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

Abberton Reservoir
Special Protection Area (SPA)
Site Code: UK9009141

Photo credit: Essex and Suffolk Water

Date of Publication: 15 March 2019

About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Abberton Reservoir SPA. This advice should therefore be read together with the SPA Conservation Objectives available here.

This advice replaces a draft version dated 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'.

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.

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.

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	Abberton Reservoir Special Protection Area (SPA)
Location	Essex
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	5 December 1991
Qualifying Features	See section below
Designation Area	726.2 ha
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Abberton Reservoir SSSI
Relationship with other European or International Site designations	The boundary of this SPA coincides with that of Abberton Reservoir Ramsar site.

Site background and geography

Abberton Reservoir is a large storage reservoir owned by ESSEX & SUFFOLK WATER lying about four miles south of Colchester. It is the largest freshwater body in Essex and one of the most important reservoirs in Britain for wildfowl. It is outstandingly important as an autumn arrival point, moulting and wintering locality for wildfowl. About thirty thousand birds visit the reservoir annually including internationally important numbers of one species and nationally important numbers of twelve others. It is also one of a handful of sites in Britain where Cormorants nest inland in trees. The reservoir is less than five miles from the coast and many birds move between it and nearby intertidal areas and grazing marshes along the Colne and Blackwater estuaries.

The Reservoir was created between 1939 and 1941 by damming Layer Brook near its junction with the Roman River and flooding the long shallow valley to the south-west. In a wet or average year, most of the water pumped into Abberton is from the unsupported River Stour and in a dry year, the River Stour is supported by flows from the Ely Ouse to Essex Transfer System.. Two causeways divide the reservoir into three sections: west, central and east. The eastern section is by far the largest and was constructed with concrete banks, unlike the other two sections. At the time of classification the reservoir's standing open water covered about 471 hectares. An additional 247 hectares of adjacent wetland, grassland, woodland and arable were included within the SPA as supporting habitat.

Between 2010 and 2014, ESSEX & SUFFOLK WATER undertook major construction works to enable water levels in the east section to be raised. The top water level was raised by 3.2 metres and the reservoir was completely filled by April 2015. Levels have not been raised in the other two sections (which receive water from Layer Brook but not from the Stour) and water is now pumped between the central and east sections. As part of the level raising scheme, the east section's concrete banks were removed and its shoreline re-profiled to create large areas of shallow wetland habitat for the site's waterfowl. Before the main construction period, new lagoons were also created around the west section to provide more habitat for wildfowl in a part of the site well away from the main works. Detailed bird monitoring showed no declines in bird numbers at a whole-site level as a result of disturbance during construction. But the way species use and are distributed within the site has changed, particularly because

the east section now has extensive shallow-water habitat, and water levels in the central and east sections can be controlled independently.

As a result of the level raising scheme, the reservoir now covers about 670 ha at maximum extent, an increase in area of about 40% (ESSEX & SUFFOLK WATER 2015). The western section of the reservoir is 16 ha (excluding the scrapes created in 2001 and 2004). The central section of the reservoir is 49 ha in extent. The raised eastern reservoir section was designed to have an extent of 604 ha. Due to the enhancement scheme, when the current reservoir is 65% full, it is the equivalent of the old reservoir at 100% full. Since enhancement, several bunded bays and lagoons create shallow water habitat and exposed areas.

As part of its operation at Abberton Reservoir, ESSEX & SUFFOLK WATER carries out a process of draw down and re-filling. The process involves beginning re-filling the reservoir in November with the aim for it to be full by the end of April. Then the draw down starts in July leading back to re-filling beginning in November. The reservoir has been designed so that it can be drawn down as low as 25% and will still provide increased and sufficient habitat for the designated waterfowl species. However, the reservoir normally operates between 50% and 100% full (Essex and Sussex Water pers. comms, 2019). This means that during the important overwintering period the reservoir is gaining water while during the autumnal passage period the lower water levels allow the appearance of an island within the reservoir which supports possible moulting waterbirds. The draw down and refilling process primarily affects the eastern section. The water level in the western section is managed by a weir so there is very little fluctuation in the area of surface water. It was originally agreed that the central section would be managed in a similar way to the historical draw down and re-fill pattern. However, recently it was agreed that keeping the central section more stable with a smaller draw down would be more beneficial, and so it is unlikely that this section would see substantially changes in water levels.

