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

Grimsthorpe Special Area of Conservation (SAC) (UK0030043)

Grimsthorpe SAC ©Nick Tribe/Natural England

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About this document

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

This advice should therefore be read together with the SAC Conservation Objectives available here.

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

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

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 HDIRConservationObjectives@naturalengland.org.uk

About this site

European Site information

Name of European Site	Grimsthorpe Special Area of Conservation (SAC)
Location	Lincolnshire
Designation Date	March 1998
Qualifying Features	See below
Designation Area	0.35 hectares
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)	Grimsthorpe Park SSSI (the SAC comprises SSSI unit no.2 only)
Relationship with other European or International Site designations	Not applicable.

Site background and geography

Situated adjacent to an area of ancient parkland on the Lincolnshire limestones of the Kesteven Uplands National Character Area, this 0.35ha site comprises a disused stone quarry (known as 'Elsea Pit') with a rich limestone flora.

This small area of unimproved calcareous grassland provides a habitat for the rare early gentian *Gentianella anglica.* Grimsthorpe SAC is the most northerly location for this species, with the site supporting two or three colonies totalling several hundred plants.

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.

Species:

- **S1654 Early gentian *Gentianella anglica***

  Early gentian *Gentianella anglica* is an annual plant, occurring in sparsely vegetated base-rich parched grasslands often on steep, south-facing slopes. It grows on bare ground or in thin turf that is typically kept open by a combination of rabbit or sheep-grazing and trampling by livestock on thin droughted soils.
  In dense turf it becomes shaded out and unable to compete with other more vigorous species. In the UK it is found on a variety of substrates and in different habitats, but is particularly frequent in

coastal grasslands. At most of its localities, early gentian is found within vegetation usually referable to the H6210 habitat of semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*).

The Habitats Directive continues to recognise *G. anglica* as a separate taxon, although *G. anglica* shows considerable phenotypic variation and there is identification of a hybrid between *G. anglica* and autumn gentian *Gentianella amarella*. Taxonomic reassessment of *G. anglica* throughout its British range is still ongoing.

G. anglica is considered endemic to England. It is also a protected plant under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) and a licence may be required to take them.

Grimsthorpe SAC represents the most northerly outpost for the early gentian *Gentianella anglica*, with its 2-3 colonies totalling several hundred plants.

Early gentian at Grimsthorpe SAC ©Nick Tribe/Natural England

Habitats:

- **H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)**

  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.

  At Gimsthorpe SAC this Annex I 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 upright brome – *Brachypodium pinnatum* tor-grass grassland, which at this site is characterised by a grassy sward variable in height but dominated by these two grasses. Typical associates of the CG5 grassland at this site include dwarf thistle *Cirsium acuale*, ladies-bedstraw *Galium verum*, common rock-rose *Helianthemum nummularium*, bird's-foot trefoil *Lotus corniculatus*, salad burnet *Sanguisorba minor* and fairy flax *Linum carthariticum*.

Table 1: Supplementary Advice for Qualifying Features: 1654 Early gentian *Gentianella anglica*

