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

Breckland Special Area of Conservation (SAC)
Site Code UK0019865

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About this document

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

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

Where this site overlaps with other European Sites, you should also refer to the separate European Site Conservation Objectives and Supplementary Advice (where available) provided for those sites.

This advice replaces a draft version dated 16 January 2019 following the receipt of comments from the site's stakeholders.

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	Breckland Special Area of Conservation (SAC)
Location	Norfolk, Suffolk
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	7548.06ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Barnhamcross Common SSSI Berner's Heath, Icklingham SSSI Bridgham & Brettenham Heaths SSSI Cavenham - Icklingham Heaths SSSI Cranwich Camp SSSI Deadman's Grave, Icklingham SSSI East Wretham Heath SSSI Field Barn Heaths, Hilborough SSSI Foxhole Heath, Eriswell SSSI Gooderstone Warren SSSI Grime's Graves SSSI Lakenheath Warren SSSI RAF Lakenheath SSSI Stanford Training Area SSSI Thetford Golf Course & Marsh SSSI Thetford Heaths SSSI Wangford Warren and Carr SSSI Weather and Horn Heaths, Eriswell SSSI Weeting Heath SSSI
Relationship with other European or International Site designations	A significant part of the SAC coincides with the Breckland SPA – (see map). Separate European Site Conservation Objectives for the nearby sites can be found at: Breckland SPA

Site background and geography

The SAC spans 7548.06ha across the Norfolk / Suffolk border and is situated within the Brecks National Character Area (NCA Profile 085). The NCA is characterised by a gently undulating plateau underlain by bedrock of Cretaceous Chalk that is largely covered by varying depths of windblown sand. The highly variable soils generally consist of a very sandy free-draining mix of chalk, sand, silt, clay and flints, which show marked pH variation within short distances. This has a profound influence on the natural vegetation and has resulted in mosaics of heather-dominated heathland, acidic grassland and calcareous grassland that are unlike those of any other site. In many places there is a linear or patterned distribution of heath and grassland, arising from fossilised soil patterns that formed under peri-glacial conditions. The climate of the Brecks is markedly less maritime than other parts of England, with relatively hot summers, cold winters and low rainfall. The unique combination of underlying geology, low-fertility soils, soil disturbance, a dry, frost-prone climate and grazing by sheep and rabbits has strongly influenced the natural and cultural evolution of the landscape.

The history of the Brecks is one of change, with changing intensity and patterns of agriculture over many centuries. This has led to a very dynamic landscape that developed from low intensity agriculture,

extensive grazing systems and widespread rabbit farming using enclosed warrens, producing early successional habitats across the landscape with periodic disturbance and abandonment.

Breckland's history of windblown sand has left one of the best preserved systems of inland sand dune vegetation in the UK. This habitat type, which is in part characterised by the nationally rare grey hair-grass is associated with open conditions and with active sand movement. The site shows the colonisation sequence from open sand to acidic grass-heath.

The heathland is representative of European dry heaths in East Anglia, which developed under a semi-continental climate. They largely fall into the sand sedge-dominated community, which is also typical of areas of blown sand, but is a very unusual feature of this location. Among the chalk grassland communities present is the largest remaining area of the rare CG7 *Festuca ovina – Hieracium pilosella – Thymus praecox* grassland. This grassland supports a large number of rare species some of which are confined to Breckland, or have their core UK distribution there. The structural and floristic characteristics of this community are more typical of a continental climate, with low rainfall and free-draining soils, than almost any other semi-natural dry grassland found in the UK.

Along the river valleys occasional wet woodland dominated by alder and willow occurs beside rivers and streams in the floodplains. These woods rely on high water levels and sometimes surface flooding and are typically present on moderately base-rich, eutrophic soils subject to periodic inundation. Some stands are dominated by tall herbs, reeds and sedges while others consist of lower-growing communities.

Aquifer-fed fluctuating meres are a feature of the Norfolk Breckland. These unique water bodies have an intrinsic regime of extreme fluctuation in water level, with periods of complete or almost complete drying out as part of the natural cycle. They are directly connected to the underlying groundwater system and periodically empty and recharge via swallow holes or smaller openings in their beds.

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:

- **H2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands**

Inland dunes with open *Corynephorus* and *Agrostis* grasslands are an extremely rare habitat in the UK and are found in one small part of Breckland in East Anglia, eastern England. This habitat comprises inland dune grassland containing grey hair-grass *Corynephorus canescens*. In the UK the vegetation of this habitat falls within NVC types SD11 *Carex arenaria – Cornicularia aculeata* dune community, and SD12 *Carex arenaria – Festuca ovina – Agrostis capillaris* grassland, where the vegetation includes stands of grey hair-grass in inland situations.

- **H3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation**

The Breckland meres in Norfolk represent natural eutrophic lakes in the east of England. They are examples of hollows within glacial outwash deposits and are fed by water from the underlying chalk aquifer. Natural fluctuations in groundwater tables mean that these lakes occasionally dry out. The flora is dominated by stonewort – pondweed *Characeae – Potamogetonaceae* associations.

- **H4030 European dry heaths**

The dry acidic heath of Breckland is represented by H1 *Calluna vulgaris – Festuca ovina* heath in the SAC series. The sand sedge-dominated *Carex arenaria* sub-community (H1d) is typical of areas of blown sand – a very unusual feature of this location. The highly variable soils of Breckland, with underlying chalk being largely covered with wind-blown sands, have resulted in mosaics of heather-dominated heathland, acidic grassland and calcareous grassland that are unlike those of any other site. In many places there is a linear or patterned distribution of heath and grassland, arising from fossilised soil patterns that formed under peri-glacial conditions.

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

Breckland in East Anglia is the most extensive surviving area of the rare grassland type CG7 *Festuca ovina – Hieracium pilosella – Thymus praecox* grassland. The grassland is rich in rare species typical of dry, winter-cold, continental areas, and is more akin to the grassland types in central Europe than almost any other semi-natural dry grassland found in the UK. The terrain is relatively flat, with few physical variations, but there are mosaics of calcareous grassland and heath/acid grassland, giving rise to patterns of structural variation.

- **H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)**

Alder woodland on floodplains. These forests, characteristic of the floodplains of lowland rivers, are now rare throughout Europe. Alder *Alnus glutinosa* is usually the dominant tree but willows *Salix* species, ash *Fraxinus excelsior*, downy birch *Betula pubescens* or elder *Sambucus nigra* may also be common. This habitat can range from alder stands on the braided channels of fast-flowing rivers, to stands on former peat cuttings along fenland rivers.

Qualifying Species:

- **S1166 Great crested newt *Triturus cristatus***

The great crested newt is the largest native British newt, reaching up to around 17cms in length. Newts require aquatic habitats for breeding. Eggs are laid singly on pond vegetation in spring, and larvae develop over summer to emerge in August – October, normally taking 2–4 years to reach maturity. Juveniles spend most time on land, and all terrestrial phases may range a considerable distance from breeding sites.

The water-bodies in the SAC are confined to key population centres within the Stanford Training Area. These are located in a variety of habitats including the meres and pingos, spring lines and low lying meadows with natural depressions, whilst others are clearly man made. A programme to restore water bodies on the site has been is ongoing for a number of years and has greatly increased the extent of available breeding habitat.

