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

Waveney and Little Ouse Valley Fens Special Area of Conservation (SAC)
Site code: UK0012882

Southern marsh orchid - Paul Lacey/Natural England

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Waveney and Little Ouse Valley Fens SAC. This advice should therefore be read together with the SAC Conservation Objectives available here.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Waveney and Little Ouse Valley Fens Special Area of Conservation (SAC)
Location	Norfolk and 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	192.37 has
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)	Blo' Norton and Thelnetham Fens SSSI, Redgrave and Lopham Fens SSSI, Weston Fen, Suffolk SSSI,
Relationship with other European or International Site designations	Redgrave & South Lopham Fens Ramsar (see map) overlies the SAC at Redgrave and Lopham Fens SSSI (see map). Conservation Objectives for the Ramsar site are not currently available.

Site background and geography

This site which lies predominantly within the South Norfolk and High Suffolk Claylands Natural Character Area (NCA Profile 83) occurs in the East Anglian centre of distribution of calcareous fens and contains very extensive great fen-sedge *Cladium mariscus* beds, including managed examples, as well as stands in contact zones between small sedge mire and species-poor *Cladium* beds. The habitat type here occurs in a number of spring-fed valley fens in the headwaters of the Little Ouse and Waveney rivers

Purple moor-grass – meadow thistle (*Molinia caerulea – Cirsium dissectum*) fen-meadows are associated with the spring-fed valley fen systems. The *Molinia* meadows occur in conjunction with black bog-rush – blunt-flowered rush (*Schoenus nigricans – Juncus subnodulosus*) mire and calcareous fens with great fen-sedge. Where the fen-meadow is grazed it is more species-rich, with frequent southern marsh-orchid *Dactylorhiza praetermissa*.

Lopham and Redgrave Fen SSSI is one of only three known locations for the Fen Raft Spider *Dolomedes plantarius* in the United Kingdom.

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:

- **H7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*.('Calcium-rich fen dominated by great fen sedge (saw sedge)')**

This Annex I type comprises the more species-rich examples of great fen-sedge *Cladium mariscus* fen, particularly stands of small-sedge fen with open low-growing sedge vegetation.

This site occurs in the East Anglian centre of distribution of calcareous fens and contains very extensive *Cladium* beds, including managed examples, as well as stands in contact zones between small sedge mire and species-poor Cladium. The habitat type here occurs in a different hydrological situation to the Broads – spring-fed valley fen rather than flood-plain mire.

- **H6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) ('Purple moor-grass meadows').**

Molinia meadows are found mainly on moist, moderately base-rich, peats and peaty gley soils, often with fluctuating water tables. They usually occur as components of wet pastures or fens, and often form mosaics with dry grassland, heath, mire and scrub communities. This habitat type includes the most species-rich *Molinia* grasslands in the UK, in which purple moor-grass *Molinia caerulea* is accompanied by a wide range of associated species, including rushes, sedges and tall-growing herbs.

This site represents M24 *Molinia caerulea – Cirsium dissectum* fen-meadow associated with spring-fed valley fen systems in East Anglia, where *Molinia* grassland is very rare. The *Molinia* meadows are found here in conjunction with M13 *Schoenus nigricans – Juncus subnodulosus* mire and 7210 calcareous fens with *Cladium mariscus*. Where the fen-meadow is grazed it is more species-rich, with frequent southern marsh-orchid *Dactylorhiza praetermissa*.

Qualifying Species:

- **S1016 Desmoulin's whorl snail *Vertigo moulinsiana***

Desmoulin's whorl snail *Vertigo moulinsiana* is the largest *Vertigo* species, with a shell height up to about 2.6 mm. It is restricted to calcareous wetlands, usually bordering lakes or rivers, or in fens. High humidity appears to be important in determining local distribution within sites. It normally lives on reed-grasses and sedges, such as reed sweet-grass *Glyceria maxima* and tussocks of greater pond-sedge *Carex riparia* and lesser pond-sedge *C. acutiformis*, where it feeds on the microflora, and in autumn it may ascend taller reeds and scrub. Like all *Vertigo* species, it is highly dependent on maintenance of existing local hydrological conditions.