Parts of the east section now lie outside the SPA boundary and some of the original terrestrial habitat within the SPA has been lost. However, there is sufficient land in the water company's ownership around the new shoreline to make up for these losses and large areas of new shallow-water habitat and semi-natural margin have been created.

About the qualifying features of the SPA

The following section gives you additional, site-specific information about this SPA's qualifying features. These are the individual species of wild birds listed on Annex I of the European Wild Birds Directive, and/or the individual regularly-occurring migratory species, and/or the assemblages (groups of different species occurring together) of wild birds for which the SPA was classified for.

- **Qualifying individual species not listed in Annex I of the Wild Birds Directive (Article 4.2)**

During the **breeding season** the SPA regularly supports:

- **A017 *Phalacrocorax carbo*; Great cormorant (Breeding)**

The great cormorant is a diving fish-eating bird. This site supports nationally important numbers of breeding cormorants during the summer months and when the SPA was classified in 1991 the site supported 360 pairs (this represented 5% of the total British breeding population). The population has declined since the SPA's classification, with a latest five year peak mean of 161 pairs (2013-2017) (unpublished data from ESSEX & SUFFOLK WATER conservation staff).

In the 1980s Abberton Reservoir was the only site at which an inland breeding colony was established. This colony was unusual in Great Britain because the birds are nesting in trees inland, rather than on coastal cliff ledges or rocky islets. At the time of designation this colony was largest in the country. Between 1989 and 1994 another inland breeding colony was established at Walthamstow Reservoir on the outskirts of London near the border of Essex. Since then further colonies have been established in and around Essex. As these new colonies have been established the population growth at Abberton Reservoir and other older sites has stabilised or declined.

The birds here primarily feed in the estuarine waters of the Essex coast between the River Colne and the River Crouch. They do also use inland sites and are known to use gravel-pits, reservoirs, lakes and rivers.

At this SPA the principal habitats supporting this qualifying species are:

Woodland (where the nesting sites are located in the trees along the north and south shores of the reservoir's central section)
Standing open water (one of their principal feeding sites is the reservoir itself although they are likely to feed on any appropriate water body within several tens of kilometres of the SPA)

During the **non-breeding season** the SPA regularly supports:

Internationally important

- **A050 *Anas penelope*; Eurasian wigeon (Non-breeding)**

The Eurasian wigeon is a bird of open wetlands, and usually feeds by dabbling for plant food or grazing, which it does very readily. The species feeds on grassland adjacent to the reservoirs.

When classified in 1991, this site supported an internationally important over-wintering population of wigeon made up of 8,400 individuals representing 3% of the British population and 1% of the North West European population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 2,300 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of 72% for this species on this site. Therefore, a **restore** conservation objective has been set for this species on this site. Decline in Widgeon populations may not solely be a result of influences at Abberton Reservoir. It is likely that restoration of coastal grazing marshes and areas that frequently flood have also become highly important to this and other wildfowl species.

At this SPA the principal habitats supporting this qualifying species are:

Standing open water
Improved grassland

- **A051 *Anas strepera*; Gadwall (Non-breeding)**

Gadwall require generally undisturbed, still, eutrophic waters that have a combination of open water and emergent vegetation (WOOD, 2007). Gadwall eat mostly submerged aquatic vegetation such as algae, grasses, rushes,

sedges, pondweed, widgeon grass, and water milfoil, including leaves, stems, roots, and seeds. They also eat snails, midges, water beetles, and other invertebrates. During the winter they predominantly eat plant life with a small amount of animal life.

When classified in 1991, this site supported an internationally important over-wintering population of gadwall made up of 480 individuals representing 8% of the British population and 4% of the North West European population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, English Nature, 1991). The current population of this species overwintering within the site is estimated at 179 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a 62.75% decrease for this species on this site. It should be noted that Gadwall numbers do fluctuate annually with counts in the year of initial designation being particularly high.

The species was listed on the SPA citation as being an important late summer passage visitor at this site. At the time of classification the citation showed that the peak August count (for the five year period 1985-1989) for the species was 110 individuals. The recent peak August count (for the five year period 2012-16) was 572 individuals.

