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

Cannock Chase Special Area of Conservation (SAC)
Site code: UK0030107

Photograph: Natural England.

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About this document

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

This advice replaces a previous version (dated 8 December 2017) following updates to explanatory notes by Natural England.

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.

You may also find it helpful to refer to Natural England's SSSI Impact Risk Zone dataset available here.

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	Cannock Chase Special Area of Conservation (SAC)
Location	Staffordshire (SJ982188)
Site Maps	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	01 April 2005
Qualifying Features	European dry heaths Northern Atlantic wet heaths with *Erica tetralix*. (Wet heathland with cross-leaved heath)
Designation Area	1236.93 ha
Designation Changes	None
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Cannock Chase SSSI
Relationship with other European or International Site designations	None
Other information	Natura 2000 Standard Data Form for Cannock Chase SAC

Site background and geography

Cannock Chase is a large, diverse area of semi-natural vegetation comprising the majority of the most ecologically valuable parts of the former Royal Chase, one of a nationally important series of relict ancient Forest/Chase landscapes in the Midlands.

Cannock Chase falls within the Cannock Chase and Cank Wood National Character Area (NCA) and is situated on a high sandstone plateau with deeply incised valleys created during the last glaciation, some of which still have flowing water, some of which are now dry. Acidic soils derived from Triassic sandstone and marls support a range of heathland, valley mire, ancient woodland and scrub types of varied origin. This geology, which can be locally dramatic, and the extent of the varied semi-natural habitats are mainly found within the Special Area of Conservation and form the heart of the Cannock Chase Area of Outstanding Natural Beauty (AONB).

The area of lowland dry heathland at Cannock Chase is the most extensive in the Midlands. Its special interest also reflects an unusual floristic character, intermediate between heathlands of northern and upland England and Wales and those of southern counties. The hot, dry soil conditions found in bare ground in early successional habitats across the dry heathland is important for invertebrates such as mining bees, ants and wasps.

The valley mire/wet heath communities are rare, threatened vegetation types, being some of the most floristically-rich and representative examples of their type in central England. The outstandingly diverse invertebrate fauna includes many species of restricted national occurrence.

Cannock Chase is home to several characteristic heathland birds, including rare and vulnerable ground-nesting species such as nightjar and woodlark that nest and forage on the heathland as well as in clear-fell areas of the nearby commercial forestry plantations. Across the Cannock Chase AONB the populations of these characteristic heathland birds, which also includes Dartford warbler, are of national importance. Cannock Chase is also a regional refuge for declining and vulnerable reptile species such as adder, common lizard, and slow worm. For adder especially, the extent of open habitat across the Cannock Chase plateau makes it an important regional stronghold and ultimately refuge for this highly vulnerable and sensitive animal, for which much of the wider, surrounding countryside is now unavailable.

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:

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

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

The scarcity of water over much of the Chase effectively confines wetland flora and fauna to the stream valley systems and a scatter of natural and artificial pools and damp depressions. The Oldacre and Sherbrook valleys have small-scale mosaics of spring-fed mire and wet heath vegetation, a result of complex water chemistry. Where acidic conditions prevail the mires are mostly formed of bog mosses *Sphagnum* spp. with cranberry *Vaccinium oxycoccus*, cotton-grasses *Eriophorum* spp. and cross-leaved heath *Erica tetralix*.

The wet heath vegetation at the SAC corresponds mainly to the NVC community type M16 *Erica tetralix – Sphagnum compactum* wet heath, which is present in mosaics in the Sher Brook Valley with a variety of other vegetation communities (vegetation with affinities to M6 *Carex echinata-Sphagnum fallax* mire, M15 *Scirpus cespitosa – Erica tetralix* mire, M21 *Narthecium ossifragum-Sphagnum papillosum* mire and M25 *Molinia caerulea-Potentilla erecta* mire. Also present is vegetation with affinities to M22 *Juncus subnodulosus-Cirsium palustre* and M24 *Molinia caerulea – Cirsium dissectum* fen meadow communities, M23 *Juncus effusus/acutiflorus-Galium palustre* rush pasture and S3 *Carex paniculata* swamp).

In the Oldacre Valley the wet heath mosaic vegetation has affinities to M25 *Molinia caerulea-Potentilla erecta* mire and M6 *Carex echinata-Sphagnum fallax* mire. Also present is vegetation with affinities to M23 *Juncus effusus/acutiflorus-Galium palustre* rush pasture, and S3 *Carex paniculata* swamp. Also in Oldacre Valley is an area of M10 *Carex dioica-Pinguicula vulgaris* mire and an area of M22 *Juncus subnodulosus-Cirsium palustre* fen meadow.

