European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features

Wimbledon Common Special Area of Conservation (SAC)
Site Code: UK0030301

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Date of Publication: 29 February 2016

About this document

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

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site. Any proposals or operations which may affect the site or its qualifying features should be designed so they do not adversely affect any of the attributes listed in the objectives and supplementary advice.

This supplementary advice to the Conservation Objectives describes in more detail the range of ecological attributes on which the qualifying features will depend and which are most likely to contribute to a site's overall integrity. It sets out minimum targets for each qualifying feature to achieve in order to meet the site's objectives.

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	Wimbledon Common Special Area of Conservation (SAC)
Location	Greater London
Site Maps	The designated boundary of this site can be viewed here on the MAGIC website.
Designation Date	April 2005
Qualifying Features	See section below
Designation Area	348.31 hectares
Designation Changes	n/a
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Wimbledon Common SSSI
Relationship with other European or International Site designations	Wimbledon Common is situated with 1km of Richmond Park SAC, which is also classified as SAC for stag beetle.
Other information	Natura 2000 Standard Data Form for Wimbledon Common SAC

Site background and geography

Wimbledon Common is one of the largest areas of uncultivated land in the conurbation of London and sits in the Thames Valley Natural Character Area. It supports a mosaic of habitats including broadleaved woodland, acid grassland, dry and wet heath, scrub and mire.

The underlying soils are mostly sands, gravels and silty clays which give rise to poorly-drained, nutrient-poor and acid conditions. The range of habitats supports a wide diversity of plants and animals, including many which are scarce in the London area.

The SAC is a particular stronghold for the stag beetle *Lucanus cervus* in the south east of England and is at the heart of the local centre of distribution of the species. The site provides ideal habitat conditions for the stag beetle, such as extensive areas of undisturbed woodland and large quantities of decaying wood. The site is also important in supporting small but important areas of heathland, a very scarce habitat in the London area.

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 Species:

- **S1083 Stag beetle *Lucanus cervus***

The stag beetle is the UK's largest terrestrial beetle, and amongst the most spectacular, reaching 7 cm in length. Featuring shiny chestnut-violet wing-cases, the stag beetle is characterised by possessing large mandibles (jaws) which are antler-shaped in the male, giving them their common name. These 'antlers' are used for fighting other males, whereas the female's mandibles, being smaller, are more powerful.

The stag beetle requires decaying wood to complete its lifecycle. The eggs are laid underground in the soil next to logs or the stumps of dead trees, and the larva (or grub) will spend up to seven years in the wood, slowly growing in size. They contribute to the recycling of dead wood, which in turn helps enrich the soil. Timber is also utilised, especially sunken fence posts.

Adult stag beetles emerge from mid-May until late July. Males emerge earlier to actively search for females to mate, and can often be seen flying on sultry summer evenings an hour or two before dusk. As adults they are short-lived and generally die after mating, although occasionally some may over-winter in places such as compost heaps.

Wimbledon Common SAC has a large number of old trees and a great quantity of fallen decaying timber which supports an important stag beetle population. It is at the heart of the south London centre of distribution for stag beetle and a relatively large number of records were received from this site during a recent nationwide survey for the species (Percy *et al*. 2000). The site supports a number of other scarce invertebrate species associated with decaying timber.

Qualifying habitats:

- **H4030 European dry heaths**

European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs, such as heather *Calluna vulgaris*, bilberry *Vaccinium* spp. or bell heather *Erica cinerea*, typically dominate the vegetation, though other dwarf-shrubs are important locally. Nearly all dry heath is semi-natural, being derived from woodland through a long history of management.

This SAC includes examples of dry heath vegetation typical of the south east of England. It is mostly present as part of a habitat mosaic which includes acid grassland, gorse scrub, bracken, birch woodland and transitions to wet or 'humid' heath. The dry heath vegetation is characterised by patches of heather *Calluna vulgaris*, with occasional dwarf gorse *Ulex minor* and common gorse *U europaeus*. Where soils are free-draining there are transitions to dry acid grassland where wavy hair-grass *Deschampsia flexuosa*, sheep's fescue *Festuca ovina* and sheep's sorrel *Rumex acetosella* are common associates of heather.