At this SPA the principal habitats supporting this qualifying species are:

Standing open water

- **A056 *Anas clypeata*; Northern shoveler (Non-breeding)**

Shoveler prefer poorly drained treeless meadows interspersed with eutrophic shallow, stagnant freshwater pools and lakes, rivers with undisturbed creeks and muddy bottoms usually processing lush emergent and floating vegetation. As a result of its specialised filter-feeding methods, its habitat choice is therefore restricted (Dittberner, H. & Dittberner, W. 1987. Zur Brutbiologie dur Loffelente (Anas clypeata). Vogelwelt 108: 81-98.) – referenced in The Birds of Essex, Simon Wood, 2007. Zooplankton is an important food source for the species and this is likely a primary food source at the site. (2019, Essex and Suffolk Water personal communication)

When classified in 1991, this site supported an internationally important over-wintering population of shoveler made up of 480 individuals representing 5% of the British population and 1% of the North West European population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 1,219 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a 154% increase for this species on this site.

The species was listed on the SPA citation as being an important late summer passage visitor at this site. At the time of classification the citation showed that the peak August count (for the five year period 1985-1989) for the species was 420 individuals. The recent peak August count (for the five year period 2012-16) was 1,055 individuals.

At this SPA the principal habitats supporting these qualifying species are:

Standing open water
Wet grassland

Nationally important

- **A005 *Podiceps cristatus*; Great crested grebe (Non-breeding)**

The great crested grebe is a diving bird mainly feeding on fish.

When classified in 1991, this site supported a nationally important over-wintering population of great crested grebe made up of 180 individuals representing 2% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, English Nature, 1991). The current population of this species overwintering within the site is estimated at 694 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, an increase of 285% for this species on this site.

At this SPA the principal habitats supporting this qualifying species are:

Standing open water

- **A036 *Cygnus olor*; Mute swan (Non-breeding)**

Mute swans are the commonest Eurasian swan and they eat aquatic vegetation, which their long necks equip them to take from the bed of the reservoir. They take the molluscs which cling to the vegetation and also eat small fish,

frogs and worms. Typically mute swans will graze big grassy fields and winter cereal crops. For this site, the winter cereals growing outside the SPA boundary are probably more important for the species than the grassland both within and outside the site boundary.

When classified in 1991, this site supported a nationally important over-wintering population of mute swan made up of 500 individuals representing 3% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 162 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of nearly 68% for this species on this site.
Traditionally, Abberton Reservoir has held large flocks of moulting swans during the post-breeding period. (WOOD 2007). The species was listed on the SPA citation as being a nationally important late summer passage visitor at this site. At the time of classification the citation showed that the peak August count (for the five year period 1985-1989) for the species was 450 individuals. At the time this was 3% of the British population. The current peak August count (for the five year period 2012-16) was 462 individuals.

At this SPA the principal habitats supporting these qualifying species are:

Standing open water
Improved grassland
Arable land

- **A052 *Anas crecca*; Eurasian teal (Non-breeding)**

This dabbling duck is the smallest European duck. Overwintering teal mainly feed on the seeds of aquatic plants, grasses and sedges.

When classified in 1991, this site supported a nationally important over-wintering population of teal made up of 2,200 individuals representing 2% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 4,987 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, an increase of over 126% for this species on this site. In fact, the population is nearing the internationally important threshold of 5,000.

At this SPA the principal habitats supporting these qualifying species are:

Standing open water
Wet grassland

- **A059 *Aythya ferina*; Common pochard (Non-breeding)**

The common Pochard is a medium-sized diving duck. They feed by diving or dabbling, eating aquatic plants with some mollusks, aquatic insects and small fish. They often feed at night, and when diving for food may feed upside down.

When classified in 1991, this site supported a nationally important over-wintering population of Pochard made up of 2,400 individuals representing 1% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 1,648 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of just over 31% for this species on this site. The current population level is still above the nationally important threshold.

Traditionally, Abberton Reservoir has held large flocks of moulting birds during the post-breeding period. (WOOD 2007). The species was listed on the SPA citation as being an important late summer passage visitor at this site. At the time of classification the citation showed that the peak August count (for the five year period 1985-1989) for the species was 2,700 individuals. The recent peak August count (for the five year period 2012-16) was 1,789 individuals.