At Womere there is an area of M4 *Carex rostrata-Sphagnum fallax* mire.

- **H4030. European dry heaths**

European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. The most common is heather *Calluna vulgaris*, which often occurs in combination with gorse *Ulex* spp., bilberry *Vaccinium* spp. or bell

heather *Erica cinerea*, though other dwarf-shrubs are important locally. Nearly all dry heath habitat is semi-natural, being derived from woodland through a long history of grazing and burning.

The area of lowland heathland at Cannock Chase is the most extensive in the English Midlands, although there have been losses due to fragmentation and scrub/woodland encroachment. The character of the vegetation is intermediate between the upland or northern heaths of England and Wales and those of southern counties.

Dry heathland communities belong to NVC types H8 *Calluna vulgaris–Ulex gallii* and H9 *Calluna vulgaris–Deschampsia flexuosa* heaths. Within the heathland, species of northern latitudes occur, such as cowberry *Vaccinium vitis-idaea* and crowberry *Empetrum nigrum*. Cannock Chase has the main British population of the hybrid bilberry *Vaccinium intermedium*, a plant of restricted occurrence.

Qualifying Species:

- None

References

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: 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**	Maintain the total extent of the H4010 wet heath feature (as a mosaic of vegetation with affinities to M6, M15, M16, M21 and M25, along with S3 and M23 vegetation) at no less than 22ha, including 1ha of M22 & M24 and smaller areas, <0.01ha, of M10 and M4. Maintain valley bogs/fen containing a mosaic of M6 *Carex echinata-Sphagnum fallax* mire, M15 *Scirpus cespitosa – Erica tetralix* mire, M16 – *Erica tetralix & Sphagnum compactum* wet heath, M21 *Narthecium ossifragum-Sphagnum papillosum* mire and M25 *Molinia caerulea-Potentilla erecta* mire, along with with M23 *Juncus effusus/acutiflorus-Galium palustre* rush pasture and S3 *Carex paniculata* swamp. Also present is vegetation with affinities to M22 *Juncus subnodulosus-Cirsium palustre* and M24 *Molinia caerulea – Cirsium dissectum* fen meadow communities, and M10 *Carex dioica-Pinguicula vulgaris* mire. M4 *Carex rostrata-Sphagnum fallax* mire is also present within the European Dry Heaths feature.	There should be no measurable reduction in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. The actual area of wet heath cannot be calculated separately from the other vegetation communities forming the valley bogs/fen mosaic.	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. CANNOCK CHASE SAC PARTNERSHIP. 2016. NATURAL ENGLAND. 2014. WHITE, J., MCGIBBON, R. & UNDERHILL-DAY, J. 2012. LILEY, D., UNDERHILL-DAY, J., WHITE, J. & SHARP, J. 2009. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006. This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				England's SSSI condition assessments.
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Maintain the distribution and configuration of the H4010 wet heath feature mosaic, 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. Such conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	Please see above under "Extent".
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain the extent of areas of transition between the H4010 wet heath feature mosaic and communities which form other heathland-associated habitats (such as dry and humid heaths, mires, acid grasslands, scrub and woodland).	Transitions and 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.	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NATURAL ENGLAND. 2014. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006. This attribute will be