This site is one of several representing Desmoulin's whorl snail *Vertigo moulinsiana* in East Anglia. At Weston Fen populations of this snail occur in a valley fen and associated habitats in the fen and associated wet grasslands, dyke margins, and emergent vegetation in the pingoes.

Table 1: Supplementary Advice for Qualifying Features: H6410. *Molinia meadows* on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae);* purple moor-grass meadows

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 and where necessary restore the total extent of the H6410 feature to the baseline level, whilst preventing deterioration from current extent	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. The component SSSIs need to have a National Vegetation Classification survey to identify the distribution of the feature across the site to provide contemporaneous data. The Redgrave and Lopham Fens SSSI was extensively restored to reverse the impacts of water abstraction. The site has improved significantly though this means that there has been some changes in the distribution of the features.	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 and restore as necessary the distribution and configuration of the feature 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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. The component SSSIs need to have a National Vegetation Classification survey to identify the distribution of the feature across the site to provide contemporaneous data. The Redgrave and Lopham Fens SSSI was extensively restored to reverse the impacts of water abstraction. The site has improved significantly though this means that there has been some changes in the distribution of the features. Given the nature of these habitats relationship with the ground water inputs and flushes, some variation in extent may result in natural seasonal fluctuations.	
Structure and function (including its typical species)	**Adaptation and resilience**	Maintain and where necessary restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being high, taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be the most vulnerable sites overall and are likely to require the most adaptation action, most urgently. A site based assessment should be carried out as a priority.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England [Available at http://publications.naturalengland.org.uk/publication/4954594591375360].

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			This means that action to address specific issues is likely, 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)	**Functional connectivity with wider landscape**	Maintain and where necessary 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.	
Structure and function (including its typical species)	**Hydrology: Water table**	Maintain and where necessary restore a hydrological regime that provides a sub-surface water table during the summer (range -2 to -48 cm below ground level) and a winter water table ± at the surface. Inundation should be absent or only occasional to a minor degree in winter	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 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 as precise tolerances are not known, further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. The hydrology of the SAC has undergone considerable research as part of the Redgrave and Lopham Fen Restoration Project, and the Environment Agency Review of Consents work. The regional geology is underlain by the Upper Chalk which acts as an aquifer and is artesian in places. Above the chalk lie a series of superficial deposits which include Till, Head, River Terrace Deposits,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Silts and Peat. The relative distribution of these sediments infilling a buried valley, together with the surface drainage, groundwater flows from both the chalk and other sediments have created a very complex hydrological system across the SAC that varies in pH and chemistry. Weston Fen is believed to have been least impacted by changes to the drainage systems. Blo Norton and Thelnetham Fens are believed to have been impacted by the deepening of the Little Ouse River together with an increase in scrub and woodland. Redgrave and Lopham fens have been adversely affected by similar influences, and in addition was affected by the construction of a drinking water borehole close to Redgrave Fen. Restoration has been undertaken funded by the Fen Restoration Project Partners (Suffolk Wildlife Trust, Essex and Suffolk Water, the Environment Agency and Natural England) using LIFE Funding from the European Union.	
Structure and function (including its typical species)	**Maintaining integrity of hydrological catchment**	Maintain and where necessary restore the full range of hydrological/hydrogeological aspects of a site's catchment that contribute to its functioning and the maintenance of the feature	The movement, quality and distribution of water within a site's wider catchment and outside of the site's boundary will affect its ability to support this wetland habitat feature. Catchment size will vary. A site's water table and other hydrological aspects may be affected by changes in the use of the land surface, water abstraction, flood alleviation, development and mineral extraction in the wider catchment.	
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. For this feature, soil P index should typically be index 0 (< 9 mg l -1)	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. This feature has not been widely studied on this site.	
Structure and function (including its typical species)	**Supporting off-site habitat**	Maintain and where necessary restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding,	Unpublished reports relating to Waveney & Little Ouse Valley Fens SAC (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Restore the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat; • Constant and preferential plant species of the M24 *Molinia caerulea – Cirsium dissectum* fen-meadow NVC vegetation type at this SAC • Populations of Fen Raft Spider *Dolomedes plantarius*	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural** species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential** species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • **Site-distinctive** species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. Lopham and Redgrave Fen SSSI is one of only three locations for the Fen Raft Spider *Dolomedes plantarius* in the United Kingdom. Significant amounts of work has been undertaken over the last 15 – 20 years to improve the condition of the site for this species.	The Fen Raft Spider Website https://www.dolomedes.org.uk/homepage
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 conditions (especially base-	This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		characterised by the following National Vegetation Classification type M24 *Molinia caerulea – Cirsium dissectum* fen-meadow	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).	England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation community transitions**	Maintain and restore as necessary 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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Undesirable species**	Maintain and where necessary restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread. • All tree and scrub species considered together but excluding *Salix repens* and *Myrica gale* <5%; • *Phragmites australis* < 10%	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
Structure and function (including its typical species)	**Water quality**	Where the feature is dependent on surface water and/or groundwater, maintain and where necessary restore 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 surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation	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)
			Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC. The regional geology is underlain by the Upper Chalk which acts as an aquifer and is artesian in places. Above the chalk lie a series of superficial deposits which include Till, Head, River Terrace Deposits, Silts and Peat. The relative distribution of these sediments infilling a buried valley, together with the surface drainage, groundwater flows from both the chalk and other sediments have created a very complex hydrological system across the SAC that varies in pH and chemistry.	
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).
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 maintain and restore the structure, functions and	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	Unpublished reports relating to Waveney & Little Ouse Valley Fens SAC (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		supporting processes associated with the feature	Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Conservation measures for this feature typically include grazing, cutting, scrub management, weed control, recreation/visitor management. Also covered is maintenance of surface drainage features such as drains, grips, gutters and foot drains. Retention of suitable land use infrastructure/ patterns to enable site management e.g. pastoral livestock farming	Natural England, 2015. Site Improvement Plan: Waveney and Little Ouse Valley Fens (SIP258). At http://publications.naturalengland.org.uk/publication/5465193064693760
Version Control 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				

