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

Devil's Dyke Special Area of Conservation (SAC)
Site Code: UK0030037

Devil's Dyke SAC (photo © N. Teesdale)

Date of Publication: 21 January 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Devil's Dyke 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	Devil's Dyke Special Area of Conservation (SAC)
Location	Cambridgeshire
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	8.02ha
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)	Devil's Dyke SSSI, Unit 3
Relationship with other European or International Site designations	*Not Applicable*

Site background and geography

Devil's Dyke is situated to the south-west of Newmarket close to the boundary between Cambridgeshire and Suffolk in the East Anglian Chalk National Character Area (NCA Profile 87). It is an ancient linear earthwork, thought to be of Anglo-Saxon origin comprising a deep ditch and high bank which extends for around 7 miles from Woodditton south of Newmarket to Reach, north-west of the town, across open chalk country. Designated a Scheduled Monument, it is thought to have been constructed to control the movement of people restricted by wetland to the north and thickly wooded claylands to the south at that time. The banks of the ditch were constructed from chalk dug from the surrounding land.

In the past sheep would have grazed Devil's Dyke and this management encouraged the development of grassland rich in a diversity of plants and animals originating from the surrounding chalk grassland, much now degraded or destroyed. For this reason the Dyke is important as one of the few remaining areas still supporting the relict chalkland vegetation communities. It holds one of the best and most extensive area of species-rich chalk grassland in the area, of a type characteristic of south, central and eastern England and represents a habitat now very restricted in distribution and extent throughout its British range. A Public Right of Way runs along the top of the Dyke bank for the whole of its length and is very popular for the dramatic effect of the elevated route, extensive views across the gently rolling countryside and the rare plants and animals to be found.

The section of Devil's Dyke SSSI adjacent to Newmarket Racecourse (also a SSSI, Newmarket Heath), Unit 3 of the SSSI, is designated a SAC. The Dyke has particularly high banks in this Unit and is punctuated by four narrow gaps created for various reasons in the past which are partially wooded. However open grassland predominates on the SAC, particularly on the south-west facing bank and in places the sward has a great diversity of chalk grassland plant species.

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 for which this SAC has been designated.

Qualifying habitats:

- **H6211 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia)* (*important orchid sites)**

In the UK, examples of this feature are generally found on thin, well-drained, lime-rich soils associated with chalk and limestone. They occur predominantly at low to moderate altitudes in England and Wales, extending locally into upland areas in northern England, Scotland and Northern Ireland. Most of these agriculturally-unimproved calcareous grasslands are maintained by grazing. A large number of rare plants can be associated with this habitat.

At Devil's Dyke SAC the notified habitat feature is known or estimated to comprise the following vegetation communities as referred to by the UK National Vegetation Classification (NVC) CG5 *Bromus erectus - Brachypodium pinnatum* grassland and CG3 *Bromus erectus* Upright Brome grassland, the latter less species-rich with transitions to species-poor MG1 *Arrhenatherum elatius* grassland in places.

The species rich-grassland has many plants typical of chalk grassland such as salad burnet *Sanguisorba minor*, dropwort *Filipendula vulgaris*, rock-rose *Helianthemum nummularium*, squinancywort *Asperula cynanchica*, dwarf thistle *Cirsium acaule* and horseshoe vetch *Hippocrepis comosa*. Uncommon plants include purple milk-vetch *Astragalus danicus*, bastard toadflax *Thesium humifusum*, pasque flower *Pulsitila vulgaris* and an important population of lizard orchids *Himantoglossum hircinum*. It is considered to be one of the best sites for this type of vegetation in the UK. The invertebrate fauna is also noteworthy with more than 50 red data book and notable species being recorded across the whole SSSI. In the SAC there is population of chalkhill blue *Polyommatus coridon* butterflies, which can number into 1000s in favourable years as well as dingy skipper *Erynnis tages*, making the SAC a premier site for butterflies in Cambridgeshire.

Qualifying Species:

N/A

Table 1: Supplementary Advice for Qualifying Features: H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites) *

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 feature to 8.02 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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Maintain the distribution and configuration of the 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	LAMBERT, S.J. (1997) Devil's Dyke SSSI Report of Botanical Survey August and September Unpublished report to English Nature. (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature. The area of dry grassland and scrub on chalk, to be at least maintained, were mapped in the survey carried out in 1997 (A14 to July Cottages section only is the SAC)	
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 types CG3 *Bromus erectus* grassland CG5 *Bromus erectus - Brachypodium pinnatum* grassland	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). The distributions of CG5 and CG3 with transitions to MG1, to be at least maintained, were mapped in the survey carried out in 1997 (A14 to July Cottages section only is the SAC)	Lambert, S.J. (1997) Devil's Dyke SSSI Report of Botanical Survey August and September Unpublished report to English Nature. (Available on request from Natural England)
Structure and function (including its typical species)	**Vegetation: proportion of herbs (including Carex spp)**	Maintain the proportion of herbaceous species within the range 40%-90%	A high cover of characteristic herbs, including sedges (Carex species) is typical of the structure of this habitat type. Monitoring by Natural England in 2008 recorded a proportion of at least 60% overall and in 2012 an average of 56% (varying between 40 and 75%).	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: • Constant and preferential	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	LAMBERT, S.J. (1997) Devil's Dyke SSSI Report of Botanical Survey August and September Unpublished report to English Nature. (Available on request from Natural England)