References

Rodwell, J.S. et al (1991). British Plant Communities. Volume 2. Mires and heaths. University Press, Cambridge

Rodwell, J.S. et al (1992). British Plant Communities. Volume 3.Grasslands and montane communities. University Press, Cambridge

Rodwell, J.S. et al (1992). British Plant Communities. Volume 1.Woodlanda and scrub. University Press, Cambridge

Table 1: Supplementary Advice for Qualifying Features: H2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands

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 at RAF Lakenheath SSSI where it occurs in a mosaic of acid and inland dune grassland. 102.9ha (Criteria Sheet 1997) Restore the total extent of the feature at Wangford Warren SSSI where it previously occurred in a mosaic of acid and inland dune grassland. 24.01ha (Sibbett 2007)	This target is included because 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 includes transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations The individual SSSI targets are intended to accommodate the natural fluctuation, whilst ensuring that particularly valuable (sub-) communities are not lost, and that more vigorous communities do not overtake others. The community maximum extent figures do not apply where additional areas are restored from woodland. 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 habitat is extremely localised and nationally rare. It is important to ensure that the net area of open sand supporting the feature is maintained by ensuring dynamic processes are able to operate fully. Wangford Warren and adjoining parts of RAF Lakenheath are included in the Breckland SAC as the only occurrence of this habitat type in the UK. The Wangford site includes the best preserved system of mobile sand dunes in Breckland which is	ECOLOGY, LAND & PEOPLE (2007) Breckland Rare Plant Monitoring Scheme (Natural England files) Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			essential for the survival of grey hair-grass *Corynephorus canescens.* This species defines the Annex 1 habitat but has suffered a dramatic decline since the 1991/2 survey and as now been lost from the site all together. Measures to restore this feature need to be identified. The large stands of grey hair-grass recorded at RAF Lakenheath in the 1991/92 survey are now extant but new areas recorded in 2003 and 2007 contain higher numbers. Since the species occurs at this site away from the more typical coastal situations, in a mown acid/dune turf, it is currently unclear what management conditions it is responding to. A site investigation is required to clarify the situation.	
Extent and distribution of the feature	Distribution of the feature, including associated transitional habitats, within the site	The distribution and continuity of the feature, including where applicable, its component vegetation types and associated transitional vegetation types, across the site is maintained.	This target has been included because 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.	ECOLOGY, LAND & PEOPLE (2007)
Structure and function (including its typical	Bare Ground	The extent of bare/disturbed ground within fixed dune grassland communities to be no less than 5% but up to 20%.	Soil disturbance is of key importance to maintaining grassland and heathland communities in Breckland. The heaths and grasslands are home to a highly characteristic group of plant specialists, rare lichens, ground nesting birds and	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)			invertebrates, which all rely on sparse vegetation with some degree of soil disturbance to survive. Bare ground should form a patchwork with vegetation and be present mainly in south-facing slopes, excluding rock, stone or litter. Ground is considered to be 'heavily disturbed' where aggressive impacts such as motor bikes (or other vehicles) etc. are evident. Rabbit activity (grazing/burrows/scrapes) and/or mechanical disturbance is integral to maintaining typical Breck grass heath and so rabbit induced bare ground is not regarded as a negative indicator. As well as rabbit activity, bare ground may be maintained or created along trackways through naturally eroding surfaces or mechanical means such as rotovation, ploughing, and turf stripping. Tracks or paths can be a source or bare ground for nesting invertebrates, and for ground-nesting birds such as stone curlew, woodlark and nightjar.	England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments NATURAL ENGLAND, (2014). Site Improvement Plan for Breckland (SIP025).
Structure and function (including its typical species)	Adaptation and resilience of the feature and the supporting processes on which it relies	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 attribute and target has been included to recognise 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	NATURAL ENGLAND, (2015a) http://publications.naturalengland.org.uk/publication/4954594591375360].

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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 supporting 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.	
Structure and function (including its typical species)	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 target has been included because 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. More information about site-relevant Critical Loads and Levels for this SAC is	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). NATURAL ENGLAND, (2014). Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			available by using the 'search by site' tool on the Air Pollution Information System (www.apis.co.uk). 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. A restore target has been set as critical loads are being exceeded on this site.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Any supporting features within the local landscape which provide a critical functional connection with the site are to be restored in terms of their overall extent, quality and function.	This attribute and target has been included to recognise 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. Sand dune habitat develops where windblown sand is deposited and is subsequently colonised by dune building grasses. A process of succession takes place and the dunes develop into semi-fixed dunes dominated by sand sedge, and eventually into fixed grassy dunes. A key feature of this habitat type is grey hair-grass *Corynephorus canescens* which is rarely found inland. It requires annual sand deposition for continued growth. These more open communities can be important for some breeding birds such as woodlark.	Natural England 2015b. http://publications.naturalengland.org.uk/publication/5004101806981120?category=5605910663659520 NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			In the past, this feature would have formed part of a much larger inland dune system in the Brecks and would have stretched from Lakenheath to Brandon. Windblown sand would have accreted naturally but over the last 100-150 years technical advances in agriculture and an increase in forestry in Breckland have led to a stabilisation of the mobile dune system. The failure to fully address the decline in windblown sand and the subsequent stabilisation of the mobile system at Wangford has resulted in the loss of grey hair-grass *Corynephorus canescens*. The species has not however been lost from the Lakenheath site although it is unclear what management conditions it is responding to. A site investigation is required to clarify the situation.	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain and where necessary 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.	This target is included because 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.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain, and where necessary restore at appropriate levels the presence and viability of the following typical species which are an integral and distinctive component of the qualifying habitat feature at this site: • The constant and preferential plants of the NVC community type which forms a key component of a	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	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		SAC habitat that is present • SD 11 *Carex arenaria - Cornicularia aculeata* dune community • SD 12 *Carex arenaria - Festuca ovina - Agrostis capillaris* dune grassland **Influential species** • European Rabbit *Oryctolagus cuniculus*	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. Rabbits are considered an influential species within Breckland SAC as rabbit activity is vital to producing the open, tightly grazed swards that much of the characteristic flora and fauna depend on. If rabbit numbers become too low additional habitat management may be required to achieve the same sward conditions.	
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 • SD 11 *Carex arenaria - Cornicularia aculeata* dune community • SD 12 *Carex arenaria - Festuca ovina - Agrostis capillaris* dune 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 (ie, the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Fixed dune communities occur on grass heath sites throughout the Brecks either as small distinct patches or more extensive stands. They also occur in mosaic with CG7/U1 communities.	
Structure and function (including its typical species)	Vegetation community transitions	Maintain/restore 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.	
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain the frequency/cover of the following undesirable species within acceptable level and ensure they are not encouraged by changes in surface condition, soils, nutrient levels or changes to hydrology: *Calamagrostis epigejos, Chamerion angustifolium, Cirsium arvense, Cirsium vulgare, Plantago major, Rumex crispus, Rumex obtusifolius, Senecio jacobaea, Urtica dioica.*	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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting processes (on which the feature relies)	Conservation measures	Maintain and where necessary 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.	This target has been included because 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. Conservation measures for this feature typically include:	Views about Management for SSSIs underpinning Breckland SAC Designatedsites.naturalengland.org.uk SUFFOLK WILDLIFE TRUST (2010): Management Plan, Wangford Warren Nature Reserve 2010-2020. (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			• Maintenance of short, open swards of <5cm through light grazing (where traditionally practised) or mowing. • Creation of bare sand on parched semi-natural grassland through a range of intermittent physical disturbance techniques e.g. rotovating, ploughing, turf-stripping. • The retention of a range of habitats and associated species that reflect the different stages of succession, by restoring the natural processes and dynamics of dune development and succession by mechanical means • Steps to manage access where pressures e.g. trampling are significant enough to result in the loss of vegetation cover and prevent recovery.	NATURAL ENGLAND, (2014) Site Improvement Plan for Breckland (SIP025).
Version Control (date last updated): N/A				
Variations from national feature-framework of integrity-guidance: The targets for some attributes listed above include both 'maintain' and 'restore' objectives. This is because this SAC is a complex of geographically-separate component sites which are currently in different states of condition. Overall, both objectives will be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will able to provide further specific advice on request CSM grassland attributes and targets have been applied to the fixed dune grassland communities as in the Brecks these are treated as calcareous grasslands (SD8, SD10), or acid grasslands (SD11, SD12).				