Table 2: Supplementary Advice for Qualifying Features: H7210. Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; Calcium-rich fen dominated by great fen sedge (saw sedge) *

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Restore the total extent of the feature to include areas lost due to scrub encroachment and hydrological changes whilst preventing deterioration from current extent	This target is included as there should be no measurable reduction (excluding any trivial loss) in the extent of this feature. Area measurements given may be approximate depending on the nature, age and accuracy of data collection. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a 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. The component SSSIs need to have a National Vegetation Classification survey to identify the distribution of the feature across the site to provide contemporaneous data. The Redgrave and Lopham Fens SSSI was extensively restored to reverse the impacts of water abstraction. The site has improved significantly though this means that there has been some changes in the distribution of the features.	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**	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	Distribution includes the spatial pattern or arrangement of this habitat feature, and its component vegetation types, across the site. Changes in distribution may affect the nature and range of the vegetation communities present, the operation of the physical, chemical, and biological processes in the system and the resiliency of the site and its features to changes or impacts. The component SSSIs need to have a National Vegetation Classification survey to identify the distribution of the feature across the site to provide contemporaneous data. The Redgrave and Lopham Fens SSSI was extensively restored to reverse the impacts of water abstraction. The site has improved significantly though this means that there has been some changes in the distribution of the features.	Unpublished reports relating to Waveney & Little Ouse Valley Fens SAC (Available on request from Natural England)
Structure and function (including its	**Adaptation and resilience**	Maintain and restore as necessary the feature's ability, and that of its supporting	See supporting text for this attribute in Table 1.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		processes, to adapt or evolve to wider environmental change, either within or external to the site		
Structure and function (including its typical species)	**Exposed substrate**	Maintain and where necessary restore a low cover of exposed substrate of between 5% & 25% across feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions. This will vary depending on nature of vegetation community.	
Structure and function (including its typical species)	**Hydrology**	At a site, unit and/or catchment level as necessary, restore 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. Wheeler et al. (2009) provide range and mean for summer & winter water levels for those wetland NVC types constituting Annex 1 habitats. This provides a rough guide to appropriate levels, but it is critical that individual sites and their needs are considered as there is considerable variation within the NVC communities listed and recorded water levels. Weston Fen is believed to have been least impacted by changes to the drainage systems. Blo Norton and Thelnetham Fens are believed to have been impacted by the deepening of the Little Ouse River together with an increase in scrub and woodland. Redgrave and Lopham fens have been adversely affected by similar influences, and in addition was affected by the construction of a drinking water borehole close to Redgrave Fen. Restoration has been undertaken funded by the Fen Restoration Project Partners (Suffolk Wildlife Trust, Essex and Suffolk Water, the Environment Agency and Natural England) using LIFE Funding from the European Union.	Unpublished reports relating to Waveney & Little Ouse Valley Fens SAC (Available on request from Natural England)
Structure and function (including its typical	**Hydrology**	Restore a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations) on	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	Unpublished reports relating to Waveney & Little Ouse Valley Fens SAC (Available on