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/ function	Vegetation composition: negative indicators	Maintain the frequency/cover of the following undesirable species at less than 5%, and are not being encouraged by changes in surface condition, soils, nutrient levels or changes to hydrology; *Cirsium arvense, Cirsium vulgare, Rumex crispus, Rumex obtusifolius, Senecio jacobaea, Urtica dioica, Holcus lanatus Brachypodium pinnatum, Bromopsis erecta, Avenula pubescens, Arrhenatherum elatius, Dactylis glomerata.*	The presence of negative floristic Indicators could include changes to the grass:herb ratio (increased grassiness), often in tandem with sward becoming 'thicker' (less bare ground) or more rank. This will suggest the supporting habitat is becoming less suitable for early gentian. Cover of tall grasses, e.g. *Brachypodium pinnatum, Bromopsis erecta, Avenula pubescens, Arrhenatherum elatius, Dactylis glomerata*, should not exceed about 10% (except the first two may locally occur at higher cover in stands of CG4a and CG3a respectively). Other species likely to be favoured by increased soil fertility/agricultural improvement, e.g. *Lolium perenne, Holcus lanatus, Cynosurus cristatus, Trisetum flavescens, Trifolium repens*, should be rare or absent. Equally, 'agricultural weeds' such as *Cirsium arvense, Cirsium vulgare, Galium aparine, Plantago major, Rumex obtusifolius, Senecio jacobaea* and *Urtica dioica*, are likely to be indicators of inappropriate management and loss/degradation of suitable habitat, so should be rare or absent. In unit 2 of the SAC – Coarse grasses such as *Holcus lanatus* are a negative species	This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Habitat structure and bare ground: regeneration/ colonisation niches	Maintain patches of bare ground (between 5-10%) and an open-textured sward to provide creating suitable regeneration/colonisation niches for early gentian.	Patches of suitable vegetation often occur in mosaics with less suitable areas, and generally associated with steeper slopes, more southerly aspects, thinner soils, heavier grazing or trampling. All available evidence points to need for there being plenty of bare ground in a short/tightly grazed open-textured sward. Many sites best described as 'sparsely vegetated'). There is some evidence that *G. anglic*a tends to occur in microsites recovering after disturbance (whereas *G. amarella* may also occur as a pioneer in recently disturbed sites).	This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Substrate	Maintain a substrate of skeletal drought-prone relatively infertile soils overlying calcareous bedrock (chalk or limestone), with a generally SE, S or SW aspect.	Maintaining a generally thin layer of soil as the growing substrate for early gentian colonies will be important.	
Supporting	Vegetation	Maintain a sward typically in the	Swards supporting early gentian usually require moderate to heavy grazing	This attribute will be

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
habitat: structure/ function	height	range of 2-5cm, but may also occur in slightly taller swards (5-20cm) as long as these still have plenty of bare ground and an absence of 'grassy' dominants.	and/or trampling to keep them sufficiently short and open; but on some coastal sites, drought and exposure may be sufficient on their own to maitain suitable sward conditions. Grazing may be by rabbits, deer, sheep or cattle. Sward height may vary from year to year, depending not only on stocking rates and timing but also on the weather.	periodically monitored as part of Natural England's site condition assessments.
Population (of the feature)	Population abundance	Maintain the abundance of the Early Gentian population at a level which is above an average of 785 plants, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This ensures there is a viable population of the feature which is being maintained or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature. Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment. Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. Due to the dynamic nature of population change, the baseline-value given may be subject to periodic review and unless otherwise stated, the baseline-value will be an 'average' population size derived from standard methodologies, for example a peak mean count over a number of years. Early gentian populations may fluctuate considerably from year to year, depending on habitat condition, weather, etc. Flowering performance may also vary between years, affecting the plant's visibility. Each site (or sub-	This attribute will be periodically monitored as part of Natural England's site condition assessments. *National Biodiversity Network 2002-2009* The following evidence is available from NE on request Early gentian survey (2012); Site visit record (1997); site-based information from Lincolnshire Environmental Records Centre; information from Plantlife

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			site) will have its own target population size, which should normally be based on a 'reference' population size based on a detailed census at or around time of original designation. At the date of notification (April 2005) 785 plants were recorded at the location in June. Numbers of the plants fluctuate annually, and the population has been recorded at 1- 1487 individual plants between 1985 to present day. The grid reference for the SAC is TF043207.	
	Population structure: presence of *Gentianella amarella*, *Gentianella x davidii* and 'intermediates'	Maintain, as appropriate, the presence of both early gentian G. anglica and field gentian G. amarella,and the putative hybrid between the two (G. x davidii)	Intermixed populations have been recorded from many sites, with the hybrid recorded especially from sites near edge of range of Early gentian *G. anglica*. Phenological differences (flowering time) usually helpful in distinguishing between *G. anglica* and *G. amarella*. Note: there is still some uncertainty about the extent to which these two species hybridise, or indeed whether the two species are actually one. *G. anglica subsp. cornubiensis* is currently considered to be a hybrid between *G. anglica* and *G. amarella* (=*G. x davidii*).	
Version Control Advice last updated: n/a				
Variations from national feature-framework of integrity-guidance: None.				