Table 2: Supplementary Advice for Qualifying features: H3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation

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 extent of potential standing water within the fluctuating meres at 22ha.	Aquifer-fed naturally fluctuating water bodies are identified as a rare and threatened habitat under the EU Habitats Directive and the UK Biodiversity Action Plan. They are also listed in Annex D (protected areas) of the Water Framework Directive river basin management plans, which requires that water dependent features within EU Habitats Directive protected areas are brought into favourable conservation status. They are defined in the UK Biodiversity Action Plan (www.ukbap.org.uk) as "natural water bodies which have an intrinsic regime of extreme fluctuation in water level, with periods of complete or almost complete drying out as part of the natural cycle. They have no inflow or outflow streams at the surface, except at times of very high water level, when temporary outflows may develop. Instead, they are directly connected to the underlying groundwater system and periodically empty and recharge via swallow holes or smaller openings in their beds." In the United Kingdom these unique water bodies divide into two types, turloughs which occur in Wales and Northern Ireland and fluctuating meres which are restricted to the Norfolk Breckland. The latter occur, at least primarily, within two Sites of Special Scientific Interest, Stanford Training Area (STANTA) SSSI and East Wretham Heath SSSI and are one of the reasons for the designations of these sites as Special Areas of Conservation. The figure given here is the *maximum* extent of the meres when water levels are at their highest. Due to natural fluctuations in water level, with periods of complete or almost complete drying out, the actual cover of water is typically lower. 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	Aerial photographs 2003-2010 Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			accurate information. 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.	
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Non-native species categorised as 'high-impact' in the UK under the Water Framework Directive should be either rare or absent but if present are causing minimal damage to the feature.	Non-native species constitute a major threat too many open water systems. Impacts may be on the habitat itself (e.g, damage to banks and consequent siltation) or directly on characteristic biota (through predation, competition and disease), or a combination of these. For example, species such as signal crayfish have been responsible for much of the decline of native crayfish through competition, habitat damage and the introduction of crayfish plague. The UK Technical Advisory Group of the Water Framework Directive produces a regularly updated classification of aquatic alien species (plants and animals) according to their level of impact. In general high impact species are of greatest concern but low or unknown impact species may be included in the target on a site-specific basis where there is evidence that they are causing a negative impact (for example high cover values or abundances). Those taxa considered likely to colonise lakes, are indicated by an 'L' in the UKTAG guidance. Species of particular concern are: *Crassula helmsii*, *Hydrocotyle ranunculoides*, *Myriophyllum aquaticum* and *Azolla filiculoides*.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments STEWART, N. (2011)
Structure and function (including its typical species)	Macrophyte community structure	Maintain characteristic zones of vegetation including: • Aquatic zone. • Exposed mud and annual herb zone. • Damp and dry inundation grassland.	Characteristic zones of vegetation should be present in both wet and dry phases. However, only some of these zones may be present at any particular time, depending on the water level and weather conditions. Communities dominated by *Phalaris arundinacea* may cut across the zones, and can be present as swamp or floating rafts in the aquatic zone or as a dominant / abundant component on recently exposed mud and in the inundation grassland zone.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments STEWART, N. (2011)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Macrophyte community structure	Maintain maximum depth of plant colonisation during the wet phase. This will often be the maximum depth colonised by *Potamogeton spp.*	This is a strongly characteristic structural aspect of this habitat feature. It will be a response to water transparency, sediment type and disturbance.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments STEWART, N. (2011)
Structure and function (including its typical species)	Physical structure - lake shoreline	Maintain the natural shoreline of the lake.	Inclusion of hard engineering solutions to lake management may have detrimental effects on lake ecology, replacing near-natural substrates with man-made materials. Alteration of the shoreline may also result in changes in water movements within the lake, which would have effects on patterns of sediment deposition.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments STEWART, N. (2011)
Structure and function (including its typical species)	Physical structure - lake substrate	Maintain the natural and characteristic substrate for the lake. The character and extent of types of substrate should be considered.	The distribution of sediment particle size and organic content influences the biology of the lake and will affect the suitability of within-lake habitats for invertebrates and macrophytes, and fish spawning grounds. Increases in sediment loading from activities in the catchment area, including those on the lake shore, may result in the smothering of coarse sediments. Increased inputs of leaf litter, as a result of scrub encroachment, may also be cause for concern, as organic-rich sediments may be a poor rooting medium for macrophytes. All of the meres are thought to have a sandy base usually overlain by a layer of silt, although the upper parts of the mere basin are often quite sandy. The silt layer can be quite firm, particularly when it has been exposed above water for a significant period. However, when it has been underwater or	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments STEWART, N. (2011)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			recently exposed it is often quite soft.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain and where necessary restore the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature [adviser to list species meeting the 3 criteria in the notes - site-distinctive species will include any mentioned in the SAC's Citation and/or in the site's FCT under a 'distinctiveness' attribute] The constant and preferential plants of the NVC community type which forms a key component of a SAC habitat that is present *including; Hydrocharition species: Stratiotes aloides, Lemna spp. (not L. minuta), Hydrocharis morsus-ranae, Riccia fluitans, Utricularia australis/vulgaris, Spirodela polyrhiza; Associates include Nuphar lutea, Nymphaea alba, Potamogeton natans, Butomus umbellatus, Callitriche spp.* Indicators of local distinctiveness including: Critically Endangered : *Norfolk Bladder Moss (Physcomitrium eurystomum).* Red list species: *Soft hornwort (Ceratophyllum submersum).*	See explanatory notes for this attribute in Table 1 The principal feature of the Breckland Fluctuating Meres is the continually changing vegetation in the three principal components. Broadly speaking, these are the aquatic zone, the recently exposed mud and annual herb zone and the more established inundation grassland on the upper draw down zones. Crossing all of these and sometimes completely replacing them are *Phalaris arundinacea* dominated communities. The extreme vegetation variations that occur in the fluctuating meres also mean that some species can be abundant one year and absent the next. Some flexibility is therefore needed in the interpretation of this attribute as to whether species are likely to be permanently lost or just not present due to conditions. Key species include characteristic species present in eutrophic and mesotrophic waters (JNCC 2005), but floating *Lemna* species and *Callitriche* species are excluded as they are not indicative of good conditions in the meres. Species of the inundation zone have been selected either because they have a local distribution nationally and/or because they are typical of particular vegetation zones.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments DARWELL, A. & GARNER, J. (2002) DARWELL, A. & SPITTLE, G. (2005) DOBSON, D. (2005) HILL, D. & KERRISON, P. (1996) NEWBOLD, C. (2000) STEWART, N. (2011) WATSON, R.A. (1974)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		Non-aquatic vascular plants of mere basins: *Orange foxtail Alopecurus aequalis, Shore dock Rumex maritimus, Tubular water dropwort Oenanthe fistulosa, Marsh dock, Rumex palustris.*		
Classified 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).	See explanatory notes for this attribute in Table 1.	DOBSON, M. *et al* (2015) 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.co.uk).
Supporting processes (on which the feature relies)	Functional connectivity /isolation	The natural connectivity of the water body should be maintained.	The natural isolation of some standing water bodies can provide some protection from threats such as pollution and invasive species. Hydrological isolation can also lead to unique or diverse species assemblages this may be due to genetic isolation or the absence of predators. These water bodies should have their isolated state maintained. In contrast, other standing water bodies naturally rely on hydrological connectivity to other freshwater systems for water supply, and can support migratory species. Hydrological connectivity may also be important for geneflow, and habitat and species resilience. These water bodies should have their hydrological connectivity maintained. Connectivity between lakes and surrounding wetlands are important for resource protection and ecosystem functioning and are particularly at risk from drainage, water level stabilisation and shoreline modifications.	STEWART, N. (2011)
