high numbers of species through the management activities of grazing, burning, mowing, turf-stripping, bracken management and scrub/tree cutting. Management of succession is a critical aspect of management for this habitat, by a combination of active processes and grazing/cutting. • A range of invertebrates and plants require bare ground/peat where it is not too frequently disturbed by vehicles or feet. Management agreements are in place to address the issues of pine encroachment on areas of the dry heath and promote recovery. .	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: 'Supporting processes – Water quality' deleted from list as not a significant attribute for this feature Supporting processes – Hydrology' deleted from list as not a significant attribute for this feature				

Table 4: Supplementary Advice for Qualifying Features: H7140. Transition mires and quaking bogs; Very wet mires often identified by an unstable `quaking` surface

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Restore the total extent of the H7140 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 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 2014 Site Improvement Plan highlights the presence of historic drainage ditches within parts of the mire; it recommends further investigation to assess any adverse impacts and the feasibility of implementing restoration measures.	NATURAL ENGLAND 2014
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the H7140 feature, including where applicable its component vegetation types, across the site	Distribution includes the spatial pattern or arrangement of this habitat feature, and its component vegetation types, across the site. Changes in distribution may affect the nature and range of the vegetation communities present, the operation of the physical, chemical, and biological processes in the system and the resiliency of the site and its features to changes or impacts. The 2014 Site Improvement Plan highlights the presence of historic drainage ditches within parts of the mire; it recommends further investigation to assess any adverse impacts and the feasibility of implementing restoration measures.	EPR 2003 NATURAL ENGLAND 2014
Structure and function (including its	**Adaptation and resilience**	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider	See notes for this attribute in table 2 above	NATURAL ENGLAND, 2015

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		environmental change, either within or external to the site		
Structure and function (including its typical species)	**Exposed substrate**	Maintain a low cover of exposed substrate of between 5-10% across feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions.	
Structure and function (including its typical species)	**Hydrology**	At a site, unit and/or catchment level as necessary, restore natural hydrological processes to provide the conditions necessary to sustain the feature within the site.	Defining, maintaining and restoring where necessary the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Wheeler et al. (2009) provide range and mean for summer & winter water levels for those wetland NVC types constituting Annex 1 habitats. This provides a rough guide to appropriate levels, but it is critical that individual sites and their needs are considered as there is considerable variation within the NVC communities listed and recorded water levels. The 2014 Site Improvement Plan highlights the presence of historic drainage ditches within parts of the mire; it recommends further investigation to assess any adverse impacts and the feasibility of implementing restoration measures.	NATURAL ENGLAND 2014 WHEELER *et al*, 2009
Structure and function (including its typical species)	**Hydrology**	Maintain a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations) on groundwater dependent sites.	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			the likelihood of impacts. Some examples of H7140 may be wholly or partly groundwater dependent. Others have a greater dependence on surface water or rain water inputs. It is critically important to understand the eco-hydrological context of all sites.	
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H7140 feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides).	
Structure and function (including its typical species)	**Presence/ cover of woody species**	Maintain a low cover (<10% of the area) of scrub or trees within stands of the H7140.feature	Native trees and shrubs occur naturally on bog and fen surfaces but an abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces.	
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 H7140 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 prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
Structure and function (including its	**Key structural, influential and**	Maintain the abundance of the typical species listed below to enable each of them to be a	.See additional notes for this attribute in table 1 above. This Annex 1 habitat is not well-defined in the JNCC guidance	ENGLISH NATURE 1994

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)	**distinctive species**	viable component of the Annex 1 habitat: Bog-mosses *Sphagnum* spp., common cottongrass *Eriophorum angustifolium*, cross-leaved heath *Erica tetralix*, cranberry *Vaccinium myrtillus* Assemblages of nationally-rare and scarce heathland invertebrates.	and includes a wide range of 'transitional' wetland vegetation. A much clearer definition and scope has been established in Tratt, 2013. This clarifies the various types of vegetation encompassed by the term 'transition mire' and includes some excluded by the JNCC (e.g. some examples of M21) and others currently often included in other Annex 1 types, e.g. M14	EPR 2003
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the H7140 feature are referable to and characterised by the following National Vegetation Classification type: M2 *Sphagnum cuspiditum/recurvum* bog pool community .	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.	EPR 2003
Structure and function (including its typical species)	**Water chemistry**	Maintain the surface water and groundwater supporting the hydrology of the bog at a low nutrient status.	UKTAG (2012) provides threshold values for nitrate concentration in groundwaters for different wetland types. The threshold values will mainly be used in the characterisation of GWDTE status for the WFD, primarily as a risk screening tool, to assess if sites are 'at risk' or 'not at risk' from groundwater mediated nutrient pressure; it is uncertain how well these standards apply to Woolmer Forest. Due to the complex cycling of nutrients within many GWDTE, these threshold values are not suited for application within sites but rather just to groundwater that is directly feeding the site.	UK TECHNICAL ADVISORY GROUP ON THE WATER FRAMEWORK DIRECTIVE, 2012.
Supporting processes (on which the	**Air quality**	Restore as necessary, the concentrations and deposition of air pollutants to at or below the	See notes for this attribute in Table 1 above	More information about site-relevant Critical Loads and Levels for this SAC is available by using