<table>
<tr><th colspan="2">Attributes</th><th>Targets</th><th>Supporting and Explanatory Notes</th><th>Sources of site-based evidence (where available)</th></tr>
<tr><td></td><td></td><td>plant species of the CG3 Bromus erectus grassland and CG5 Bromus erectus - Brachypodium pinnatum grassland which comprise the H6210 feature within the SAC

• Important orchid populations including Lizard Orchid Himantoglossum hircinum; Common Spotted Orchid Dactylorhiza fuchsia; Common Twayblade Listera ovata; Fragrant Orchid Gymnadenia conopsea; Man Orchid Aceras anthropophorum; and Pyramidal Orchid Anacamptis pyramidalis

• Vascular plant assemblage including Bastard Toadflax Thesium humifusum; Pasque Flower Pulsatilla vulgaris; Chalk Eyebright Euphrasia pseudokerneri; Field Fleawort Tephroseris integrifolia; Lesser Meadow Rue Thallictrum minus

• Characteristic invertebrates including Chalkhill Blue Polyommatus coridon and Dingy Skipper Erynnis tages</td><td>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.

Counts of Lizard Orchid (Himantoglossum hircinum) are undertaken on a regular basis.

<table><tr><td>Year</td><td>No. of flowering plants</td></tr><tr><td>1994</td><td>152</td></tr><tr><td>1995</td><td>252</td></tr><tr><td>1997</td><td>1 - 9</td></tr><tr><td>200</td><td>250</td></tr><tr><td>2001</td><td>232</td></tr><tr><td>2007</td><td>~150</td></tr><tr><td>2008</td><td>>54</td></tr><tr><td>2012</td><td>70</td></tr></table></td><td>LESLIE, A C (1983) New Plant Records from the Devil’s Ditch. Nature in Cambridgeshire 26

LESLIE, A C (2011) An Annotated Check List of the Flora of the Devil’s Ditch, Cambridgeshire. Nature in Cambridgeshire 53

LEA, V (2011) Conservation of the Chalkhill Blue and other butterflies on the Devil’s Dyke. Nature in Cambridgeshire 53

NATURAL ENGLAND (2011) Definition of Favourable Condition – Devil’s Dyke SSSI (Final) (Available on request from Natural England)

This attribute will be periodically monitored as part of Natural England’s SSSI Condition Assessments</td></tr>
</table>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Vegetation: undesirable species**	Maintain the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread Undesirable species: No species more than occasional throughout the sward or singly or together more than 5% cover Rank grasses: No species individually or collectively at more than 10% cover Trees & scrub: No more than 5% cover.	There will be a range of undesirable or uncharacteristic species which, if allowed to colonise and spread, are likely to have an adverse effect on the feature's structure and function, including its more desirable typical species. These may include invasive non-natives such as Cotoneaster spp, or coarse and aggressive native species which may uncharacteristically dominate the composition of the feature. **Undesirable species include:** *Cirsium arvense, Cirsium vulgare, Rumex crispus, Rumex obtusifolius, Senecio jacobaea, Urtica dioica.* **Rank grasses** include *Arrhenatherum elatius, Brachypodium pinnatum, Bromopsis erecta* and *Dactylis glomerata*: Although Upright Brome, *Bromopsis erecta* is characteristic of the plant communities that make up the qualifying habitat, if it becomes dominant at the expense of the other typical species, this would be undesirable. Scrub and trees are important components of the qualifying habitat but similarly if they increase beyond an average of 5% cover, to the detriment of the other typical species, this would be undesirable.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments NATURAL ENGLAND (2011) Definition of Favourable Condition – Devil's Dyke SSSI (Final) (Available on request from Natural England)
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain the pattern of natural vegetation zonations/transitions	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. Lizard orchid is a characteristic species of lightly managed grasslands. It does not appear to tolerate grazing by stock or wild creatures.	NATURAL ENGLAND (2011) Definition of Favourable Condition – Devil's Dyke SSSI (Final) (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			On Devil's Dyke SAC it occurs mostly at the north-west end of the site where the sward is quite thin but grows up tall. Climate, especially rainfall when the leaves are growing, is also thought to be important for Lizard Orchid to thrive. Elsewhere on the site, where sward height is shorter more plant species typical of the plant communities CG3 and CG5 thrive.	
Structure and function (including its typical species)	**Soils, substrate and nutrient cycling**	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the qualifying habitat.	Soil is the foundation of basic ecosystem function and 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.	
Structure and function (including its typical species)	**Supporting off-site habitat**	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature	Include only where applicable. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent /reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment. Newmarket Heath SSSI abuts the north-eastern side of the SAC. The notified features of the adjacent SSSI include CG3 and Lizard Orchid and thus Newmarket Heath effectively increases the extent of the habitat.	
Structure and function (including its typical species)	**Functional connectivity with wider landscape**	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Newmarket Heath SSSI abuts the north-eastern side of the SAC. The notified features of the adjacent SSSI include CG3 and Lizard Orchid and thus Newmarket Heath effectively increases the extent of the habitat.	
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low taking into account the sensitivity, fragmentation, topography and management of its habitats This means that this is considered to be vulnerable overall but are a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.	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)
Supporting processes (on which the feature relies)	**Air quality**	Maintain 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.	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)	**Conservation measures**	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain 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. The SAC is managed through cutting and removing grass, cutting and controlling scrub. Volunteers from Butterfly	Further information about the conservation management of the site is available on request from Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Conservation carry out management on specific areas each year particularly to benefit butterfly species but which is is also of great benefit to the flora	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				