Supporting processes (on which the	Hydrology	At a unit level maintain natural hydrological processes to provide the conditions necessary to	This target is included because defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and	ENTEC (2002a). ENTEC (2002b).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		sustain the feature within the site.	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. Hydrology influences lake ecosystem functioning in two ways: determining residence time (flushing) and water level fluctuations. Flushing of lakes is important for dilution and removal of nutrients and phytoplankton, and for reduction in sedimentation. The timing of different flushing rates within the year influences the biology of the lake. The meres are fed from the water table and water levels vary in relation to seasonal weather with a time delay of up to several months. Peak water levels tend to be around May but vary between sites and between years. Water levels tend to vary by up to 3 metres and the lack of a consistent shoreline results in a typical bowl-shaped or saucer-shaped form. Although, water abstraction from the water table could affect the hydrology of the meres, there seems to be no indication that there has been any increase in dry periods compared to the past. Regular recording of the water levels needs to be continued if any changes are to be picked up.	ENTEC (2005) @One Alliance (2008) STEWART, N. (2011)
Supporting processes (on which the feature relies)	Sediment load	Maintain the natural sediment load	Increased sediment loadings may result in clogging of the lake bed, increased siltation in the basin and deoxygenation of sediments. Blockage of coarser substrates with finer sediment restricts water flow-through, whilst increases in organic matter increase biochemical oxygen demand. Increases in the sediment load also increases nutrient loads to a site. Examples of causes of increases in siltation include: increased lake productivity, changes in catchment land-use, such as housing developments, intensification of agriculture, lake level fluctuations, climatic fluctuations and associated changes in drainage patterns.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments DOBSON, M. *et al* (2015)
Supporting processes (on which the	Water quality - acidity	Acidity levels should reflect unimpacted conditions - values of Acid Neutralising Capacity (ANC)	Changes in pH can alter the entire freshwater community present within a water body affecting all trophic levels. Potential causes of a shift in pH include air pollution and direct	DOBSON, M. *et al* (2015)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		are typically pH 7.0-9.0 for eutrophic lakes.	application of lime to the water column as an acidification amelioration strategy (this should not be carried out). Acidity levels should reflect unimpacted conditions - values of Acid Neutralising Capacity (ANC) considered to avoid significant impact on characteristic biota are laid out in the site's FCT (these are the same numerical values as used to protect high ecological status under the WFD in the UK). As a guide, pH 7.0-9.0 for eutrophic lakes. Although, pH naturally fluctuates throughout the year e.g. snow melt may lead to pulses of acid water, and increased plant biomass in summer may result in large fluctuations in pH, including daytime increases in pH values. Therefore pH is not used as a monitoring target; however its importance in affecting many in lake processes means that the pH of a water body should not be artificially altered.	
Supporting processes (on which the feature relies)	Water quality - algae	Chlorophyll a concentration should comply with WFD high ecological status and not have a negative impact on the ecosystem.	Chlorophyll is the pigment used for photosynthesis by plants, and the concentration of chlorophyll in the water column during the growing season therefore provides a good measure of the abundance of phytoplankton. Phytoplankton is an important driver of structure and function in lakes and high phytoplankton levels (algal blooms) are usually associated with nutrient enrichment. Characteristic and representative algal cover may be significant, but excessive growths of uncharacteristic, filamentous algae on lake substrate or macrophytes are indicative of nutrient enrichment. Presence of extensive cover of e.g. *Cladophora glomerata*, is indicative of a site in unfavourable condition. Assessment Methods: Phytoplankton. Chlorophyll a and Percentage Nuisance Cyanobacteria. Available online at: http://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Biological%20Method%20Statements/lake%20phytoplankton.pdf	DOBSON, M. *et al* (2015)
Supporting processes (on which the	Water quality - dissolved oxygen	Adequate dissolved oxygen levels for health of characteristic fauna.	As for species in terrestrial environments, dissolved oxygen (DO) is required for respiration by aquatic organisms. Anthropogenic activities leading to phytoplankton blooms and	DOBSON, M. *et al* (2015)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
feature relies)			increased loadings of organic matter to lakes can cause decreases in the concentration of dissolved oxygen available to support the species present. Mean dissolved oxygen refers to DO being measured at 0.5m intervals throughout the entire water column where the water column is not stratified and measurements taken at 0.5 m intervals below the thermocline only where stratification occurs. The meres support a range of Invertebrates including many species of dragonfly, water boatmen and diving beetles, which are highly mobile and so readily colonise. Fish are generally absent, but a range of amphibians can be found, including the great crested newt *Triturus cristatus* which is a European protected species.	
Supporting processes (on which the feature relies)	Water quality - nitrogen	Maintain a stable nitrogen concentration at between 1-2mg/l.	There is an increasing understanding that some standing waters are sensitive to nitrogen (N) enrichment and eutrophication may be driven by increases in N, but site-specific information is usually required to determine whether N or P is more important. Where P levels are significantly above their target values and there is evidence that the lake is N limited (for example, by N levels falling to negligible levels in summer), N targets should be set in addition to P targets. We recommend that such targets should preferably be developed using site-specific information, but should be based around the threshold of 1-2mg/l identified by James *et al*. (2005). In this situation N targets should be used in combination with P targets to drive a management strategy for the lake that reduces all nutrient inputs.	DOBSON, M. *et al* (2015)
Supporting processes (on which the feature relies)	Water quality - other pollutants	Good chemical status (i.e. compliance with relevant Environmental Quality Standards).	A wide range of pollutants may impact on habitat integrity depending on local circumstance. Good chemical status includes a list of EQSs for individual pollutants that are designed to protect aquatic biota with high levels of precaution.	DOBSON, M. *et al* (2015)
Supporting processes (on which the feature relies)	Water quality - phosphate	Maintain stable nutrient levels appropriate for lake type. The maximum annual mean	Increased loadings of P to a water body are likely to lead to higher algal biomass in the water column, which in turn can have significant impacts on the standing water ecosystem through, for example, competition with vascular plants for	DOBSON, M. *et al* (2015)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		concentration of 50 µg P l^{-1} for shallow (<3m) eutrophic lakes. These should be met unless site specific targets are available.	nutrients and light, changes in pH, oxygen depletion and production of toxins. Decreasing dissolved oxygen and increasing ammonia levels are associated with death and decay of algal blooms, as is a release of toxins from toxin-producing species. If palaeolimnological techniques or hindcast modelling have been employed to reconstruct natural background phosphorus concentrations for a particular lake, these can be used to set targets, although it may be necessary to accept a small deviation from these background conditions. Alternatively, historical water chemistry data may exist for individual lakes. Where existing, site-specific water column TP concentrations are consistently lower than the standard appropriate for the habitat type a lower target should be applied to prevent deterioration from current status.	
Supporting processes (on which the feature relies)	Water transparency	Maintain/restore the clarity of water at or to at least a depth of 2.5 metres.	Water transparency is the major determinant of the depth of colonisation by macrophytes, therefore, it should not be reduced. This should allow plant colonisation to at least 2.5m, but if maximum depth of colonisation has previously been recorded at greater water depths this should be maintained. Increased nutrient loads leading to increased algal growth will reduce water transparency. Increased sediment loads to a lake would also have this effect.	http://www.wfduk.org/reference/environmental-standards
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 3: Supplementary Advice for Qualifying features: H4030 European dry heaths