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the H4010 wet heath feature mosaic are broadly referable to and characterised by the following National Vegetation Classification types: **In the Oldacre Valley:** wet heath mosaic vegetation with affinities to M25 *Molinia caerulea-Potentilla erecta* mire and M6 *Carex echinata-Sphagnum fallax* mire. **In the Sher Brook Valley:** M16 *Erica tetralix – Sphagnum compactum* wet heath, present in mosaics with a variety of other vegetation communities (vegetation with affinities to M6 *Carex echinata-Sphagnum fallax* mire, M15 *Scirpus cespitosa – Erica tetralix* mire, M21 *Narthecium ossifragum-Sphagnum papillosum* mire and 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, and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NATURAL ENGLAND. 2014. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Restore an overall cover of dwarf shrub species across the H4010 wet heath feature to within 25-30%. Dwarf-shrubs include: *Calluna vulgaris, Empetrum nigrum,Erica cinerea, E.*	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) are 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	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		tetralix, Ulex gallii, Vaccinium myrtillus, V. vitis-idaea (and hybrids).	vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The ericaceous species heather or ling *Calluna vulgaris*, bell heather *Erica cinerea*, cross-leaved heath *Erica tetralix*, Dorset heath *Erica ciliaris*, Cornish heath *Erica vagans*, bilberry or blaeberry *Vaccinium myrtillus* and cowberry *Vaccinium vitis-idaea* are the commonest and most characteristic dwarf-shrubs. Hybrids of Dorset and crossleaved heath and of bilberry and cowberry can be locally abundant. *Calluna* is usually the most abundant. Crowberry *Empetrum nigrum*, another common species in some coastal and transitional heaths, is not strictly ericaceous but is often treated as an ericoid species. **Reason for restore:** this is due to the currently low cover (5-10%) of dwarf shrubs present across the feature as recorded in the latest condition assessments. At Oldacre valley this is considered to be due to a combination of the long-term effects of: • Damaged hydrology throughout the wetland area due to the presence of the functioning WW1 drainage system • Eutrophication from the WW1 drainage system • Lack of conservation grazing management contributing to a dominance of *Molinia caerulea* that has resulted in poor structural and species diversity At Sher Brook valley, this is due to a combination of the long-term effects of: • Drying out of the hydrological unit • Lack of conservation grazing management contributing to a dominance of *Molinia caerulea* that has resulted in poor structural and species diversity • Localized eutrophication. In 2016 further work was done to understand the extent of the drying out in the Sher Brook valley and this investigation revealed former groundwater outflows that are now dry, and peat in situations too dry to currently lead to the formation of peat. Such features indicate that there has been a general reduction in elevation of groundwater outflows along the valley, in the order of between 1 and 3 m. The timescale of such changes is not certain, but the state of decay of some tussock sedge remnants is suggestive of several decades at least.	NATURAL ENGLAND. 2014; 2013; 2010. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Restore a diverse age structure amongst the ericaceous shrubs typically found across the H4010 wet heath feature. No one growth form should be dominant.	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 comprising different phases of growth, with all stages of growth present across the wet heath feature. **Reason for restore:** this is due to a lack of a diverse age structure amongst the ericaceous shrubs as most is mature with hardly any pioneer or young heather. This even-aged structure is due to the effects of insufficient removal of biomass either by conservation grazing or cutting, contributing to dominance by purple moor-grass *Molinea caerulea*. Underpinning this is the effects of the damaged hydrology. Measures to restore as near-natural as possible hydrological functioning of the wetland, along with appropriate long-term grazing management, will encourage the regeneration of typical ericaceous shrubs at the expense of the dominant *Molinia caerulea* and help restore the feature over time.	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NATURAL ENGLAND. 2014; 2013; 2010. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Vegetation structure: cover of gorse	Maintain the cover of common gorse *Ulex europaeus* across the whole of H4010 wet heath feature at a typically low level of <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. Extensive mature stands may also be serious fire hazards.	NATURAL ENGLAND. 2014; 2013; 2010. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	Vegetation structure: tree cover	Restore the open character of the H4010 wet heath feature, with a typically scattered (not overly clumped in one area) and low cover of trees and scrub of between 1-10%	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole. **Reason for restore:** the latest assessment in July 2013 for Unit 25 Oldacre valley mire found that the feature failed this target due to an average cover of 15% trees and scrub in the assessed stops. Tree and scrub cover across the wetland mosaic in the Oldacre valley is currently estimated (from 2016 aerial photography and site visits) at 30%. The latest assessment in Aug 2010 for Unit 26 Sher Brook valley found that the feature failed this target due to a cover of trees and scrub of 10-15% locally at the southern end of the unit where the best mire remains. Tree and scrub cover across the wetland mosaic in the Sher Brook valley is currently estimated (from 2016 aerial photography and site visits) at 20%.	NATURAL ENGLAND. 2014; 2013; 2010. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function (including its typical species)	**Vegetation composition: bracken cover**	Restore the cover of dense bracken across the H4010 wet heath feature to a typically low level of <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. **Reason for restore:** the latest assessment in July 2013 for Unit 25 Oldacre valley mire found that bracken cover was on average 10% in the assessed stops. Dense bracken cover across the wetland mosaic in the Oldacre valley is currently estimated (from 2016 aerial photography and site visits) at 15%. The latest assessment in Aug 2010 for Unit 26 Sher Brook valley found that bracken cover was also on average 10% in the assessed stops. Dense bracken cover across the wetland mosaic in the Sher Brook valley is currently estimated (from 2016 aerial	NATURAL ENGLAND. 2014; 2013; 2010. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			photography and site visits) at 25%.	
	Bare ground	Restore the cover of bare ground within the H4010 wet heath feature to at least 1% but no more than 10% cover, consisting of muddy, exposed bare ground.	Warm, dry, bare substrate close to or within heathland vegetation is important as basking, hunting, nesting and burrowing sites for certain plants, invertebrates, birds and amphibians strongly associated with dry heaths. Bare ground is defined here as soil (especially sandy, exposed soil in dry heaths and peaty soil besides open water in wet heaths) which is free of vegetation cover or litter and not subject to heavy and regular disturbance. It can be natural or man-made and should be firm, sun-lit, horizontal, sloping or vertical exposed bare ground. **Reason for restore:** the latest condition assessments recorded no bare ground in the assessed stops and there is no conservation grazing or small-scale manual scraping currently undertaken to create this bare ground micro-habitat feature.	NATURAL ENGLAND. 2014; 2013; 2010. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function (including its typical species)	**Key structural, influential and/or site-distinctive species: flora and fauna**	Restore the abundance of the species listed below to enable each of them to be a viable component of the H4010 wet heath feature: Constant and preferential wet heath plant species of M6, M15, M16 and M25 along with M10, M21, M22, M23, M25 & S3 vegetation types in the intimate valley bog/mire mosaic including *Erica tetralix*, *Vaccinium oxycoccus, Eriophorum angustifolium*, *Sphagnum* species, *Thelypteris thelypteroides, Drosera rotundifolia, Eleocharis quinqueflora, Narthecium ossifragum, Carex dioica, Carex lepidocarpa, Carex paniculata, Pinguicula vulgaris and Parnassia palustris.* Pending the results of future surveys for these species, restore populations of the following characteristic species of wet	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.	JOY, J. 2014. NATURAL ENGLAND. 2014, 2014b. MORRIS, P. 2012. SHAW, S.C. 2010. GRUNDY, D. 2007. JOY, J. 2006. GODFREY, M. & HILL, R. 2006. GODFREY, M. & HILL, R. 2006a. WEBB, J. R. & JUKES, A. 2001. ENGLISH NATURE. 1987.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		heath and associated transition areas: • Bog Bush Cricket *Metrioptera brachyptera* • Small pearl-bordered fritillary *Boloria selene* • *Gnypeta velata* wetland beetle	**Reason for restore:** the habitats on which most of these species rely are not currently in favourable condition it is reasonable to expect that these species populations are not as robust as they might be.	
	Vegetation: undesirable species	Restrict the cover of the following undesirable species across the H4010 wet heath feature at acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: < 1% cover of exotic species such as *Rhododendron ponticum, Gaultheria shallon, Fallopia japonica*. Exotic species should be eradicated if possible. Other species in this list may be beneficial for a range of invertebrates and only become indicators of negative quality if they are over the established limit: < 1 % cover of ragwort, nettle, thistles and other herbaceous species such as *Cirsium arvense, Digitalis purpurea, Epilobium* spp. (excluding. *E. palustre*), *Chamerion angustifolium, Juncus effusus, J. squarrosus, Ranunculus spp., Senecio spp., Rumex obtusifolius, Urtica dioica*, coarse grasses.	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants.	NATURAL ENGLAND. 2014; 2013; 2010. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function	**Functional connectivity**	Restore the overall extent, quality and function of any supporting features	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	EADES, P. PENDLETON,