At this SPA the principal habitats supporting these qualifying species are:

Standing open water

- **A061 *Aythya fuligula*; Tufted duck (Non-breeding)**

The tufted duck is a medium-sized diving duck. The species is mainly carnivorous with animal material forming more than 80% of their diet (WOOD 2007). The diet consists of molluscs, insects and some plants.

When classified in 1991, this site supported a nationally important over-wintering population of tufted duck made up of 3,500 individuals representing 2% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 1,733 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of 50.5% for this species on this site. The current population level is still above the nationally important threshold.

The species was listed on the SPA citation as being an important late summer passage visitor at this site. At the time of classification the citation showed that the peak August count (for the five year period 1985-1989) for the species was 2,700 individuals. The recent peak August count (for the five year period 2012-16) was 2,969 individuals.

At this SPA the principal habitats supporting these qualifying species are:

Standing open water

- **A067 *Bucephala clangula*; Common goldeneye (Non-breeding)**

The goldeneye is a medium-sized diving duck. Goldeneyes typically forage underwater. They eat crustaceans, aquatic insects and small fish. They will also eat plant material, mainly seeds. Unlike pochard and tufted duck, goldeneye often feed in estuarine waters.

When classified in 1991, this site supported a nationally important over-wintering population of goldeneye made up of 560 individuals representing 3% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 381 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of 31.9% for this species on this site. The current population level is still above the nationally important threshold.

At this SPA the principal habitats supporting these qualifying species are:

Standing open water

- **A125 *Fulica atra*; Common coot (Non-breeding)**

The common coot is a member of the rail and crake bird family. The species is omnivorous, feeding primarily on plant matter such as shoots and seeds of aquatic and some terrestrial plants, algae, grasses and cereals. It also takes animal food such as worms, leeches, molluscs, shrimps, insects (adults and larvae) and spiders.

When classified in 1991, this site supported a nationally important over-wintering population of common coot made up of 11,500 individuals representing 10% of the British population, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this species overwintering within the site is estimated at 2,833 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of 75.4% for this species on this site. The current population level is still above the nationally important threshold.

Coot is not listed on the SPA citation as an autumn passage species at Abberton, but in recent years annual peak numbers have generally occurred between August and October (FROST et al, 2018).

At this SPA the principal habitats supporting this qualifying species are:

Standing open water

- **Qualifying assemblage of species (Article 4.2)**

During the non-breeding season the SPA regularly supports an assemblage of waterfowl of more than 20,000 birds.

When classified in 1991, this site supported an internationally important over-wintering waterfowl population made up of 34,000 individuals, at the time (1985/86 to 1989/90) (Abberton Reservoir citation, ENGLISH NATURE, 1991). The current population of this overwintering assemblage within the site is estimated at 27,327 individuals, based on a 5 year peak mean from 2012/13 to 2016/17, a decrease of 19.6% for the assemblage on this site.

The main individual component species of the assemblage are listed below:

Wigeon; Gadwall; Mute swan; Shoveler; Teal; Pochard; Tufted duck; Goldeneye; Coot; Pintail; Great crested grebe; Smew; Cormorant; Lapwing; Golden plover; Ruff.

Below is a table showing why these species have been selected:

Qualifying criteria to being listed as main individual component species[1]:

(i) Species level is currently nationally important;
(ii) Species level is currently internationally important;
(iii) Species currently occurs at ≥2,000 individuals;
(iv) Species is named on SPA citation;
(v) Species currently occurs at ≥10% internationally important level

Species	**(i)**	**(ii)**	**(iii)**	**(iv)**	**(v)**
Wigeon			✓	✓	✓
Gadwall	✓			✓	✓
Mute swan				✓	✓
Shoveler	✓	✓		✓	
Teal	✓		✓	✓	✓
Pochard	✓			✓	✓
Tufted duck	✓			✓	✓
Goldeneye	✓			✓	
Coot	✓		✓	✓	✓
Pintail	✓				
Great crested grebe	✓			✓	✓
Smew	✓				
Cormorant	✓				✓
Lapwing			✓		✓
Golden plover					✓
Ruff	✓				

Many of these species have been discussed above. Pintail are a duck that feed by dabbling for plant food. Smew are a diving duck that eats fish, insect larvae and other insects. Golden plover are waders that regularly feed on arable land and grassland in early and late winter. They eat worms, beetles and other insects. The species generally favour roosting on ploughed arable land. Ruff are waders that mainly feed in freshwater wetlands and eat insects, crustaceans, spiders, molluscs, worms, frogs, small fish, and plant seeds.

