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

Carrine Common Special Area of Conservation (SAC)
Site Code: UK0012795

Carrine Common (photograph © Natural England 2009)

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Carrine 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'

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	Carrine Common Special Area of Conservation (SAC)
Location	Cornwall
Site Map	The designated boundary of this site can be viewed here on the MAGiC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	45.86ha
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Carrine Common & Penwethers SSSI
Relationship with other European or International Site designations	Not applicable

Site background and geography

Carrine Common SAC is situated approximately 1.5km southwest of Truro. The site is within the Cornish Killas National Character Area (NCA Profile 152). The site is leased to Natural England and it is managed as a nature reserve with the intention to declare it a National Nature Reserve.

The SAC comprises the open land known as Carrine Common in the west and a series of small fields around Penwethers Vean Farm to the east. The component SSSI is Carrine Common and Penwethers SSSI, the boundaries of the SSSI and SAC are identical. The open land on Carine Common is C.R.O.W. Open Access Land (providing access on foot) and there is a network of informal paths around parts of the site; there is also a public right of way – byway open to all traffic that crosses Carrine Common from the northwest to the southeast direction. A public highway, Pound Lane, crosses the southern end of the site. Carrine Common (17.35 ha) was registered as Common Land in 2012.

The local landscape around the site has a number of ancient roundbarrows, including one within the SAC, on the eastern edge of Carrine Common, which is a scheduled monument.

The site is underlain by Devonian slates and sandstones of the Mylor Series. Well drained shallow Brown Earth soils underlie the dry heath and drier meadows. Lower lying mire vegetation has developed over waterlogged cambic stagnogley soils, often displaying a wet, peaty surface horizon. Alluvial deposits occur along the stream valleys.

The SAC supports a variety of habitats, ranging from western lowland heath, scrub and mesotrophic herb-rich hay meadows on drier slopes, to low-lying areas with impeded drainage, which support wet heath, willow carr, streamside and mire vegetation.

Carrine Common supports dry dwarf shrub heath, dominated by heather *Calluna vulgaris*, bell heather *Erica cinerea*, western gorse *Ulex gallii* and bristle bent grass *Agrostis curtisii*. Dorset heath *Erica ciliaris* is locally dominant in the southeast of the common. This is the largest population of Dorset heath in Cornwall and is unusual in that it occurs in dry rather than wet heath.

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:

- **H4020 Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* (priority feature)***

Heathlands containing cross-leaved heath *Erica tetralix* and the nationally rare Dorset heath *E. ciliaris* are generally found on acid soils with slightly impeded drainage, although in Cornwall they extend onto dry soils. The abundance of *E. ciliaris* differentiates this habitat from other Annex I heath types.

Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* often contain heather *Calluna vulgaris* and varying proportions of bell heather *Erica cinerea*. Other associated species include purple moor-grass *Molinia caerulea*, bristle bent *Agrostis curtisii* and dwarf gorse *Ulex minor*, with the latter being replaced by western gorse *U. gallii* in south-west England. This habitat type is not recognised as a distinct community in the NVC. At Carrine Common it includes forms of the following communities in which *E. ciliaris* is abundant:

H4 *Ulex gallii – Agrostis curtisii* heath
M21 *Narthecium ossifragum – Sphagnum papillosum* valley mire

These heathlands may grade into wetter heath and bog communities, notably valley mires with bog-moss *Sphagnum* spp. and bog asphodel *Narthecium ossifragum*.

In Europe, temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* are characteristic of the western Mediterranean region and within the EU are found in France, Spain and Portugal. In the UK, this form of heathland is confined to warm, oceanic locations. It is a rare habitat, occurring naturally only in Dorset and Cornwall.

Carrine Common has a large area of Dorset heath *Erica ciliaris* and is important for the representation of the full geographical distribution of temperate Atlantic wet heaths. This site also takes account of the ecological variation of the habitat type, as *E. ciliaris* at Carrine Common occurs on soils that appear to be more free-draining than is usually the case in Dorset and elsewhere in Cornwall. The occurrence of this habitat type under such conditions is thought to reflect the highly oceanic climate of Cornwall.

Erica ciliaris is a Red Data Book species.

- **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*. At Carrine Common it includes forms of the NVC community H4 *Ulex gallii – Agrostis curtisii* heath – the dry dwarf shrub heath on the site is dominated by heather *Calluna vulgaris*, bell heather *Erica cinerea*, Western gorse *Ulex gallii* and bristle bent *Agrostis curtisii*. The nationally rare plant, Dorset heath *Erica ciliaris* is locally dominant in the south-east of Carrine Common. This is the largest population of Dorset heath in Cornwall and is unusual in that it occurs here in dry rather than wet heath.