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 extent of the feature at 303.74ha.	See explanatory notes for this attribute in Table 1. The feature is largely centred on the Elveden Estate in Suffolk and the Stanford Training Area to Brettenham Heath area in Norfolk. The remaining heaths form relatively small, scattered fragments of formerly extensive areas. In a Breckland context, heather heath and grass heath are generally treated as a single entity as differences in soil type, over sometimes quite small distances, mean the plant communities can occur in an intricate mosaic of acid and calcareous vegetation. This may mirror the underlying ground conditions, arising from fossilised soil patterns that formed under peri-glacial processes, or simply the depth of the overlying sands and the degree to which these have been leached of their calcareous elements. Heather is a valuable component of Breck grass heath and should be considered as a useful indicator of appropriate structure, with most of the heather occurring on site in the pioneer (including pseudo-pioneer) stage Its presence should not, however, generally be seen as a constraint to site management.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) 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	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	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.	See explanatory notes for this attribute in Table 1.	NATURAL ENGLAND, 2015a. http://publications.naturalengland.org.uk/publication/4954594591375360
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.	*Natural England 2015b.* NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).
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 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.	
Structure and function (including its	Key structural, influential and/or	Maintain the abundance of the typical species listed below to enable each of them to be a	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	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
typical species)	distinctive species	viable component of the Annex 1 habitat which in Breckland will include a combination of some of the following: *Calluna vulgaris*, *Genista anglica*, *Agrostis spp*., *Ammophila arenaria*, *Carex* spp., *Danthonia decumbens*, *Deschampsia flex*uosa, Festuca spp., Nardus stricta, *Galium saxatile*, *Hypochaeris radicata*, *Lotus corniculatus*, *Plantago lanceolata*, *Polygala serpyllifolia*, *Potentilla erecta*, *Rumex acetosella*, *Serratula tinctoria*, *Thymus praecox*, *Viola riviniana*. Fixed dune grassland: *Aira praecox, Corynephorus canescens, Phleum arenarium, Erodium cicutarium, Sedum acre*. **Influential Species:** European Rabbit *Oryctolagus cuniculus*	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. Rabbits are considered an influential species within Breckland SAC as rabbit activity is vital to producing the open, tightly grazed swards that much of the characteristic flora and fauna depend on. If rabbit numbers become too low additional habitat management may be required to achieve the same sward conditions.	SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types:	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).	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		H1: *Calluna vulgaris* - Festuca ovina heath	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
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 grasslands, scrub and woodland.	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
Structure and function (including its typical species)	Vegetation composition: bracken cover	Maintain a cover of dense bracken which is low, typically at <10%.	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. 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.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	Bare Ground	At least 1% but not more than 25% cover of the area of the feature should consist of firm, sunlit, horizontal, sloping or vertical, exposed bare ground, with no more than 1% heavily disturbed (see text in comments).	Soil disturbance is of key importance to maintaining grassland and heathland communities in Breckland. The heaths and grasslands are home to a highly characteristic group of plant specialists, rare lichens, ground nesting birds and invertebrates, which all rely on sparse vegetation with some degree of soil disturbance to survive. Bare ground should form a patchwork with vegetation and be present mainly in south-facing slopes, excluding rock, stone or	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			litter. Ground is considered to be 'heavily disturbed' where aggressive impacts such as uncontrolled use of motor bikes (or other motorised vehicles) etc. are evident. Rabbit activity (grazing/burrows/scrapes) and/or mechanical disturbance is integral to maintaining typical Breck grass heath and so rabbit induced bare ground is not regarded as a negative indicator. As well as rabbit activity, bare ground may be maintained or created along trackways through naturally eroding surfaces or mechanical means such as rotovation, ploughing, and turf stripping. Tracks or paths can be a source or bare ground for nesting invertebrates, and for ground-nesting birds such as stone curlew, woodlark and nightjar.	Assessments
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 25-75%. NB where dwarf shrub cover is over 50% the proportion of pioneer heather should be >40%.	The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in Breckland is restricted to *Calluna vulgaris.* See comments below regarding the emphasis placed on the pioneer heather stage in the Brecks, rather than on later growth phases.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	Vegetation structure: cover of gorse	Maintain total cover of common gorse *Ulex europaeus at <10%* and the combined cover of *Ulex spp* and/or *Genista spp* at <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*	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			masse may also be serious fire hazards. Judgement will be needed when assessing this attribute as levels of gorse cover will vary across the SAC at any one time; the key issue is that the levels of gorse cover should be appropriate to ensure maintenance of habitat quality. There should be no indication of declining condition of the associated habitat due to increasing dominance of gorse.	
Structure and function (including its typical species)	Vegetation structure: heather age structure	Maintain a diverse age structure within stands of *Calluna vulgaris.*	Each phase of growth 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. In Breckland the pioneer stage of heather growth, especially when associated with bare or sparsely vegetated areas, is especially important for plant and invertebrate assemblages, and is beneficial to breeding woodlark and nightjar. Management should place more emphasis on this phase than on other later phases. The age structure will typically consist of: • pioneer phase (including pseudo-pioneer): 20-50%; • building/mature phase: 20-50%; • degenerate phase: <30%; • dead: <10%, of total ericaceous cover.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
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. Tree and scrub species include: *Betula* spp., *Prunus spinosa, Pinus spp., Rubus* spp., *Cytisus scoparius, and Quercus* spp.	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.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).
Structure and	Vegetation:	Maintain the frequency/cover of	Undesirable non-woody and woody vascular plants species	Natural England (Various)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
function (including its typical species)	undesirable species	the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread.	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. Undesirable species include: *Cirsium arvense, Digitalis purpurea, Epilobium* spp. *(*excluding*. E. palustre), Chamerion angustifolium, Juncus effusus, J. squarrosus, Ranunculus* spp*., Senecio* spp*., Rumex obtusifolius, Urtica dioica, '*coarse grasses'*, including Calamagrostis epigejos.*	Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
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.	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). NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			A restore target has been set as the critical load levels for this feature have been exceeded.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain and restore as necessary the management measures as required to maintain / restore the structure, functions and supporting processes associated with the feature.	In a Breckland context, no distinction is generally made between grass heath and heather heath as these inter-grade in terms of their plant communities, and can occur in mosaics due to patterned soil arising for peri-glacial processes. Heather is a useful indicator of appropriate structure on Breck grass heath sites, where the aim should be to ensure the majority of heather occurring on the site is in the pioneer (including pseudo-pioneer) growth stage representing hard grazing and recent physical disturbance. These types of condition are suitable for a wide range of specialist Breckland species that require early successional conditions and disturbed soil to thrive. The presence of heather should not therefore generally be regarded as a limitation or an objective to site management i.e. grazing intensity should not be constrained. 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. Specific Conservation measures include: • Maintenance of sward height on semi-natural grassland of (<2cm for nesting and 5cm for feeding) through intensive grazing by both livestock and rabbits. • Maintenance of bare/disturbed ground on semi-natural	NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			grassland through a range of intermittent physical disturbance techniques e.g. rotovating, ploughing, turf-stripping. • Encouraging the expansion of rabbit populations on semi-natural grassland through the use of brash piles (artificial warrening structures), forage harvest track ways between brash piles (to encourage rabbit dispersal), and some level of sheep grazing.	