The whole of the site is used by the waterbird assemblage from the open water of the three reservoir sections, the shallows of the banks, and the grassland and other habitats adjacent to the reservoir. Neighbouring pasture and arable fields are used by parts of the assemblage for feeding and roosting.

At this SPA the principal habitats supporting the waterbird assemblage are:

Standing open water
Improved grassland
Wet grassland
Arable land

[1] Current species level is calculated as the mean peak for the five year period 2012/13 to 2016/17.

Site-specific seasonality of SPA features

The table below highlights in grey those months in which significant numbers of each mobile qualifying feature are most likely to be present at the SPA during a typical calendar year. This table is provided as a general guide only.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SPA outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying bird features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required. Non-breeding water bird monthly maxima data gathered for this site through the Wetland Bird Survey ('WeBS') may be available upon request from the British Trust for Ornithology.

Feature	Season	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Cormorant	*Breeding*	*Summer*													*DENNIS 1996*
Gadwall	*Non-breeding*	*Passage and Winter*													*Abberton Reservoir WeBS data (FROST et al. 2018). Five-year average monthly counts for 2012/13 to 2016/17 used.*
Mute swan															
Pochard															
Shoveler															
Tufted duck															
Coot	*Non-breeding*	*Winter*													*Abberton Reservoir WeBS data (FROST et al. 2018). Five-year average monthly counts*
Goldeneye															

Feature	Season	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Great-crested grebe	*Non-breeding*	*Winter*													*for 2012/13 to 2016/17 used.*
Teal															
Waterbird assemblage															
Wigeon															

Guide to terms:
Breeding – present on a site during the normal breeding period for that species
Non-breeding - present on a site outside of the normal breeding period for that species (includes passage and winter periods).
Summer – the period generally from April to July inclusive
Passage - the periods during the autumn and spring when migratory birds are moving between breeding areas and wintering areas. These periods are not strictly defined but generally include the months of July – October inclusive (autumn passage) and March – April inclusive (spring passage).
Winter - the period generally from November to February inclusive.

Table 1: Supplementary Advice for Qualifying Features: A017. *Phalacrocorax carbo*; Great cormorant (Breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Breeding population	**Population abundance**	**Restore** the size of the breeding population to a level which is above 360 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will sustain the site's population and ensures it contributes to a viable local, national and bio-geographic population. Due to the mobility of birds and the dynamic nature of population change, the target-value given for the abundance of this feature is considered to be the minimum standard for conservation/ restoration measures to achieve. When Abberton Reservoir was designated, inland breeding colonies of Cormorant were limited and they have since expanded substantially possibly contributing to the reported decline. This minimum-value may be revised where there is evidence to show that a population's size 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 abundance 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 classified, 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. Maintaining or restoring bird abundance depends on the suitability of the site. However, factors affecting suitability can also determine other demographic rates of birds using the site including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and / or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by	The target for the restore characteristic is from the SPA citation population figure.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured/estimated to inform judgements of likely impacts on abundance targets. Unless otherwise stated, the population size 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. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available.	
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting breeding habitat**	**Maintain** the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding): Standing open water: Between 185 ha and 670 ha. Wet woodland adjacent to reservoir: Approximately 10.5 ha	Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection. This target will apply to any supporting habitat which is known to occur outside the site boundary. Western section is 16 ha, central section is 49 ha and raised eastern reservoir was designed to have a maximum of 604 ha (Personal communication with Essex and Suffolk Water). The range in the standing open water extent reflects changing water levels due to the draw down and re-filling process undertaken at the site.	The extent of wet woodland used for nesting was calculated from aerial photographs of the site (2018)
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	**Maintain** the availability of key prey species (e.g. fish) at preferred prey sizes	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population.	
Supporting habitat (both within	**Water depth**	**Maintain** the availability of standing water of 2-10 m deep.	This feature is known to require extensive areas of water in which to feed. Birds are visual predators, with some having the ability to dive or to feed from the surface. As they will rely on detecting their prey	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
and outside the SPA): function/ supporting process			within the water to hunt, the depth of water at critical times of year may be paramount for successful feeding and therefore their fitness and survival. Deep water surrounding nesting sites may also be important to deterring predators.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**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).	The structure and function of the habitats which support this SPA feature may be sensitive to changes in air quality. Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats. Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy 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. 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. 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 SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	**Maintain** management or other measures (whether within and/or outside the site boundary as appropriate) necessary to **maintain** the structure, function and/or the supporting processes associated with the feature and its supporting habitats.	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site can be provided by 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.	ENGLISH NATURE (2004) Views about Management: Abberton Reservoir SSSI Natural England (2104) Abberton Reservoir SPA Site Improvement Plan:

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	Water quality/ quantity	Where the supporting habitats of the SPA feature are dependent on surface water, **maintain** water quality and quantity at a standard which provides the necessary conditions to support the feature.	For many SPA features which are dependent on wetland habitats supported by surface 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, feeding and roosting habitats. 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 SPA Conservation Objectives but in some cases more stringent standards may be needed to support the SPA feature. Further site-specific investigations may be required to establish appropriate standards for the SPA.	
Supporting habitat (both within and outside the SPA): minimising disturbance	Minimising disturbance caused by human activity	**Restrict** the frequency, duration and/or intensity of disturbance of nesting, roosting, foraging, feeding, moulting and/or loafing birds so that the feature is not significantly disturbed	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, presence of people, animals and structures. There are public and permissive footpaths through the countryside around the site. More footpaths, bridleways and cycleways were added recently as part of the Abberton Scheme. These are set well back from the shoreline or screened to prevent bird disturbance. Fishing is restricted to the western causeway and a short length of shoreline near the main dam on a limited number of days and requires a permit. No swimming, sailing or other boating is permitted in the reservoir.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): predation	Predation	**Restrict** predation and disturbance caused by native and non-native predators.	This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that maintain or restore the abundance of the feature. Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also from significant disturbance. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features. At Abberton Reservoir, a decline in cormorant breeding success in 1997 was considered to be due to low water levels that allowed brown rats to climb some trees and eat the young, and foxes to patrol under the trees and continually disturb sitting adults (Wood 2007). Ensuring that water levels in the central section are kept sufficiently high during the breeding season to prevent a recurrence is likely to be the only predator control measure needed unless conditions change.	Wood 2007, p.173.
Supporting habitat (both within and outside the SPA): structure	Vegetation characteristics	**Maintain** the overall abundance of tall trees within nesting areas that are typically either over or near the water's edge along the north and south sides of the reservoir's central section.	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/rearing/concealment/roosting. Many bird species will have specific requirements that conservation measures will aim to maintain, for others such requirements will be less clear. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may adversely affect the feature. Nearly all the nesting trees used are willows actually growing in shallow water.	Personal communication (C Williams, Natural England)
Version Control Advice last updated: **14 March 2019 –** Following stakeholder feedback addition explanatory notes added to **Population Abundance** target to provide clarity of population trends at time of classification.				
Variations from national feature-framework of integrity-guidance: Attribute relating **number of water bodies of optimal size** removed as this is considered not relevant as the site is a permanent reservoir				

Table 2: Supplementary Advice for Qualifying Features: A050 *Anas penelope* Eurasian wigeon (Non-breeding); A050 *Anas strepera* Gadwall (Non-breeding); A056 *Anas clypeata* Northern Shoveler (Non-breeding); A005 *Podiceps cristatus* Great-crested grebe (Non-breeding); A036 *Cygnus olor* Mute Swan (Non-breeding); A052 *Anas crecca* Eurasian teal (Non-breeding); A059 *Aythya farina* Common Pochard (Non-breeding); A061 *Aythya fuligula* (Non-breeding); A067 *Bucephala clangula* Common goldeneye (Non-breeding); A125 *Fulica atra* Common Coot (Non-breeding)