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	**with wider landscape**	within the local landscape which provide a critical functional connection with the site.	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. **Reasons for restore:** A "restore" target has been set here for the following reasons: 1. Securing a semi-natural surface water catchment for both valleys supporting the wet heath feature will support the hydrological functioning on which the wet heath feature relies. 2. Similar/complimentary wetland habitats occur in the many valleys draining the Cannock Chase plateau, both inside and outside the SAC. Restoring linkages and habitat management across the plateau will allow landscape conservation of species closely associated with the wet heath feature mosaic such as small pearl bordered fritillary and bog bush cricket and so strengthening their populations in to the future. 3. Outside the SAC, but in close proximity to it, are several, large, high quality heathlands that were once part of the former continuous tract of Cannock Chase stretching to Sutton Park (now SSSI and National Nature Reserve) in Birmingham. These are Gentleshaw Common SSSI, Hednesford Hills and Chasewater SSSIs along with Shoal Hill Common Local Wildlife Site and smaller areas of lowland heathland throughout the area. Although now discrete heathland areas, separated from the larger Cannock Chase SAC by forestry, intensive agriculture and peri-urban development, these heathlands provide a critical functional connection to Cannock Chase SAC therefore their continued conservation and enhancement is a priority as it supports the integrity of Cannock Chase SAC. This vital network of heathlands supports species which can	E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NOAKE, B. 2014. NATURAL ENGLAND. 2014b. STAFFORDSHIRE WILDLIFE TRUST. 2013. JOY, J. 2006. GODFREY, M. & HILL, R. 2006a.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			disperse and range more widely such as birds and invertebrates, forming part of meta-populations that are important for genetic diversity and building resilience to cope with climate change. Restoring and/or creating new corridors of heathland/complimentary heathland habitats (such as wetlands, acid grassland, scrub and oakwoods (alderwoods in wet areas) between the surviving heathlands is critical to securing the integrity of the SAC into the future	
Structure and function (including its typical species)	**Adaptation and resilience**	Restore the H4010 wet heath 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. **Reason for restore: t**he vulnerability of Cannock Chase SAC <u>overall</u> to climate change has been assessed by Natural England as being low, taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be vulnerable overall but a lower priority for further assessment and action. A “restore” target has been set here because the site is still at risk as wetland habitats, which comprise a small but highly valuable part of the SAC, are at greater risk than the drier heathland habitats, and individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be required.	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NATURAL ENGLAND, 2015; 2014b; 2014; 2013; 2010. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006.
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 H4010 wet heath feature.	Active and ongoing conservation management is needed to restore the H4010 wet heath 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	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NATURAL ENGLAND.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. **Reason for restore:** in addition to the measures described under the Water Quality section below, conservation grazing is required to control the more competitive species that are a natural component of the feature such as *Molinia caerulea,* but which dominate over time due to a lack of conservation grazing (and also changes in hydrology), and to increase the vegetation's structural diversity. Lowland heathland vegetation is an especially fragile wildlife habitat and the fauna that live in it are restricted to it making them especially vulnerable to site impacts. One of the biggest threats to the special features of Cannock Chase is recreational disturbance and the direct and indirect damaging impacts it can have on the heathland's flora and fauna. Erosion, path widening, trampling, arson, pollution of soil from horse dung and dog waste can change the vegetation over time away from heathland and disturbance in the breeding season also directly harms reptiles and birds that nest on the ground in the open heathland. The Cannock Chase SAC Partnership has been created to deliver robust Strategic Access Management and Monitoring Measures (SAMMMs) to mitigate the negative effects of predicted future increases in recreational usage of the SAC from new housing development in the area.	2014b. ENGLISH NATURE, 2005.
	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 H4010 wet heath feature.	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.	
	Air quality	Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level	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	CEH. 2015. More