Table 2: Supplementary Advice for Qualifying Features: H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)

Attributes		Targets	Supporting and/or 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 H6210 feature at 0.35 hectares, subject to natural changes.	There should be no measurable net reduction (excluding any trivial loss)in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from 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 a 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 site condition assessments.
	Distribution of the feature, including associated transitional habitats, within the site	Maintain the distribution and continuity of the H6210 feature, including where applicable its component vegetation types and associated transitional vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function	Vegetation community	Ensure the component vegetation communities of the	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical	This attribute will be periodically

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	composition	H6210 feature are referable to and characterised by the following National Vegetation Classification type (s): CG5 upright brome *Bromus erectus* – tor-grass *Brachypodium pinnatum* lowland calcareous grassland	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).	monitored as part of Natural England's site condition assessments.
Structure and function (including its typical species)	Vegetation: proportion of herbs (including Carex spp)	Maintain the proportion of herbaceous species across the H6210 feature within the range 40%-90%	A high cover of characteristic herbs, including sedges (*Carex* species) is typical of the structure of this habitat type. Recorded at 60% in 2012.	This attribute will be periodically monitored as part of Natural England's site condition assessments.
Structure and function (including its typical species)	Typical species: flora and fauna	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the H6210 Annex 1 habitat; at this site; Vascular Plants: *Brachypodium pinnatum, Bromopsis erecta, Campanula glomerata, Helianthemum nummularium, Hippocrepis comosa, Leontodon hispidus/L, saxatilis* and *Sanguisorba minor* *Gentianella anglica*	"The term 'typical species' is used in the Habitats Directive. They are an important and integral component of the structure and function of an Annex I habitat type and should contribute to achieving its overall favourable status across its natural range. However not all such species may be present in every habitat example, and there may be natural fluctuations in their frequency and cover. Similarly, the relative contribution made by each 'typical species' to the overall ecological integrity of a site will vary, and Natural England will provide bespoke advice on this where necessary. Taking account of the principles given in current European Commission guidance, a 'typical species' is broadly described here as being any species (or community of species) which is particularly characteristic of, confined to and/or dependent upon the qualifying Annex I habitat feature at a particular site. This may include those species which; • are critical to the composition or structure of an Annex I habitat (e.g. those included as 'positive indicators' used to inform assessment of a habitat's condition and/or define the habitat (such as NVC community constant and preferential species [see also the targets for 'vegetation community composition']) • exert a critical positive influence on the Annex I habitat's structure or function	*Reports: H6210 JNCC report (2006)* This attribute will be periodically monitored as part of Natural England's site condition assessments.

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			(e.g. a bioturbator (mixer of soil/sediment), grazer, surface borer or predator) • are consistently associated with, and dependent upon, the Annex I habitat feature for specific ecological needs (e.g. feeding, sheltering), completion of life cycle stages (e.g. egg-laying) and/or during certain seasons/times • are particularly distinctive or special of the Annex I habitat feature at a particular site The list of typical species given 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 or if our understanding of the term 'typical species' changes. "	
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain the frequency/cover of the following undesirable species are either absent or contained at acceptable levels and are not encouraged by changes in surface condition, soils, nutrient levels or changes to hydrology.; *Cirsium arvense, Cirsium vulgare, Rumex crispus, Rumex obtusifolius, Senecio jacobaea, Urtica dioica, Holcus lanatus*	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.	This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Vegetation community transitions	Maintain any patterns of natural vegetation zonations/transitions	These transitions/zonations are usually related to changes in soil, aspect or slope	
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil and substrate types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, within typical values for the H6210 habitat	Soil and substrate 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.	
Supporting	Air quality	Maintain or, where necessary,	This habitat type is considered sensitive to changes in air quality.	More information

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
processes (on which the feature relies)		restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for the H6120 feature of the site on the Air Pollution Information System (www.apis.ac.uk).	Exceedance of 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.	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).
Structure and function (including its typical species)	Supporting off-site habitat	Maintain the extent, quality and spatial configuration of surrounding unimproved or low-input grassland adjacent to the SAC	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 population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
	Functional connectivity with wider landscape	Maintain any supporting features within the wider local landscape which provide a critical functional connection with the site in terms of their overall extent, quality and function.	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	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the H6120 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site, is not prejudiced	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.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain management or other measures (within and/or outside the site boundary as appropriate) necessary to maintain the structure, functions and supporting processes associated with the H6210 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.	Natural England's Views about the Management of the SSSI which underpin this SAC are available from **http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm**
Version Control Advice last updated: 20 May 2015 – Previous version incorporated into new 2015 document template; minor edits to generic text made.				
Variations from national feature-framework of integrity-guidance: The final target " Vegetation structure – density, age, structure and % fruiting" which relates to Juniper has been removed as Juniper has never been present on				

Attributes	Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Grimsthorpe SAC.			

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