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)		groundwater dependent sites.	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. Some examples of H7210 are largely groundwater dependent (e.g. Holme Moor and Clean Moor). Others have a greater dependence on base-rich surface water inputs (e.g. some Broads sites). Critically important to understand ecohydrological context of all sites.	request from Natural England)
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 can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat 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). Redgrave and Lopham Fens have recently experienced outbreaks of *Crassula helmsii*, New Zealand pigmyweed,	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Presence/cover of woody species**	Maintain and restore as necessary a low cover of not more than 10% of scrub or trees within stands of H7210.	Native trees and shrubs occur naturally on bog and fen surfaces but an abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces. There has been scrub and woodland encroachment onto the valley fens. Some has been retained on Redgrave and Lopham Fens SSSI to act as a fire break. On other sites this has been due to a lack of management and some restoration works are required.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Supporting off-site habitat**	Maintain and where necessary restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	Include only where applicable. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
Structure and function (including its typical species)	**Key structural, influential and/or distinctive species**	Maintain and where necessary restore the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; Constant and preferential plant species of the S2 *Cladium mariscus* swamp and sedge, S24 *Phragmites australis – Peucedanum palustris* tall-herb fen, S25 *Phragmites australis – Eupatorium cannabinum* tall-herb fen, M13 *Schoenus nigricans – Juncus subnodulosus* mire and M24 *Molinia caerulea – Cirsium dissectum* fen-meadow NVC vegetation types at this SAC Populations of Fen Raft Spider at Redgrave and Lopham Fens SSSI	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural** species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential** species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • **Site-distinctive** species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. Lopham and Redgrave Fen SSSI is one of only three locations for the Fen Raft Spider *Dolomedes plantarius* in the United Kingdom. Significant amounts of work has been undertaken over the last 15 – 20 years to improve the condition of the site for this species.	Unpublished reports relating to Waveney & Little Ouse Valley Fens SAC (Available on request from Natural England) Shaw, S, & Tratt, R (2015) "Observations on *Schoenus nigricans–Juncus subnodulosus* mire (M13) sites in selected East Anglian Fens, 2014: Market Weston Fen. Unpublished report to Environment Agency (Available on request from the Environment Agency)
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	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).	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)
		Classification types: • S2 *Cladium mariscus* swamp and sedge beds • S24 *Phragmites australis – Peucedanum palustris* tall-herb fen • S25 *Phragmites australis – Eupatorium cannabinum* tall-herb fen • M13 *Schoenus nigricans – Juncus subnodulosus* mire • M24 *Molinia caerulea – Cirsium dissectum* fen-meadow	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.	
Structure and function (including its typical species)	**Water chemistry**	Maintain and where necessary the low nutrient status of irrigating water, ensuring it is rich in base ions, particularly calcium.	UKTAG (2012) provides threshold values for nitrate concentration in groundwaters for different wetland types. The threshold values will mainly be used in the characterisation of GWDTE status for the WFD, primarily as a risk screening tool, to assess if sites are 'at risk' or 'not at risk' from groundwater mediated nutrient pressure. Due to the complex cycling of nutrients within many GWDTE, these threshold values are less well suited for application within sites but rather just to groundwater that is directly feeding the site.	
Supporting processes (on which the feature relies)	**Air quality**	Maintain and where necessary restore, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. 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.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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.	
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 or 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. This habitat in most cases requires ongoing cutting or grazing maintain its open character.	Natural England, 2015. Site Improvement Plan: Waveney and Little Ouse Valley Fens (SIP258). At http://publications.naturalengland.org.uk/publication/5465193064693760
Version Control 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				