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		values given for the H4010 wet heath feature of the site on the Air Pollution Information System (www.apis.ac.uk).	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. **Reason for restore:** the Critical Loads and Levels are being exceeded at present and so are a threat to the wet heath feature, causing enrichment and acidification of its vegetation.	information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool at www.apis.ac.uk)
Supporting processes (on which the feature relies)	**Water quality**	Restore surface water and/or ground water quality and quantity to a standard which provides the necessary conditions to support and restore the H4010 wet heath feature. There should be no artificial functioning drains.	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC. **Reason for restore:** currently neither Oldacre valley nor the Sher Brook valley are functioning correctly hydrologically to support the wetland habitats present (or those expected to be there) and both are showing signs of nutrient enrichment. In	EADES, P. PENDLETON, E., TRATT, R., SHAW, S. & WHEELER, B. 2016. NATURAL ENGLAND. 2014. SHAW, S.C. 2010. GODFREY, M. & HILL, R. 2006.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			the Oldacre Valley the WW1 drainage system is still working to a certain extent/intercepting natural ground and surface water flows and so impacting on the wet heath mosaic vegetation here. In addition there may be pulses of enrichment from extant structures during heavy rainfall. The conservation measures that are required include investigating the extent and features of the World War 1 camp drainage system in the Oldacre Valley and its impact on the wet heath mosaic features with the aim of restoring to a natural as possible functioning wetland system(s) while conserving the historic World War 1 features. Impacts of altered hydrology are more substantial in the Sher Brook Valley than in the Oldacre Valley. The conservation measures that are required include investigating the hydrology of the Sher Brook Valley catchment to inform restoration options.	
Supporting processes (on which the feature relies)	**Hydrology**	Restore the natural hydrological regime at the catchment level to provide the conditions necessary to sustain the H4010 wet heath 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. **Reason for restore:** the wet heath feature in both of the valleys is in poor condition due to altered (man-made) hydrological regimes. Investigations are needed into how a natural hydrological regime can be restored to restore the wet heath mosaic feature. There should be no additional artificial functioning drains.	Please see above under "Water Quality".
Version Control: Advice last updated 8 December 2017: the supporting notes for the 'functional connectivity' attribute (point 3) have been amended. 20 January 2020: supporting notes for Conservation Measures attribute has been amended.				
Variations from national feature-framework of integrity-guidance: No variation from national guidance.				