Version Control
8 March: Table updated following stakeholder feedback. **Extent of feature within site / Conservation measures:** Additional explanatory text included to set out relationship between heather heath and grass heath. **Bare Ground:** clarification that "heavily disturbed" ground may be caused by uncontrolled mechanical disturbance rather than controlled disturbance as part of agreed habitat management.

Variations from national feature-framework of integrity-guidance:
The percentage cover of bare ground/sparse vegetation attribute has been included as this is an essential component of Breck grass heaths. Rabbit activity (grazing/burrows/scrapes) and/or mechanical disturbance is integral to maintaining typical Breck grass heath and so rabbit induced bare ground is not regarded as a negative indicator.

The targets for some attributes listed above include both 'maintain' and 'restore' objectives. This is because this SAC is a complex of geographically-separate component sites which are currently in different states of condition. Overall, both objectives will be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will able to provide further specific advice on request

Vegetation structure: heather age structure: The percentage cover range for heather in its pioneer (including pseudo-pioneer) phase has been increased, as this stage of growth is especially important for a range of characteristic Breck flora and fauna. The percentage cover range of the other growth phases has been reduced.

Vegetation structure: cover of dwarf shrubs: The maximum percentage cover of dwarf shrubs has been reduced to better reflect the contribution of this type of vegetation to the overall structure of Breck grass heaths. Where dwarf shrubs cover is over 50% the proportion of pioneer heather should be increased.

Table 4: 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 feature at 1141.57ha.	See explanatory notes for this attribute in Table 1.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) 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 or as necessary 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.	
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	See explanatory notes for this attribute in Table 1.	NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
species)		within or external to the site.		
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 migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	
Structure and function (including its typical species)	**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 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)	**Key structural, influential and/or distinctive species**	Restore the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: The constant and preferential plants of the NVC community type which forms a key	See explanatory notes for this attribute in Table 1 Rabbits are considered an influential species within Breckland SAC as rabbit activity is vital to producing the open, tightly grazed swards that much of the characteristic flora and fauna depend on. If rabbit numbers become too low additional habitat management may be required to achieve the same sward conditions.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		component of a SAC habitats that are present: CG2 – *Festuca ovina - Avenula pratensis* grassland CG6 - *Avenula pubescens* grassland CG7 – *Festuca ovina - Hieracium pilosella - Thymus praecox/pulegioides* grassland **Influential Species** European Rabbit *Oryctolagus cuniculus*		Assessments
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: CG2: *Festuca ovina - Avenula pratensis* grassland CG6 - *Avenula pubescens* grassland CG7 – *Festuca ovina - Hieracium pilosella - Thymus praecox/pulegioides* grassland (all sub-communities)	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
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.	
Structure and function (including its typical species)	**Bare ground**	Areas of CG7 grassland: restore cover of bare ground to between 5% - 20%	Soil disturbance is of key importance to maintaining grassland and heathland communities in Breckland. The heaths and grasslands are home to a highly characteristic group of plant specialities, rare lichens, ground nesting birds and invertebrates, which all rely on sparse vegetation with some degree of soil disturbance to survive. Cover of bare ground/sparse vegetation at less than the minimum thresholds would normally indicate unfavourable condition. Bare/sparsely vegetated areas >20% should not normally be deemed unfavourable, provided other site features are not negatively impacted. Areas maintained by rabbits may exceed 20% cover, but is likely to be temporary with the natural dynamism of rabbit populations. Bare ground may be maintained or created by rabbit and mole activity, along trackways, naturally eroding surfaces, or through mechanical means such as rotovation, ploughing, and turf stripping.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).
Structure and function (including its typical species)	**Vegetation: proportion of herbs (including *Carex* spp.)**	Restore 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. For CG7c it is preferable to substitute this attribute with one for cover of terricolous lichens and acrocarpous bryophytes, normally within the range 15-90%, and with *pleurocarpous* bryophytes at less than 50% cover.	
Structure and function (including its	**Vegetation: undesirable species**	Restore the frequency/cover of the following undesirable species to within acceptable levels and	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	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland

Attributes		Targets	Supporting and/or 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:	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: *Calamagrostis epigejos, Chamerion angustifolium, Cirsium arvense, Cirsium vulgare, Plantago major, Rumex crispus, Rumex obtusifolius, Senecio jacobaea, Urtica dioica*	SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting processes (on which the feature relies)	**Air quality**	Maintain 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 explanatory notes for this attribute in Table 1.	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.co.uk).
Supporting processes (on which the feature relies)	**Conservation measures**	Maintain, and restore as necessary the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain / 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. Specific Conservation measures include: • Maintenance of sward height on semi-natural grassland of (<2cm for nesting and 5cm for feeding) through intensive grazing by both livestock and rabbits. • Maintenance of bare/disturbed ground on semi-natural grassland through a range of intermittent physical disturbance techniques e.g. rotovating, ploughing, turf-stripping. • Encouraging the expansion of rabbit populations on semi-natural grassland through the use of brash piles	NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			(artificial warrening structures), forage harvest track ways between brash piles (to encourage rabbit dispersal), and some level of sheep grazing.	
Version Control (date advice last updated): N/A				
Variations from national feature-framework of integrity-guidance: The targets for some attributes listed above include both 'maintain' and 'restore' objectives. This is because this SAC is a complex of geographically-separate component sites which are currently in different states of condition. Overall, both objectives will be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will able to provide further specific advice on request **Bare Ground:** An attribute covering bare ground has been included as this is an essential component of Breck grass heaths.				