Where soils are less free-draining, tormentil *Potentilla erecta*, purple moor-grass *Molinia caerulea* and heath rush *Juncus squarrosus* are typically frequent.

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

Wet heath usually occurs on acidic, nutrient-poor substrates, such as shallow peats or sandy soils with impeded drainage.

This SAC supports small but important areas of 'humid' heath as part of a complex mosaic of habitats.

This type of heath vegetation is a very rare feature in the London area. The humid heath vegetation is characterised by varying amounts of heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, purple moor-grass *Molinia caerulea* and dwarf gorse *Ulex minor*, with locally uncommon plants including creeping willow *Salix repens*, heath grass *Danthonia decumbens* and mat grass *Nardus stricta*.

References

PERCY, C., BASSFORD, G. & KEEBLE, V. 2000. Findings of the 1998 National Stag Beetle Survey. People's Trust for Endangered Species, London, UK.

Table 1: Supplementary Advice for Qualifying Features: S1083 Stag beetle *Lucanus cervus*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/ function	Decaying-wood habitat	Maintain or restore* an abundance and constant supply of ancient trees, standing dead trees, fallen trees, stumps and roots in a state of decay. In urban areas ensure larger native trees and man-made timber structures are retained wherever possible as a larval food resource.	Female beetles lay their eggs near the rotting wood and roots of broadleaved trees which are in contact with the soil so that the wood remains moist and is able to rot. Once they have mated, the females lay small, round eggs below ground in rotting wood, particularly log piles, rotting tree stumps and old fence posts. These larvae feed on the decaying wood around them for at least three years and up to five years after which they will begin to pupate into adults. It is therefore critically important that sources of decaying timber are left undisturbed wherever possible. *This target may also applicable to off-site features which may provide larval habitat to support the SAC population. Local gardens, parks and roadside trees may all be important in helping to maintain the local stag beetle population if decaying timber is present and may provide linkage in the landscape to neighbouring colonies. Measures to restore the supporting habitat to a more favourable condition on land outside the designated site where management or habitat conditions are currently unsuitable for stag beetle survival may be required.	
	Woodland habitat structure	Maintain or restore* a well-structured broadleaved woodland habitat, with sheltered, sunlit glades and rides containing stumps and other suitable decaying wood	During their short adult lives the male stag beetles will spend their days sunning themselves in an attempt to gather strength for the evening's activities of flying in search of a mate. Areas of woodland should be structurally diverse with widespread availability of large-diameter decaying wood and with good functional linkage across the habitat which facilitates movement of stag beetles to find mates. It is also important that there is good functional linkage between the site and any adjacent areas of suitable habitat so that the stag beetle population does not become genetically isolated. *This target may also applicable to off-site features which may provide larval habitat to support the SAC population.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Natural processes	Ensure the continuity of processes of timber decay and nutrient recycling, in particular the continued provision of plentiful decaying stumps and roots	The natural processes of decomposition and decay are important in providing optimal conditions for stag beetles to lay eggs and survive as larvae. Most actively-decaying wood should be permanently moist and therefore timber is most favourable when buried at or near the soil surface in shaded or slightly shaded locations, rather than exposed above ground and in full sun.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance	Maintain or restore* the presence of the stag beetle population across its full range within the SAC, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. *This target may also applicable to off-site features which may provide larval habitat to support the SAC population. Due to the dynamic nature of population change, the target value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period. The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature. There is currently no reliable means of estimating stag beetle population size other than the collation of records of direct observation of adults during the peak period of mating activity. Populations are thought to vary significantly in size from year to year according to natural population cycles, and the availability and abundance of suitable larval habitat. Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current range and size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration.	PERCY, C., BASSFORD, G. & KEEBLE, V. 2000. Findings of the 1998 National Stag Beetle Survey. People's Trust for Endangered Species, London, UK.
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain or restore* the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the stag beetle feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. *****This target may also applicable to off-site features which may provide larval habitat to support the SAC population. 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	NATURAL ENGLAND, 2014. Site Improvement Plan: Wimbledon Common SAC (SIP262)