Table 2: 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 European dry heath feature to 830 hectares	See the notes for this attribute in Table 1 above. **Reason for restore:** the existing area of dry heathland covers 750ha with a further 80ha of recent woodland (conifer plantation and secondary birch woodland) that can be easily restored to heathland over time. There is also c.260ha of site fabric within the SSSI boundary and expansion of the heathland feature into this mainly mixed plantation would be a welcome addition to the heathland area.	NATURAL ENGLAND. 2014. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Spatial distribution of the feature within the site	Restore the distribution and configuration of the H4030 European dry heath feature, including where applicable its component vegetation types, across the site.	See the notes for this attribute in Table 1 above. **Reason for restore:** please see above under "Extent".	
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the H4030 European dry heath feature are broadly referable to and characterised by the following National Vegetation Classification types: H8 *Calluna vulgaris-Ulex gallii* heath H9 *Calluna vulgaris - Deschampsia flexuosa*. heath	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).	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Vegetation community transitions	Maintain areas of transition between the H4030 European dry heath feature and communities which form other heathland-associated habitats (such as	Transitions and 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.	NATURAL ENGLAND. 2014.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		dry and humid heaths, mires, acid grasslands, scrub and woodland).	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.	This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Restore an overall cover of dwarf shrub species across the H4030 European dry heath feature which is typically between 60 - 80%. Dwarf-shrubs include*: Calluna vulgaris, Empetrum nigrum, E. cinerea, E. tetralix, Ulex gallii, Vaccinium myrtillus, V. vitis-idaea* (and hybrids).	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) are needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The ericaceous species heather or ling *Calluna vulgaris*, bell heather *Erica cinerea*, cross-leaved heath *Erica tetralix*, Dorset heath *Erica ciliaris*, Cornish heath *Erica vagans*, bilberry or blaeberry *Vaccinium myrtillus* and cowberry *Vaccinium vitis-idaea* are the commonest and most characteristic dwarf-shrubs. Hybrids of Dorset and cross-leaved heath and of bilberry and cowberry can be locally abundant. *Calluna* is usually the most abundant. Crowberry *Empetrum nigrum*, another common species in some coastal and transitional heaths, is not strictly ericaceous but is often treated as an ericoid species. **Reason for restore:** in northern and eastern parts of the SAC the cover of dwarf shrubs are below the target though due to dense bracken and/or trees/scrub dominating in these areas.	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014; 2015; 2016. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Vegetation composition: bracken cover	Reduce the cover of dense bracken across the H4030 European dry heath feature to a typically low level of between 1 - 10%.	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. Active management of bracken is usually 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.	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014; 2015; 2016. This attribute will be