Table 5: Supplementary Advice for Qualifying features: H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*

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 feature to 164.19ha.	See explanatory notes for this attribute in Table 1. The feature largely occurs on the Stanford Training Area where it is found in several large blocks but is also present at the Cavenham-Icklingham Heaths and Thetford Golf Course and Marsh sites. For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil. Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g, lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) 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	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain the resilience of the feature by ensuring a diversity (at least 3 species) of site-native trees (e.g. alder, willow - Salix spp, ash) across the site.	This recognises the increasing likelihood of natural habitat features needing 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.	
Structure and function (including its typical species)	**Browsing and grazing by herbivores**	Maintain browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy etc.), and tree seedlings and sapling common in gaps.	Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			poaching damage, canopy fragmentation, heavy browsing, bark stripping and a heavily grazed sward.	
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature.	Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Such species can include rhododendron, snowberry, Japanese knotweed, giant Hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.	
Structure and function (including its typical species)	**Regeneration potential**	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate.	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will Include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
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 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	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	**Tree and shrub species composition**	Maintain a canopy and under-storey of which 95% is composed of site native trees and shrubs including *Alnus glutinosa, Fraxinus excelsior, Salix cinerea, Betula pubescens,* and *Quercus robur*.	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) 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 (see notes) to enable each of them to be a viable component of the Annex 1 habitat. The constant and preferential plants of the NVC community type which forms a key component of the H91EO feature that is present: W5 *Alnus glutinosa - Carex paniculata* woodland W6 *Alnus glutinosa - Urtica dioica* woodland W7 *Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum* woodland	See explanatory notes for this attribute in Table 1.	
Structure and function (including its	**Vegetation community composition**	Ensure the component vegetation communities of the feature are referable to and	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	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
typical species)		characterised by the following National Vegetation Classification type(s: W5 *Alnus glutinosa - Carex paniculata* woodland W6 *Alnus glutinosa - Urtica dioica* woodland W7 *Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum* woodland	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.	SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - age class distribution**	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - canopy cover**	Maintain an appropriate tree canopy cover across the feature, which will typically be between 30-90% of the site.	Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litter fall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.	
Structure and function (including its typical species)	**Vegetation structure - dead wood**	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically some areas of relatively undisturbed mature/old growth stands or a scatter of large trees allowed to grow to over-maturity/death on site (e.g. a minimum of 10% of the woodland or 5-10 trees per ha) and 4 trees per ha allowed to die standing.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - old growth**	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - open space**	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10%of area.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as wind-throw/fire/tree falling over/snow damage.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - shrub layer**	Maintain an understorey of shrubs covering 10 - 60% of the stand area (this will vary with light levels and site objectives).	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - woodland edge**	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/ wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc.).	
Supporting processes (on which the feature relies)	**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	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	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		the site.	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.	
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.	
Supporting processes (on which the feature relies)	**Illumination**	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Supporting processes (on which the feature relies)	**Water quality /quantity**	Where the feature is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard	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	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		which provides the necessary conditions to support the feature.	inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards of lowland, alkalinity rivers set out by the Water Framework Directive (WFD 2000/60/EC), will also be sufficient to support the achievement of SAC Conservation Objectives. However, 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.	
Version Control: 8 March 2019: Table updated following stakeholder feedback: **Extent of feature within site:** Additional text to clarify where the feature is found within the SAC.				
Variations from national feature-framework of integrity-guidance: **Vegetation structure (dead wood)**: Attribute amended to reflect targets in underpinning SSSIs.				

Table 6: Supplementary Advice for Qualifying species: S1166 Great crested newt *Triturus cristatus*