Table 3: Supplementary Advice for Qualifying Features: S1016. *Vertigo moulinsiana*; Desmoulin`s whorl snail

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	**Abundance**	Maintain and where necessary restore a healthy adult: juvenile structure and population density (typically>250 individuals per m² in late summer), whilst avoiding deterioration from current levels as indicated by the latest 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. 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, Plastic tray sampling, or white sheet beating surfaces are typically used as sample points in wetlands for assessments of this species. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. 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.	Killeen IJ (2001). *Surveys of EU Habitats Directive* Vertigo *species in England: 3.* Vertigo moulinsiana. *Part 4: The Waveney and Little Ouse Valley Fens SAC*. English Nature Research Reports, Peterborough (Available from Natural England on request). Abrehart Ecology (2014) SAC status reporting on *Vertigo moulinsiana* in Norfolk & Suffolk. Unpublished report. (Available from Natural England on request).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	**Connectivity with other populations**	Maintain the abundance and supporting habitat of Desmoulins whorl snail upstream of the SAC and the connectivity between populations	This recognises population vulnerability of the top-most population to localised extinction; it remains likely that colonies are moved in flood events to downstream sites, so loss of headstream populations weakens the opportunities to overcome localised extinction events further downstream.	
Supporting habitat: extent and distribution	**Distribution of supporting habitat**	Maintain 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 Within this SAC this feature is only found on Weston Fen, Suffolk SSSI	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.	
Supporting habitat: extent and distribution	**Extent of supporting habitat**	Maintain the total extent of the habitats which support the feature	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. Abrehart, 2014 identifies suitable habitats for the species. The most favourable are habitats based on tall *Carex* species, *Cladium mariscus* and *Glyceria maxima*. The second best is habitat based on *Equisetum fluviatile or Phragmites australis.* The third group were based on *Juncus subnodulosus, Mentha aquatica Angelica sylvestris.*	Killeen IJ (2001). *Surveys of EU Habitats Directive* Vertigo *species in England: 3.* Vertigo moulinsiana. *Part 4: The Waveney and Little Ouse Valley Fens SAC*. English Nature Research Reports, Peterborough (Available from Natural England on request). Abrehart Ecology (2014) SAC status reporting on *Vertigo moulinsiana* in Norfolk & Suffolk. Unpublished report. (Available from Natural England on request).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/ function	**Ground moisture**	Maintain and where necessary restore appropriate soil/ground moisture conditions so that water levels are continuously at or just above the ground surface throughout the year.	High groundwater levels throughout the year are considered to be one of the most important factors influencing the distribution of Desmoulin's whorl snail. For this feature the water level must remain close to the surface so that the ground remains at least moist for most of the summer, although some seasonal drying appears to be acceptable. Relatively high groundwater also contributes to maintaining a high humidity in the vegetation. The optimal degree of ground moisture for this feature is usually measured as 2 or 3 using a version of the '5 Point Wetness scale' (Killeen & Moorkens 2003).	
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	**Vegetation composition - invasive non-native plants**	Ensure invasive non-native plants are either rare or absent within the site	Desmoulin's whorl snails are potentially or actually at risk from non-native invasive plants. Such plants are considered a major threat to habitat due to their rapid growth and dominance over native species and the difficulty of controlling them. Species of concern include Japanese knotweed (*Polygonum [Fallopia] japonica*), Himalayan [Indian] balsam (*Impatiens glandulifera*) and giant hogweed (*Heracleum mantegazzianum*).These riparian plants may directly alter the composition of Desmoulin's whorl snail habitat by replacing preferred species and increasing shading.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat: structure/ function	**Vegetation structure**	Maintain dense stands of tall vegetation, which is typically >70cms tall by August, with an abundance of tussocks and decaying leaf litter.	Humidity is important to all whorl snails (Vertigo spp.) and the different species achieve their requirements by occupying different levels (i.e. vertical movement) within their microhabitats. Desmoulin's whorl snail is a climbing species on emergent vegetation, living over a large vertical range at different times of year. The snail may over-winter in the lower levels of vegetation, within tussocks or in amongst decaying layer of leaf litter and vegetation. Associated supporting vegetation is usually tall, bulky marginal plants such as *Glyceria, Carex, Cladium, Sparganium* and *Iris*. Supporting habitat is typically tall herb swamp and fen communities such as NVC types S7, S5, S2, S3 & S6 NVC	Killeen IJ (2001). *Surveys of EU Habitats Directive* Vertigo *species in England: 3.* Vertigo moulinsiana. *Part 4: The Waveney and Little Ouse Valley Fens SAC*. English Nature Research Reports, Peterborough (Available from Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			communities, but also in stands with *Phragmites*. Drift into communities such as S26, especially with strong *Urtica* populations, which can signal undesirable ground drying.	England on request). Abrehart Ecology (2014) SAC status reporting on *Vertigo moulinsiana* in Norfolk & Suffolk. Unpublished report. (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 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 supporting text for this attribute in Table 1.	
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 supporting text 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.	Killeen IJ (2001). *Surveys of EU Habitats Directive* Vertigo *species in England: 3.* Vertigo moulinsiana. *Part 4:* Natural England, 2015. Site Improvement Plan: Waveney and Little Ouse