Qualifying Species:

None

Table 1: Supplementary Advice for Qualifying Features: H4020. Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*; Wet heathland with Dorset heath and cross-leaved heath* (*priority feature*)

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 H4020 feature at 20.87 hectares.	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. Target for extent is based on the cover of this habitat stated on SSSI Definition of Favourable Condition. A full NVC survey has not been undertaken for this site. A baseline habitat extent map is appended to the SSSI Definition of Favourable Condition, this is based on the Phase 1 Habitat survey map (1994) and Management Agreement map (1999) on file in Truro office. Details regarding wetland NVC communities in unit 4 are derived from a survey by Wanda Fojt (English Nature) in July 1991. A map of the extent of Dorset heath habitat (based on Dorset Heath study 1996) is also appended to the SSSI Definition of Favourable Condition.	Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site.	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation 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. A map of the extent of Dorset heath habitat (based on Dorset Heath study 1996) is appended to the SSSI Definition of Favourable Condition Target is set to “restore” because some areas of wet heath have been encroached by scrub.	This attribute will be periodically monitored as part of Natural England’s SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2011) *Carrine Common National Nature Reserve Management Plan 2011 – 2016* Hocking S. (1997) *The Status of Dorset Heath (Erica ciliaris) in Cornwall Volumes I & II* Cornwall Wildlife Trust, Truro (report for English Nature) Hocking S. & Stewart J. (2000) *The Status of Dorset Heath Erica ciliaris in Cornwall* English Nature Research Report (ENRR) No. 353
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification (NVC) types: H4**:** *Ulex gallii – Agrostis curtisii* heath M21: *Narthecium ossifragum –*	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	This attribute will be periodically monitored as part of Natural England’s SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Sphagnum papillosum valley mire (where *Erica ciliaris* is present)	and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Maintain an overall cover of dwarf shrub species which is typically between 25-90%	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly 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*, are the commonest and most characteristic dwarf-shrubs. Hybrids of Dorset and cross-leaved heath can be locally abundant. *Calluna* is usually the most abundant.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Restore cover of common gorse *Ulex europaeus* to below 25% cover	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands en masse may also be serious fire hazards. Target is set to "restore" because some areas of the habitat feature have been encroached by gorse scrub.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2014) Site Improvement Plan: Carrine Common. Natural England (2011) Carrine Common National Nature

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				Reserve Management Plan 2011 – 2016 (Available on request from Natural England)
Structure and function (including its typical species)	**Vegetation structure: tree cover**	Restore the open character of the feature, with a typically scattered and low cover of trees and scrub (<5% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole. Target is set to "restore" because some areas of the habitat feature have been encroached by trees and scrub.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2014) Site Improvement Plan: Carrine Common. Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 – 2016 (Available from Natural England on request)
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Restore a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers. Target is set to "restore" because of lack of pioneer, mature and degenerate growth stages of heathers.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)
Structure and function (including its	**Vegetation: undesirable species**	Restore frequency/cover of the following undesirable species to within acceptable levels and	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	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)
typical species)		prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread. All invasive non-native species including: Japanese knotweed *Fallopia japonica* and non-native garden plants	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. Target is set to "restore" because fly-tipping of garden waste and subsequent spread of non-native garden species and invasive species is identified as an issue at this site.	Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2014) *Site Improvement Plan: Carrine Common.*
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Restore the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat; • Constant and preferential plant species of H4 and M21 NVC vegetation types at this SAC	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural** species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential** species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • **Site-distinctive** species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Hocking S. 1997 *The Status of Dorset Heath (Erica ciliaris) in Cornwall Volumes I & II* Cornwall Wildlife Trust, Truro (report for English Nature)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Target is set to “restore” because condition assessments have recorded low numbers of typical herb species in H4 heath.	
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. 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. The target is set to “restore” because the site is currently an island of semi-natural habitat surrounded by agricultural land. Functional connectivity with the wider landscape could be improved by creating more habitat to buffer the site and by creating habitat links/corridors to increase connectivity between this site and others in the vicinity. Strategies to increase connectivity within the landscape are likely to benefit a wide range of species by facilitating the movement of species populations. Influencing sympathetic management adjacent to the site is likely to help support the ecological processes on which the SAC and its features rely.	Natural England (2011*)* Carrine Common National Nature Reserve Management Plan 2011 2016 (Available on request from Natural England)
Structure and function (including its typical	**Adaptation and resilience**	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either	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	Natural England, 2015. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)		within or external to the site	change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be vulnerable overall but moderately so. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable. Dorset heath *Erica ciliaris* at Carrine Common occurs on soils that appear to be more free-draining than is usually the case in Dorset and elsewhere in Cornwall. The occurrence of this species under such conditions is thought to reflect the highly oceanic climate of Cornwall. Climate change could lead to hotter and potentially drier summers, which could present a risk to this species as well as to wetland habitats such as the wet heath vegetation at the site. The target is set to “restore” because the site is currently an island of semi-natural habitat surrounded by agricultural land. Resilience to change could be improved by creating more habitat to buffer the site and by influencing sympathetic	Natural England (2011*)* Carrine Common National Nature Reserve Management Plan 2011 – 2016 (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			management adjacent to the site as well as by creating habitat links/corridors to increase connectivity between this site and others in the vicinity. Strategies to increase connectivity within the landscape are likely to benefit a wide range of species by facilitating the movement of species populations in response to climate change.	
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 habitat. For this feature typical pH values are 3.5-5.5 and bulk density 0.5-1.5 g/ml;	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. Target is set to "restore" because of concerns that dog fouling could be leading to localised nutrient enrichment of the soils which may have an adverse impact on heath vegetation.	Natural England (2014) *Site Improvement Plan: Carrine Common.*
Supporting processes (on which the feature relies)	**Conservation measures**	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Management appropriate for this site might include maintaining low nutrient levels to maintain high numbers of species through the management activities of grazing, burning, mowing, sod-cutting and scrub/tree cutting. Management of succession is a critical aspect of management for this habitat. A range of invertebrates and plants require bare ground where it is not too frequently disturbed by vehicles or feet. Target is set to "restore" because the heathland would benefit	Natural England (2014) Site Improvement Plan: Carrine Common. Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 – 2016 English Nature (2005) Views About Management of Carrine Common and Penwethers SSSI