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Reason for restore: dense bracken cover across the whole dry heath feature at Cannock Chase is currently conservatively estimated (from 2016 aerial photography and site visits) at just over 10%.	periodically monitored as part of Natural England's SSSI condition assessments.
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Maintain the cover of common gorse *Ulex europaeus* at <25% and the combined cover of *U.europaeus* and *U.gallii* at <50% of the whole H4030 European dry heath feature.	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. Extensive mature stands may also be serious fire hazards.	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014; 2015; 2016. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Vegetation structure: tree cover	Restore the open character of the H4030 European dry heath feature, with a typically scattered and low cover of trees and scrub of between 5 - 15%.	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole. **Reason for restore:** although current tree and scrub cover across the whole dry heath feature is conservatively estimated (from 2016 aerial photography and site	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014; 2015; 2016. This attribute will be periodically monitored as part of Natural England's SSSI condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			visits) at nearly 13%, there are areas of potential heathland habitat will benefit from restoration by further opening up of pine plantations at Moors Gorse and Brindley Heath. Current tree and scrub cover mainly comprises mature scrub, woodland and single mature birch trees, many of which are important for the rare Welsh clearwing moth. It would be beneficial to heathland fauna to restore a shifting mosaic of young scattered trees, thickets and scrub to provide microhabitats	assessments.
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Restore a diverse age structure amongst the ericaceous shrubs typically found across the H4030 European dry heath feature.	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. **Reason for restore:** there is an overall lack of pioneer heather across the dry heath feature. Most of the heather is in the building-mature stage, moving into degenerate stage.	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014; 2015; 2016. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Vegetation: undesirable species	Restrict the cover of the following undesirable species across the H4030 European dry heath feature to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: < 1% cover of exotic species such as *Rhododendron ponticum, Gaultheria shallon, Fallopia japonica*. Exotic	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants.	NATURAL ENGLAND, 2010; 2011; 2012; 2013, 2014; 2015; 2016. This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		species should be eradicated if possible. Other species in this list may be beneficial for a range of invertebrates and only become indicators of negative quality if they are over the established limit: < 1 % cover of ragwort, nettle, thistles and other herbaceous species such as *Cirsium arvense, Digitalis purpurea, Epilobium* spp. (excluding. *E. palustre*), *Chamerion angustifolium, Juncus effusus, J. squarrosus, Ranunculus spp., Senecio spp., Rumex obtusifolius, Urtica dioica*, coarse grasses.		England's SSSI condition assessments.
Structure and function (including its typical species)	**Bare ground**	Restore the cover of bare ground within the H4030 European dry heath feature to at least 1% but no more than 10% cover, consisting of at least 0.5% horizontal and 0.5% vertical bare ground.	Warm, dry, bare substrate close to or within heathland vegetation is important as basking, hunting, nesting and burrowing sites for certain plants, invertebrates, birds and amphibians strongly associated with dry heaths. Bare ground is defined here as soil (especially sandy, exposed soil in dry heaths and peaty soil besides open water in wet heaths) which is free of vegetation cover or litter and not subject to heavy and regular disturbance. It can be natural or man-made and should be firm, sun-lit, horizontal, sloping or vertical exposed bare ground. **Reason for restore:** the latest condition assessments recorded insufficient bare ground across the feature. Edges of paths and tracks total just under 1% at most and therefore active management is needed to boost this micro-habitat resource across the dry heath feature.	NATURAL ENGLAND. 2014. NATURAL ENGLAND. 2013. NATURAL ENGLAND. 2010. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments.
	Key structural,	Restore the abundance of the species listed below to enable each of them to	See the Supporting/Explanatory Notes for this attribute above in table 1.	JOY, J. 2014. LOWE, A.,