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		agreements.	
Version Control Advice last updated: not applicable			
Variations from national feature-framework of integrity-guidance: n/a			

Table 2: Supplementary Advice for Qualifying Features: H4030 European dry heaths

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation composition: bracken cover	Maintain or restore a cover of dense bracken which is low, typically at <5%, across the H4030 feature	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 reptiles occur and utilise bracken litter habitat.	
	Vegetation structure: cover of gorse	Maintain or restore a cover of common gorse *Ulex europaeus* at <1-5% and a combined cover of *U.europaeus* and dwarf gorse *U.minor* at <20%, across the H4030 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 hazard.	
	vegetation structure: tree and scrub cover	Maintain or restore the open character of the H4030 feature, with a typically scattered and low cover of trees and scrub <10% cover (excluding common gorse)	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. 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. The area of scrub/tree cover should be stable or not increasing as a whole	
	Vegetation structure: heather age structure	Maintain or restore a diverse age structure amongst the ericacerous shrubs typically found as part of the H4030 feature	The presence of a range of age class of dwarf shrubs, which are typical of this habitat feature, is important as each growth phase creates different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Ideally, this age structure will consist of between 10-40% cover of (pseudo) pioneer heather; 20-80% cover of building/mature heather; <30% cover of degenerate heather and less than <10% cover of dead heather.	
Extent and distribution of the feature	Extent of the feature within the site	Restore the combined total extent of the H4030 and H4010 feature to 48.6 hectares, including its component habitat types and transitions to adjacent	There should be no measurable net reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered	NATURE CONSERVANCY COUNCIL, 1986. Phase 1 habitat survey of Wimbledon