<table>
<tr><th colspan="2">Attributes</th><th>Targets</th><th>Supporting and Explanatory Notes</th><th>Sources of site-based evidence (where available)</th></tr>
<tr>
<td>Non-breeding population</td>
<td>Population abundance</td>
<td>All species in Table 2
For each individual species, maintain or restore as appropriate the size of the non-breeding population at/to a size which is above the baseline for each species, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent

See explanatory notes for more details</td>
<td>
<table>
<tr><th>Species – (internationally important)</th><th>Season</th><th>Target</th><th>Baseline population (individuals)</th></tr>
<tr><td>Wigeon</td><td>Over-wintering</td><td>Restore</td><td>8,400</td></tr>
<tr><td>Gadwall</td><td>Over-wintering</td><td>Restore</td><td>480</td></tr>
<tr><td></td><td>Passage</td><td>Maintain</td><td>110</td></tr>
<tr><td>Shoveler</td><td>Over-wintering</td><td>Maintain</td><td>480</td></tr>
<tr><td></td><td>Passage</td><td>Maintain</td><td>420</td></tr>
<tr><td>Species (nationally important)</td><td></td><td></td><td></td></tr>
<tr><td>Great-crested grebe</td><td>Over-wintering</td><td>Maintain</td><td>180</td></tr>
<tr><td>Mute Swan</td><td>Over-wintering</td><td>Restore</td><td>500</td></tr>
<tr><td></td><td>Passage</td><td>Maintain</td><td>450</td></tr>
<tr><td>Teal</td><td>Over-wintering</td><td>Maintain</td><td>2,220</td></tr>
<tr><td>Pochard</td><td>Over-wintering</td><td>Restore</td><td>2,400</td></tr>
<tr><td></td><td>Passage</td><td>Restore</td><td>2,700</td></tr>
<tr><td>Tufted Duck</td><td>Over-wintering</td><td>Restore</td><td>3,500</td></tr>
<tr><td></td><td>Passage</td><td>Maintain</td><td>2,700</td></tr>
<tr><td>Goldeneye</td><td>Over-wintering</td><td>Restore</td><td>560</td></tr>
<tr><td>Coot</td><td>Over-wintering</td><td>Restore</td><td>11,500</td></tr>
</table>
</td>
<td>Target is the number of species occurring at SPA classification (see SPA citation)</td>
</tr>
</table>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			This will sustain the site's population and ensures it contributes to a viable local, national and bio-geographic population. Due to the mobility of birds and the dynamic nature of population change, the target-value given for the abundance 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 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 abundance 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 classified, 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. Maintaining or restoring bird abundance depends on the suitability of the site. However, factors affecting suitability can also determine other demographic rates of birds using the site including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and / or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured/estimated to inform judgements of likely impacts on	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			abundance targets. Unless otherwise stated, the population size 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. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available.	
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting breeding habitat**	**All species in Table 2** **Maintain** the extent, distribution and availability of suitable breeding habitat which supports the feature in the non-breeding/wintering period (moulting, roosting, loafing, feeding) **Standing open water** - Between 185 ha and 670 ha (wigeon, gadwall, shoveler, great-crested grebe, mute swan, teal, Pochard, tufted duck, goldeneye, coot) **Grassland** – 72ha (wigeon) **Wet grassland, fen, marsh & swamp** – 6ha (shoveler, teal) **Arable land** – 76ha within SPA boundary (mute swan)	Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection. This target will apply to any supporting habitat which is known to occur outside the site boundary. Western section is 16 ha, central section is 49 ha and raised eastern reservoir was designed to have a maximum of 604 ha (Personal communication with Essex and Suffolk Water). The range in the standing open water extent reflects changing water levels due to the draw down and re-filling process undertaken at the site. The extent of wet woodland used for nesting was calculated from aerial photographs of the site (2018) The grassland target was calculated from habitat mapping undertaken in 2008. The target was the area within the SPA extent before the raising of water levels. Arable land outside the boundary is much more important to Mute Swan than areas that were in the site boundary and may subsequently have been affected by the change in water levels of the reservoir in recent years.	Welcome to the Abberton Scheme by Essex and Suffolk Water"
Supporting habitat	**Air quality**	**All Species in Table 2:**	The structure and function of the habitats which support this SPA feature may be sensitive to changes in air quality.	More information about site-relevant Critical Loads and Levels