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			from a more diverse age structure and more bare ground. Lowland heath is traditionally managed by extensive grazing and a programme of controlled burning but here has been no recent history of these activities on the SAC. The NNR Management Plan includes objectives to investigate opportunities for heathland burning/cutting/grazing options and instigate some bare ground patch management. An ongoing programme of management is also required to control scrub, bracken and Japanese knotweed.	
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales. Target is set to “restore” because the minimum Critical Loads are exceeded for nutrient nitrogen deposition, acid deposition	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).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			(nitrogen) and ammonia concentration. Where the concentration and/or deposition measurements of air pollutants are higher than the site-relevant minimum Critical Load values, then it may be necessary to adjust management to counteract them, e.g. by cutting and/or increasing grazing pressure.	
Supporting processes (on which the feature relies)	**Water quality**	Where the feature is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature particularly relating to nutrient inputs.	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.	
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: Supporting processes (on which the feature relies) water quality: added words “particularly relating to nutrient inputs” as advised by Isobel Alonso (Natural England heathland specialist).				

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**	Maintain the total extent of the H4030 feature at 17.73 hectares.	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. Target for extent is based on the cover of the H4 dry heath habitat stated on the SSSI Definition of Favourable Condition. A full NVC survey has not been undertaken for this site. A baseline habitat extent map is appended to the SSSI Definition of Favourable Condition this is based on the Phase 1 Habitat survey map (1994) and Management Agreement map (1999) on file in Truro office. Details regarding wetland NVC communities in unit 4 are derived from a survey by Wanda Fojt (English Nature) in July 1991. A map of the extent of Dorset heath habitat (based on Dorset Heath study 1996) is also appended to the SSSI Definition of Favourable Condition.	Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)
Extent and distribution of the feature	**Spatial distribution of the feature**	Restore the distribution and configuration of the feature, including where applicable its	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	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)
	within the site	component vegetation types, across the site	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. Target is set to “restore” because some areas of dry heath have been encroached by scrub.	Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 – 2016
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type: • H4**:** *Ulex gallii – Agrostis curtisii* 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).	This attribute will be periodically monitored as part of Natural England’s SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain any areas of transition between this and communities which form other heathland-associated habitats, such as dry and humid heaths, mires, acid	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.	Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		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.	
Structure and function (including its typical species)	**Vegetation structure: cover of dwarf shrubs**	Maintain an overall cover of dwarf shrub species which is typically between 25-90%	Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly 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* 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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)
Structure and function (including its typical species)	**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 fritillary butterflies occur and utilise bracken litter habitat. Target is set at "restore" because in some areas bracken cover	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			exceeds the target threshold and an ongoing programme of bracken control is required.	Natural England (2014) *Site Improvement Plan: Carrine Common.* Natural England (2011*) Carrine Common National Nature Reserve Management Plan 2011 – 2016* English Nature (2005) *Views About Management of Carrine Common and Penwethers SSSI*
Structure and function (including its typical species)	**Vegetation structure: cover of gorse**	Restore the cover of common gorse *Ulex europaeus* to <25% and the combined cover of *U. europaeus* and *U. gallii* to <50%	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands en masse may also be serious fire hazards. Target is set to “restore” because some areas of the habitat feature have been encroached by gorse scrub.	This attribute will be periodically monitored as part of Natural England’s SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2014) Site Improvement Plan: Carrine Common. Natural England (2011) *Carrine Common National Nature Reserve Management Plan 2011 – 2016*
Structure and function (including its typical species)	**Vegetation structure: tree cover**	Restore the open character of the feature, with a typically scattered and low cover of trees and scrub (<5% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly	This attribute will be periodically monitored as part of Natural England’s SSSI Condition Assessments. Natural England (2009) Definition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Target is set to "restore" because some areas of the habitat feature have been encroached by trees and scrub.	of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2014) Site Improvement Plan: Carrine Common. Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 - 2016
Structure and function (including its typical species)	**Vegetation structure: heather age structure**	Restore a diverse age structure amongst the ericaceous shrubs typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of degenerate heathers and less than <10% cover of dead heathers Target is set to "restore" because of lack of pioneer, mature and degenerate growth stages of heathers.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England)
Structure and function (including its typical species)	**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. All invasive non-native species including: Japanese knotweed *Fallopia japonica* and non-native garden	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. Target is set to "restore" because fly-tipping of garden waste and subsequent spread of non-native garden species and invasive species is identified as an issue at this site.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments. Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Natural England (2014) Site