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).		the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk). NATURAL ENGLAND 2014
Supporting processes (on which the feature relies)	**Conservation measures**	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore] 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. This habitat in most cases requires ongoing cutting or grazing maintain its open character. The 2014 Site Improvement Plan highlights the presence of historic drainage ditches within parts of the mire; it recommends further investigation to assess any adverse impacts and the feasibility of implementing restoration measures.	NATURAL ENGLAND 2014
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 5: Supplementary Advice for Qualifying Features: H7150. Depressions on peat substrates of the Rhynchosporion

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 H7150 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 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 Rhynchosoporion is a vegetation alliance closely associated with bog pools and runnels on intact bogs (valley, raised and blanket bogs) and transition mire and quaking bog. JNCC guidance also includes within the definition vegetation on seepage areas on humid and wet heath. This Annex 1 feature is difficult to map due to both the small size of individual patches and the transitory nature of elements of the habitat (e.g. when on disturbed shallow peat/sand). As a result, the extent, or even presence, of the H7150 feature on protected sites is rarely known and detailed survey will be necessary on smaller sites.	
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H7150 feature, including where applicable its component vegetation types, across the site	Distribution includes the spatial pattern or arrangement of this habitat feature, and its component vegetation types, across the site. Changes in distribution may affect the nature and range of the vegetation communities present, the operation of the physical, chemical, and biological processes in the system and the resiliency of the site and its features to changes or impacts.	EPR 2003
Supporting processes (on which the	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the	See notes for this attribute in table 1 above.	More information about site-relevant Critical Loads and Levels for this SAC is available by using

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).		the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk). NATURAL ENGLAND 2014
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See notes for this attribute in table 2 above	NATURAL ENGLAND, 2015
Structure and function (including its typical species)	Exposed substrate	Maintain a low cover of exposed substrate of between 5% & 10% across the H7150 feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions.	
Structure and function (including its typical species)	Hydrology	At a site, unit and/or catchment level as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the H7150 feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. The hydrological status of H7150 is largely dependent on the overall hydrological integrity of the larger peatland in which it is found. Wheeler et al. (2009) provide range and mean for summer & winter water levels for those wetland NVC types constituting Annex 1 habitats. This provides a rough guide to appropriate levels, but it is critical that individual sites and their needs are considered as there is considerable variation within the NVC communities listed and recorded water levels.	WHEELER *et al*, 2009
Structure and function (including its typical	Hydrology	Maintain a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations) on groundwater	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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)		dependent sites.	Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Some examples of H7150 may be wholly or partly groundwater dependent. Others have a greater dependence on surface water or rain water inputs. It is critically important to understand the eco-hydrological context of all sites.	
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H7150 feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides).	
Structure and function (including its typical species)	Presence/ cover of woody species	Maintain a very low cover (<1% of the area) of scrub or trees within stands of H7150.	Native trees and shrubs occur naturally on bog and fen surfaces but an abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the H7150 habitat:	This Annex 1 habitat is not well-defined in the JNCC guidance and includes a wide range of 'transitional' wetland vegetation. See additional notes for this attribute in table 1 above.	EPR 2003 NATURAL ENGLAND 2017(a)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Common cottongrass *Eriophorum angustifolium*, white-beaked sedge *Rynchospora alba*, oblong-leaved sundew *Drosera intermedia*, cross-leaved heath *Erica tetralix*, purple moor-grass *Molinia caerulea*, bog asphodel *Narthecium ossifragum* Assemblage of bog-mosses including *Sphagnum papillosum.*		
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H7150 feature are referable to and characterised by the following National Vegetation Classification types: The H7150 feature overlaps in places with both the M21 *Narthecium ossifragum – Sphagnum papillosum* valley mire and M16 *Erica tetralix – Sphagnum compactum* wet heath communities.	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.	
Structure and function (including its typical species)	Water chemistry	Maintain the surface water and groundwater supporting the hydrology of the bog at a low nutrient status.	UKTAG (2012) provides threshold values for nitrate concentration in groundwaters for different wetland types. The threshold values will mainly be used in the characterisation of GWDTE status for the WFD, primarily as a risk screening tool, to assess if sites are 'at risk' or 'not at risk' from groundwater mediated nutrient pressure; it is uncertain how well these standards apply to Woolmer Forest. Due to the complex cycling of nutrients within many GWDTE, these threshold values are not suited for application within sites but rather just to groundwater that is directly feeding the site.	UK TECHNICAL ADVISORY GROUP ON THE WATER FRAMEWORK DIRECTIVE, 2012
Supporting processes (on	Conservation measures	Maintain the management measures (either within and/or	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
which the feature relies)		outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the H7150 feature	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. This habitat in most cases requires ongoing cutting or grazing maintain its open character.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: 'Structure and function – supporting off-site habitat' deleted from list as the feature is not reliant on off-site habitat				

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