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	**Population abundance**	Maintain the abundance of the population at a level which is above the baseline peak count taken as the highest site total from monitoring data in the 3 years leading up to designation, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (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. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures stated are the best available. Estimating the average size of the GCN population will normally be based on the peak count of adults undertaken in the known peak season for the area, and in-year weather conditions; likely to be Mid-April to Mid-May in central areas. The peak count is derived by summing the counts across the site on 'best' night for each season. Considerable natural between-year variation in population counts is frequent. A baseline survey is needed to determine the population abundance of Great Crested Newt at Stanford Training Area SSSI (STANTA). This will be based on a sample of 20 ponds spread across the geographic and habitat range of the site. Two previous surveys covering a large proportion of the waterbodies on the site were carried out in 1997/8 and 2010/12. The first survey found GCN present in 45 (35%) of the waterbodies, while in the second survey the occupancy rate had increased to 64 waterbodies but the percentage remained the same as more waterbodies were sampled.	
Population (of the feature)	**Population viability**	Maintain the presence of Great Crested Newt eggs in breeding ponds at a level which is likely to maintain the abundance of the population at or above its target level.	A "breeding pond" is defined as a pond in which egg-laying and successful metamorphosis (e.g. the pond doesn't dry up too soon) is likely to occur at least once every three years. The optimum time to survey for eggs is mid-March to mid-May. Presence of eggs can be recorded by day or night visits and surveys should be combined with visits for the adult component.	
Population (of the feature)	**Supporting meta-populations**	Restore the connectivity of the SAC population to any associated metapopulations (either within or outside of the site boundary).	Great crested newts often exist in metapopulations. A meta-population is a group of associated populations made up of newts which breed in, and live around, a cluster of ponds. There will be some interchange of newts between these populations, even though most adults consistently return to the same pond to breed, and so it will be important to avoid the isolation of these populations from each other. A meta-population associated with a SAC may occur outside of the designated site boundary.	GIBBONS, N. (1998) GIBBONS, N. (2012)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			The connectivity of the wider local landscape to the SAC may therefore be important as this may help to ensure the survival of the overall population even if sub-populations are temporarily affected by, for example, pond desiccation or fish introductions.	
Supporting habitat: extent and distribution	**Distribution of supporting habitat**	Restore the distribution and continuity of the feature and its supporting habitat, 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) 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. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may 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 this feature and this may affect its viability. The distribution of water bodies and terrestrial habitat range of Great Crested Newts has been mapped by GIBBONS (1998 & 2012).	GIBBONS, N. (1998) GIBBONS, N. (2012) NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).
Supporting habitat: extent and distribution	**Extent of supporting habitat**	Restore the total extent of 64 waterbodies which support the feature (see GIBBONS, (2012).	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data. For this SAC the feature is confined to the Stanford Training Area (STANTA) which is a heavily used military training ground. The water bodies at STANTA are located in a variety of habitats and various stages of succession. Some are semi-natural such as meres and pingos / periglacial features, spring lines and low lying meadows with natural depressions whilst others are clearly man made e.g, mineral extraction pits.	GIBBONS, N. (1998) GIBBONS, N. (2012) NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			The extent of supporting habitat has been mapped by GIBBONS (1998) and is derived from drawing a 500m circle around individual ponds. This is distance that Great Crested Newt metamorphs are known to travel from breeding ponds and so represents the maximum range of the species.	
Supporting habitat: structure/ function	**Cover of macrophytes**	Maintain a high cover of macrophytes, typically between 50-80%, within ponds.	Marginal and emergent vegetation are important components of a great crested newt pond as they provide excellent egg-laying sites. Good plants for this purpose include water forget-me-not *Myosotis scorpioides*, flote/sweet grass *Glyceria fluitans* and great hairy willowherb *Epilobium hirsutum*. They are, however, an integral part of the natural successional change of a waterbody and whilst it is preferable to have a good range and area of marginal plants, they should not extend across the entire water surface. In most circumstances it will be desirable to retain a fringe of marginal and emergent vegetation around at least half of a pond's edge. Where the marginal vegetation is particularly invasive, and provides no specific benefit to crested newts, it may be decided that its complete removal is necessary.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat: structure/ function	**Overall Habitat Suitability Index score**	For this SAC, Maintain an overall Great Crested Newt Habitat Suitability Index score of no less than 0.8.	The Habitat Suitability Index provides a measure of evaluating habitat quality and quantity for Great Crested Newts. The Index score lies between 0 and 1, with 1 representing optimal GCN habitat. In general, the higher the index score the more likely the site is to support Great Crested Newts. The HSI methodology is documented in ARG-UK Advice Note 5 (May 2010). The HSI should not be used as a substitute for more detailed surveys and consideration of other attributes where necessary.	ARG-UK (2010)
Supporting habitat: structure/ function	**Permanence of ponds**	Maintain the permanence of water within ponds present within the site	Ponds to include breeding ponds as well as non-breeding ponds, since the latter may be used for foraging or sustaining prey populations. Ponds should have a high degree of permanence (they never or rarely dry out other than though natural drought) and this may be adversely affected by changes in the supply or flow of water (from either surface water and/or groundwater sources]	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			to the ponds.	monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat: structure/ function	**Presence of fish and wildfowl**	Ensure fish and wildfowl are absent from 75% of all ponds.	At high densities waterfowl (i.e. most water birds such as ducks, geese and swans but excluding moorhen) can remove all aquatic vegetation, adversely affect water quality and create turbid pond water conditions. Some may also actively hunt adult newts and their larvae. Similarly fish can be significant predators of GCN larvae. The presence of waterfowl and fish can reduce habitat suitability. These should be wholly absent form sites which support fewer than 5 ponds.	
Supporting habitat: structure/ function	**Presence of ponds**	Restore the number or surface area of ponds present within the site.	Ponds to include breeding ponds as well as non-breeding ponds, since the latter may be used for foraging or sustaining prey populations. The surface area of a pond is taken from when water reaches its highest level (excluding flooding events), which will usually be in the spring. The total number of breeding and non-breeding ponds identified at STANTA is 184.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments GIBBONS, N. (1998) GIBBONS, N. (2012) NATURAL ENGLAND, 2014. Site Improvement Plan for Breckland (SIP025).
Supporting habitat: structure/ function	**Shading of ponds**	Ensure pond perimeters are generally free of shade: 25% of breeding ponds to have >20% of southern margin solidly shaded.	Shading from trees and/or buildings (not including emergent pond vegetation) can negatively affect the abundance of marginal vegetation in ponds, water temperature and the rate of hatching and development of great crested newt eggs and larvae.	Natural England (Various) Definitions of favourable condition for SSSIs underpinning Breckland SAC (Available from Natural England on request)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		<50% of breeding ponds to have >20% of southern margin solidly shaded in woodland areas i.e. West Tofts and Madhouse Plantations.	Great Crested Newt breeding success rapidly falls off where shading by scrub is above 20%. Regular tree and scrub control is undertaken to open up some of the sites where Great Crested Newts have been recorded in recent years by the removing of shading scrub and trees.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat: structure/ function	**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, within typical values for the supporting habitat.	Soil supports basic ecosystem function and is 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 the supporting habitat of this Annex II feature.	
Supporting habitat: structure/ function	**Supporting terrestrial habitat**	Maintain the quality of terrestrial habitat likely to be utilised by Great Crested Newts, with no fragmentation of habitat by significant barriers to newt dispersal.	Great crested newts need both aquatic and terrestrial habitat. Good quality terrestrial habitat, particularly within 500m of the breeding ponds, provides important sheltering, dispersing and foraging conditions and can include all semi-natural habitat along with meadows, rough tussocky grassland, scrub, woodland, as well as 'brownfield' land or low-intensity farmland. Good quality terrestrial habitat for GCNs has structural diversity which can be provided by features such as hedges, ditches, stone walls, old farm buildings, loose stone/rocks, rabbit burrows and small mammal holes. Good habitat provides a range of invertebrates, such as earthworms, insects, spiders and slugs, on which GCNs are known to feed. Fragmentation refers to significant barriers to GCN movement such as walls and buildings, but not footpaths or tracks. Newts disperse over land to forage for food, and move between ponds. The distances moved during dispersal vary widely according to habitat quality and availability. At most sites, the majority of adults probably stay within around 250m of the breeding pond but may well travel further if there are areas of high quality foraging and refuge habitat extending beyond this range.	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature and/or its supporting habitat relies)	**Adaptation and resilience**	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site.	See explanatory notes for this attribute in Table 1.	Natural England 2015a Climate Change Theme Plan and National Biodiversity Climate Change Vulnerability Assessments (NBCCVAs)
Supporting processes (on which the feature and/or its supporting habitat relies)	**Air quality**	Maintain or, where necessary, restore 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 the explanatory notes for this attribute in Table 1.	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 and/or its supporting habitat 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 and/or its supporting habitats.	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.	
Supporting processes (on which the feature and/or its supporting habitat relies)	**Water quantity/ quality**	Where the feature or its supporting habitat 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.	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 environmental standards for lakes 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 to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	EU. 2011. Links between the Water Framework Directive and Natura Directives at http://ec.europa.eu/environment/nature/natura2000/management/docs/FAQ-WFD%20final.pdf

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature or its supporting habitat relies)	**Water quality**	Maintain the quality of pond waters within the site as indicated by the presence of an abundant and diverse invertebrate community.	As the clarity and chemical status of water bodies supporting GCNs can be subjective, the presence of an abundant and diverse community of freshwater invertebrates can be indicative of suitable water quality standards. Invertebrate groups present should include groups such as mayfly larvae and water shrimps. This will ensure ponds support a healthy (mainly invertebrate) fauna to provide food for developing GCN larvae and adults.	
Version Control N/A				
Variations from national feature-framework of integrity-guidance: **Presence of fish and wildfowl:** Target amended in line with definition for favourable condition on underpinning Stanford Training Area SSSI.				

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