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		On this SAC the snail is currently only found in Weston Fen SSSI		Valley Fens (SIP258). At http://publications.naturalengland.org.uk/publication/5465193064693760
Supporting processes (on which the feature and/or its supporting habitat relies)	**Mosaic of biotopes on floodplains**	Maintain the extent and patterning of In-channel and riparian biotopes which are characteristic of natural fluvial processes. There should be no physical modification of existing conditions which would reduce the connectivity between river and floodplain.	Watercourses with a high degree of naturalness are governed by dynamic processes which result in a mosaic of characteristic physical features and habitats (or 'biotopes'), including a range that are important to Desmoulin's Whorl Snail. A range of physical habitat modifications to rivers (such as channel straightening, widening and deepening, bankside and bed protection, close floodbanks and impoundments) can disconnect them from their floodplain, resulting is disjointed distributions of suitable habitat for Desmoulin's Whorl Snail. Rivers that have sections that are already significantly physically modified should be subject to a process for planning and implementing physical restoration measures. This should be based on restoring natural geomorphological processes (including where possible restoration of continuity between river and floodplain) as far as possible to allow restoration of characteristic and sustainable biotope mosaics, working within the practical constraints of essential flood protection for people and the built environment. In certain instances, sections of river channel may lie outside the boundary of the site, but may still be integral to how the site functions	*The Waveney and Little Ouse Valley Fens SAC*. English Nature Research Reports, Peterborough (Available from Natural England on request).
Supporting processes (on which the feature and/or its supporting habitat relies)	**Water flow (rivers)**	Maintain and restore where necessary the natural flow regime of the river, with daily flows as close to what would be expected in the absence of abstractions and discharges (the 'naturalised' flow).	The natural flow regime both shapes and sustains characteristic biotope mosaics on the river and its floodplain. All parts of the natural flow regime are important, including flushing flows, seasonal baseflows and natural low flows. Any significant impacts on the natural flow regime should be rectified sustainably by reducing flow modifications. Peak flows are of particular importance in aiding the spread of individuals for colonization of suitable habitats downstream.	
Supporting processes (on which the feature and/or its supporting habitat relies)	**Water quality/quantity**	Maintain and restore where necessary 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 during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect the availability and suitability of breeding, rearing and feeding habitats. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD	Killeen IJ (2001). *Surveys of EU Habitats Directive* Vertigo *species in England: 3.* Vertigo moulinsiana. *Part 4: The Waveney and Little Ouse Valley Fens SAC*. English Nature Research Reports, Peterborough

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			2000/60/EC) will also be sufficient to support the SAC Conservation Objectives but in some cases more stringent standards may be needed to support the SAC feature. Further site-specific investigations may be required to establish appropriate standards for the SAC. While the feature is present and well maintained on Market Weston Fen, it has been lost since 2007 from Thelnetham Middle Fen due to changing water levels.	(Available from Natural England on request). Abrehart Ecology (2014) SAC status reporting on *Vertigo moulinsiana* in Norfolk & Suffolk. Unpublished report. (Available from Natural England on request).
Version Control 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				