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		habitats.	from site-based surveys carried out in the 1980s which is prior to recent habitat restoration work but is considered appropriate for the purposes of this target. 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 includes 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.	Common. Available from Natural England on request.
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain or 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 and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H4030 feature are referable to and characterised by the following National Vegetation Classification type (s): H1 *Calluna vulgaris – Festuca ovina* Heathland; H2 *Calluna vulgaris – Ulex minor* heath (and as mosaics with acid	This habitat feature comprises 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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		grassland vegetation)	fluctuations).	
Structure and function (including its typical species)	Vegetation community transitions	Maintain or restore any areas of transition between the H4030 feature and other heathland-associated habitats, such as humid heath, mires, acid grassland, scrub and woodland.	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
	Vegetation structure: cover of dwarf shrubs	Maintain or restore an overall cover of dwarf shrub species which is typically between 75-90% of the H4030 feature	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). These should be prominent components of the Annex I habitat and factors which might result in a reduction in cover, such as excessive trampling, grazing or nutrient input should be regarded as damaging.	
	Vegetation: undesirable species	Maintain or restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes to surface condition, soils, nutrient levels or hydrology which may encourage their spread: *Acaena* spp., *Rhododendron ponticum, Gaultheria shallon, Fallopia japonica, Cirsium arvense, Digitalis purpurea,Epilobium spp. (excl. E. palustre), Ranunculus repens, Senecio jacobaea, Rumex obtusifolius, Urtica dioica*.	Undesirable exotic or native 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. Some of these species can be valuable as minor components of a heathland mosaic but their presence may indicate undesirable influences such as increasing nutrient levels, damage by fire or excessive disturbance. In most cases 'acceptable levels' means less than 1% cover or no more than rare.	
	Key structural, influential and distinctive species	Maintain or restore the abundance of the species listed below to enable each of them to be a viable component of the	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;	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Annex 1 habitat: Heather *Calluna vulgaris,* Bell heather *Erica cinerea,* dwarf gorse *Ulex minor,* pill sedge *Carex pilulifera,* heath bedstraw *Galium saxatile,* petty whin *Genista anglica, Hypochaeris radicata,* tormentil *Potentilla erecta,* sheep's sorrel *Rumex acetosella,* Mosses *Hypnum jutlandicum, Dicranum scoparium, Polytrichum juniperinum.*	- **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.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Maintain or 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 desirability of maintaining or restoring 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.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain or restore 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	This reflects the need to consider the ability of natural habitats 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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Modelling studies predict that heathland habitats are likely to come under increasing stress as a result of more frequent and prolonged droughts, high summer temperatures and increased susceptibility to uncontrolled fires. These effects may contribute towards a tendency for grasses to become more prominent than dwarf shrubs, with consequent changes in associated species. 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. Such responses may include management to reduce fire risk, the retention of scattered trees and bushes to provide shade and measures to promote heather regeneration.	
	Soils, substrate and nutrient cycling	Maintain or 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 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. Typically, heathland soils are 'raw' with little humus and low nutrient status. Soils at Wimbledon Common are derived from river terrace sands and gravels and are predominantly acidic.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain or restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the H4030 feature	Active and ongoing conservation management is needed to protect, maintain or restore heathland at this site. The necessary conservation measures for this feature will include measures to control scrub and tree encroachment, spread of bracken, establishment of non-native species, control of pests and diseases, and maintenance of low nutrient levels. Maintenance of the feature is also dependent upon management to keep the dwarf shrub component in good condition, such as rotational cutting, controlled burning or grazing, and measures to create scattered patches of bare ground.	NATURAL ENGLAND, 2014. Site Improvement Plan: Wimbledon Common SAC (SIP262) ENGLISH NATURE, 2005. A statement of English Nature's views about the management of Wimbledon Common Site of Special Scientific Interest (SSSI). Available from

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				http://www.sssi.naturalengland.org.uk/Special/sssi/vam/VAM%201004317.pdf
Supporting processes (on which the feature relies)	Air quality	Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Nitrogen deposition at this SAC currently exceeds site relevant critical loads. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Version Control Advice last updated: [*applicable only to subsequent versions – adviser to give brief details of what has changed in this table, when and by whom*]				
Variations from national feature-framework of integrity-guidance: [*adviser to give details of what has varied and why*] Functional connectivity with wider landscape – removed due to urban setting				

Table 3: Supplementary Advice for Qualifying Features: H4010 Northern Atlantic wet heaths with *Erica tetralix*