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	influential and/or site-distinctive species: flora and fauna	be a viable component of the H4030 European dry heath feature: Constant and preferential plant species of the H8 and H9 vegetation types. Population of *Vaccinium intermedium.* Assemblage of heathland invertebrates associated with unshaded, early successional mosaics (such as solitary bees and wasps). Assemblage of heathland breeding birds, including Dartford warbler *Sylvia undata,* nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea*. Assemblage of native reptiles: adder *Vipera berus,* common lizard *Zootoca vivipara,* grass snake *Natrix helvetica*, slow worm *Anguis fragilis*. Population of Bog Bush Cricket *Metrioptera brachyptera.*	**Reason for restore:** the habitats on which most of these species rely are not currently in favourable condition. It is reasonable to expect that these species populations are not as robust as they might be. Across the SAC there are few large areas of uninterrupted or undisturbed habitat; for example the average area of habitat between paths/tracks is about 6ha. This can have implications for characteristic, ground-nesting heathland birds such as nightjar and woodlark (Lowe *et al*. 2014)	ROGERS, A.C. AND DURRANT, K.L. 2014. NATURAL ENGLAND. 2014. NATURAL ENGLAND. 2014b. MORRIS, P. 2012. SHAW, S.C. 2010. GRUNDY, D. 2007. BENNETT, J.S. 2007. WEBB, J. R. & JUKES, A. 2001. ENGLISH NATURE. 1987.
Structure and function (including its typical species)	**Functional connectivity with wider landscape**	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site.	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely.	NOAKE, B. 2014. STAFFORDSHIRE WILDLIFE TRUST. 2013. NATURAL ENGLAND. 2013.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. **Reason for restore:** A "restore" target has been set here for three reasons: 1. Although good heathland corridors have been created on former Forest Enterprise commercial forestry land and managed by conservation grazing to connect formerly fragmented parts of the SAC, there may be opportunities to extend these and/or create new corridors of heathland/complimentary heathland habitats* to increase the functional connectivity with the SAC to allow the site to be as resilient as possible into the future. 2. Surrounding the SAC is Cannock Forest, managed by Forest Enterprise for commercial timber production. The clear-fell management system has provided nightjar and woodlark with favourable nesting habitat, the continuity of which across the landscape is vital for the survival of the important populations of these rare birds in the Midlands. 3. Outside the SAC, but in close proximity to it, are several, large, high quality heathlands that were once part of the former continuous tract of Cannock Chase stretching to Sutton Park (now SSSI and National Nature Reserve) in Birmingham. These are Gentleshaw Common SSSI, Hednesford Hills and Chasewater SSSIs along with Shoal Hill Common Local Wildlife Site and smaller areas of lowland heathland throughout the area. Although now discrete heathland areas, separated from the larger Cannock Chase SAC by forestry, intensive agriculture and peri-urban development, these heathlands provide a critical functional connection to Cannock Chase SAC therefore their continued conservation and enhancement is a priority as it supports the integrity of Cannock Chase SAC. This vital network of heathlands supports species which can disperse and range more widely such as birds and invertebrates, forming part of meta-populations that are important for genetic diversity and building resilience to cope with climate change. Restoring and/or creating new corridors of heathland/complimentary heathland habitats (such as acid grassland, scrub and oakwoods (alderwoods in wet areas) between the surviving heathlands is critical to securing the integrity of the SAC into	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			the future	
Structure and function (including its typical species)	**Adaptation and resilience**	Restore the H4030 European dry heath 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. **Reason for restore: t**he vulnerability of Cannock Chase SAC <u>overall</u> to climate change has been assessed by Natural England as being *low*, taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be vulnerable overall but a lower priority for further assessment and action. A “restore” target has been set here because most of the land between the SAC and the other high quality heathlands in the local landscape is now urban development, intensive farming and forestry. To make the SAC and its typical species become more resilient in the face of climate change and other impacts and threats, we need to reconnect isolated heathland sites together. Where possible, land adjacent to existing heathland should be restored to lowland heathland and associated habitats such as wetland, acid grassland, scrub and oak-woods (alder-woods in wet areas).	CANNOCK CHASE SAC PARTNERSHIP. 2016. NATURAL ENGLAND. 2010; 2011; 2012; 2013; 2014; 2014b, 2015
Structure and function (including its typical species)	**Soils, substrate and nutrient cycling**	Restore the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal/bacterial ratio, to within typical values for the H4030 European dry heath 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. **Reason for restore:** there is evidence to suggest that the soils at Cannock Chase	CEH. 2015.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			are vulnerable to acidification.	
Supporting processes (on which the feature relies)	**Conservation measures**	Restore the management measures within (and outside the site boundary where required) which are necessary to restore the structure, functions and supporting processes associated with the H4030 European dry heath 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. **Reason for restore: c**ontinuing existing conservation management and new conservation grazing, subject to ongoing public consultation, will contribute hugely to achieving favourable conservation status of the dry heath feature by increasing nutrient removal from the heathland, help create a mosaic of habitats and improving functioning of the heathland ecosystem. Lowland heathland vegetation is an especially fragile wildlife habitat and the fauna that live in it are restricted to it making them especially vulnerable to site impacts. One of the biggest threats to the special features of Cannock Chase is recreational disturbance and the direct and indirect damaging impacts it can have on the heathland's flora and fauna. Erosion, path widening, trampling, arson, pollution of soil from horse dung and dog waste can change the vegetation over time away from heathland and disturbance in the breeding season also directly harms reptiles and birds that nest on the ground in the open heathland. The Cannock Chase SAC Partnership will deliver the Strategic Access Management Measures required to mitigate for the increase in recreational impacts from new housing in the area, allowing the measures detailed in the structure and function and supporting processes sections of the Supplementary Advice to have maximum positive effect on the dry heath feature so improving its resilience into the future.	STAFFORDSHIRE COUNTY COUNCIL. 2016. NATURAL ENGLAND, 2010; 2011; 2012; 2013; 2014b. ENGLISH NATURE, 2005.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Ongoing monitoring of and new research into the *Phytophthora pseudosyringae* infection in bilberry *Vaccinium myrtillus* is required to better understand its ecology for control and overall site management purposes.	
Supporting processes (on which the feature relies)	**Air quality**	Restore the concentrations and deposition of air pollutants to within 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 Supporting/Explanatory Notes for this attribute above in table 1. **Reason for restore:** the Critical Loads and Levels are currently being exceeded at present and are a threat to the dry heath feature, causing enrichment and acidification of the soil beyond the expected pH for a lowland heathland soil.	CEH. 2015. More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool at www.apis.ac.uk
Version Control: Advice last updated 8 December 2017: the supporting notes for the 'functional connectivity' attribute (point 3) have been amended 20 January 2020: supporting notes for Conservation Measures attribute has been amended.				
Variations from national feature-framework of integrity-guidance: The following attributes are not relevant to this feature at this site: • Supporting processes (on which the feature relies) – Water Quality • Supporting processes (on which the feature relies) – Hydrology				

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