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		plants		Improvement Plan: Carrine Common. Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 - 2016
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Restore the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat: • Constant and preferential plant species of the H4 dry heathland NVC community at this SAC	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. Target is set to "restore" because condition assessments have recorded low numbers of typical herb species in H4 heath.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments Natural England (2009) Definition of Favourable Condition - Carrine Common and Penwethers SSSI (Available on request from Natural England) Hocking S. 1997 *The Status of Dorset Heath (Erica ciliaris) in Cornwall Volumes I & II* Cornwall Wildlife Trust, Truro (report for English Nature)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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. 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. The target is set to “restore” because the site is currently an island of semi-natural habitat surrounded by agricultural land. Functional connectivity with the wider landscape could be improved by creating more habitat to buffer the site and by creating habitat links/corridors to increase connectivity between this site and others in the vicinity. Strategies to increase connectivity within the landscape are likely to benefit a wide range of species by facilitating the movement of species populations. Influencing sympathetic management adjacent to the site is likely to help support the ecological processes on which the SAC and its features rely.	Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 - 2016
Structure and function (including its typical species)	**Adaptation and resilience**	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See generic text for this attribute in Table 1 Dorset heath *Erica ciliaris* at Carrine Common occurs on soils that appear to be more free-draining than is usually the case in Dorset and elsewhere in Cornwall. The occurrence of this species under such conditions is thought to reflect the highly oceanic climate of Cornwall. Climate change could lead to hotter and potentially drier summers, which could present a risk to this species and other features at the site.	Natural England (2015) Climate Change Theme Plan Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 - 2016

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The target is set to “restore” because the site is currently an island of semi-natural habitat surrounded by agricultural land. Resilience to change could be improved by creating more habitat to buffer the site and by influencing sympathetic management adjacent to the site as well as by creating habitat links/corridors to increase connectivity between this site and others in the vicinity. Strategies to increase connectivity within the landscape are likely to benefit a wide range of species by facilitating the movement of species populations in response to climate change.	
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 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. Target is set to “restore” because of concerns that dog fouling could be leading to localised nutrient enrichment of the soils which may have an adverse impact on heath vegetation.	
Supporting processes (on which the feature relies)	**Conservation measures**	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements Management appropriate for this site might include maintaining low nutrient levels to maintain high numbers of species through the management activities of grazing, burning, mowing, sod-cutting and scrub/tree cutting. Management of succession is a	Natural England (2011) Carrine Common National Nature Reserve Management Plan 2011 – 2016 English Nature (2005) *Views About Management of Carrine Common and Penwethers SSSI*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			critical aspect of management for this habitat. A range of invertebrates and plants require bare ground where it is not too frequently disturbed by vehicles or feet. Target is set to “restore” because the heathland would benefit from a more diverse age structure and more bare ground. Lowland heath is traditionally managed by extensive grazing and a programme of controlled burning but here has been no recent history of these activities on the SAC. The NNR Management Plan includes objectives to investigate opportunities for heathland burning/cutting/grazing options and to instigate some bare ground patch management. An ongoing programme of management is also required to control scrub, bracken and Japanese knotweed.	
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See generic text for this attribute in Table 1 Target is set to “restore” because the minimum Critical Loads are exceeded for nutrient nitrogen deposition, acid deposition (nitrogen) and ammonia concentration.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the ‘search by site’ tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	**Water quality**	Where the feature is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature particularly relating to nutrient inputs.	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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: • Structure and function: vegetation structure: tree cover: target for cover lowered to <5%, which is the target adopted in SSSI definitions of favourable condition • Supporting processes (on which the feature relies) water quality: added words “particularly relating to nutrient inputs” as advised by Isobel Alonso (Natural England Heathland specialist)				