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 and H4030 features to 48.6 hectares.	There should be no measurable net reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from site-based surveys carried out in the 1980s. This is prior to recent habitat restoration work but is the best available information for the purposes of this target at present. 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 includes 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.	NATURE CONSERVANCY COUNCIL, 1986. Phase 1 habitat survey of Wimbledon Common. Available from Natural England on request.
	Spatial distribution of the feature within the site	Maintain 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 and more specialist species associated with the Annex I habitat feature.	
Structure and function	Vegetation community	Maintain or restore any areas of transition between this and	Transitions or zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	transitions	communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
	Vegetation community composition	Ensure the component vegetation communities of the H4010 feature are referable to and characterised by the following National Vegetation Classification type (s): M16 *Erica tetralix – Sphagnum compactum* heathland and as mosaics with M25 *Molinia caerulea – Potentilla erecta* mire	This habitat feature comprises 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).	RODWELL, J.S. (ed.) 1991. British Plant Communities. Volume 2. Mires and Heaths. Cambridge University Press.
	Vegetation structure: cover of dwarf shrubs	Maintain an overall cover of dwarf shrub species which is typically between 75-90%	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' (heathers). These should be prominent components of the habitat and factors which might result in a reduction in cover, such as excessive trampling, grazing or nutrient input should be regarded as damaging.	
	Vegetation structure: heather age structure	Maintain a diverse age structure amongst the ericaceous shrubs typically found on the site	The presence of a range of age class of dwarf shrubs is important as each growth phase creates different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Ideally, 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	
	Vegetation structure: cover of gorse	Maintain cover of common gorse at <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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	vegetation structure: tree and scrub cover	Maintain the open character of the H4010 feature, with a typically scattered and low cover of trees and scrub (<10% 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. 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. The area of scrub/tree cover should be stable or not increasing as a whole	
	Vegetation composition: bracken cover	Restore a cover of dense bracken which is low, typically at <5%	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Usually active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has also some nature conservation value, for example on sites where reptiles occur and utilise bracken litter habitat.	
	Key structural, influential and site-distinctive species	Restore the abundance of the species listed below to enable each of them to be a viable component of the H4010 Annex 1 habitat: *Calluna vulgaris, Erica tetralix, Myrica gale, Salix repens, Ulex minor, Eleocharis spp., Eriophorum angustifolium, Molinia caerulea, Trichophorum cespitosum, Anagallis tenella, Drosera spp., Narthecium ossifragum*	See attribute above in table 2.	
	Vegetation: undesirable species	Restore 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:	See attribute above in Table 2.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Acaena spp., Rhododendron ponticum, Gaultheria shallon, Fallopia japonica, Cirsium arvense, Digitalis purpurea, Epilobium spp. (excl. E. palustre), Ranunculus repens, Senecio jacobaea, Rumex obtusifolius, Urtica dioica.		
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 desirability of maintaining or restoring 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.	
	Adaptation and resilience	Maintain or restore the H4010 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 reflects the need to consider the ability of natural habitats to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecosystem to cope with and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Modelling studies predict that heathland habitats are likely to come under increasing stress as a result of more frequent and prolonged droughts, high summer temperatures and increased susceptibility to uncontrolled fires. These effects may contribute towards a tendency for grasses to become more prominent than dwarf shrubs, with consequent changes in associated species. 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.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability NBCCV) assessments for SACs and SPAs in England [available at http://publications.naturalengland.org.uk/publication/4954594591375360].

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The overall vulnerability of this particular SAC to climate change has been assessed by Natural England as being *moderate*, taking into account the sensitivity, fragmentation, topography and management of its habitats/supporting habitats. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be required.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the H4010 feature	Active and ongoing conservation management is needed to protect, maintain or restore heathland at this site. The necessary conservation measures for this feature will include measures to control scrub and tree encroachment, spread of bracken, establishment of non-native species, control of pests and diseases, and protection of hydrological conditions. Maintenance of the feature is also dependent upon management to keep the dwarf shrub component in good condition, such as rotational cutting, controlled burning or grazing, and measures to create scattered patches of bare ground.	NATURAL ENGLAND, 2014. Site Improvement Plan: Wimbledon Common SAC (SIP262) ENGLISH NATURE, 2005. A statement of English Nature's views about the management of Wimbledon Common Site of Special Scientific Interest (SSSI). Available from http://www.sssi.naturalengland.org.uk/Special/sssi/vam/VAM%201004317.pdf
	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, at within typical values for the H4010 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. Typically, heathland soils are characteristically 'raw' with little humus and low nutrient status. Soils at Wimbledon Common are derived from the	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			underlying river terrace sands and gravels and are predominantly acidic. The soils vary in their permeability and springs and flushes are present at the junction of less permeable deposits which feed small mires.	
	Air quality	Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for the H4010 feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See attribute above in table 2.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
	Hydrology	At a site, unit and/or catchment level as necessary, maintain or restore the natural hydrological regime to provide the conditions necessary to sustain the H4010 feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in the 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.	
Version Control Advice last updated: not applicable				
Variations from national feature-framework of integrity-guidance: not applicable				