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(both within and outside the SPA): function/ supporting process		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).	Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats. Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy 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. 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. 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.	for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting habitat (both within and outside the SPA): function/ supporting process	**Connectivity with supporting habitats**	**Tufted duck, Pochard, Teal, Shoveler, Wigeon** **Maintain** the safe passage of birds moving between roosting and feeding areas **Wigeon** **Maintain** the availability of grasslands in close proximity (typically <50 m) to open water bodies.	The ability of the feature to safely and successfully move to and from feeding and roosting areas is critical to their breeding success and to the adult fitness and survival. This target will apply within the site boundary and where birds regularly move to and from off-site habitat where this is relevant.	
Supporting habitat	**Conservation measures**	**All Species in Table 2**	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other	ENGLISH NATURE (2004) Views about Management: Abberton

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(both within and outside the SPA): function/ supporting process		**Maintain** management or other measures (whether within and/or outside the site boundary as appropriate) necessary to **maintain** the structure, function and/or the supporting processes associated with the feature and its supporting habitats.	measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site can be provided by 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.	Reservoir SSSI Natural England (2104) Abberton Reservoir SPA Site Improvement Plan:
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	**Maintain** the availability of key prey species at preferred prey sizes Shoveler: *C*rustaceans, caddisflies, *diptera*, beetles Great-crested grebe: bleak, minnows, perch, roach, *Gobius* spp., prawns, shrimps Teal: Flies, caddisfly, beetles, bugs, hatching midges Pochard: *Chironomid* larvae, caddis, *Tubifex*) Tufted duck**:** *Dreissena polymorpha, Mytillus, Cardium spp, Chironomid* larvae, *Gammarus,* Goldeneye: *Trichoptera, chironomid* larvae*, Gammarus, Asellus* Coot: *Mytilus, Dreissena polymorpha, caddis-fly larvae, Odonata, Lepidoptera,* beetles and bugs	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Maintain high cover/abundance of preferred food plants Wigeon; Teal: *Polygonum, Eleocharis, Rumex, Ranunculus* Gadwall: *Glyceria fluitans, Agrostis stolonifera, Chara, Potomageton, Ceratophyllum* spp., *Ruppia* Shoveler: *Scirpus, Eleocharis, Carex, Potamogeton, Glyceria*, surface plankton and zooplankton Mute swan: *Glyceria fluitans, Rorippa spp., Alopecurus geniculatus, Potamogeton, Callitriche, Myriophyllum, Chara spp*. Pochard / Tufted Duck: *Chara, Nitella, Potamogeton spp., Myriophyllum* Coot: *Chara, Cladophora, Potamogeton, Ruppia, Ranunculus, Spirogyra, Elodea*	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population.	
Supporting habitat (both within and outside the SPA): function/ supporting	**Water depth**	Maintain the availability of standing water at optimal depth, typically: Teal:<0.1m Gadwall: <0.25m Shoveler: <0.3m	These features are known to require extensive areas of water in which to feed. Birds are visual predators, with some having the ability to dive or to feed from the surface. As they will rely on detecting their prey within the water to hunt, the depth of water at critical times of year may be paramount for successful feeding and therefore their fitness and survival.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
process		Mute Swan<1m Coot: 1-3m Great-crested grebe: 1-5m Goldeneye 2-4m Pochard: 2-6m Tufted Duck: 2-6m	Optimal water depth is not applicable to wigeon as this species feeds predominantly on grassland.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water quality/ quantity**	**All Species** Where the supporting habitats of the SPA feature are dependent on surface water, **maintain** water quality and quantity at a standard which provides the necessary conditions to support the feature.	For many SPA features which are dependent on wetland habitats supported by surface 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, feeding and roosting habitats. 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 SPA Conservation Objectives but in some cases more stringent standards may be needed to support the SPA feature. Further site-specific investigations may be required to establish appropriate standards for the SPA.	
Supporting habitat (both within and outside the SPA): minimising disturbance	**Minimising disturbance caused by human activity**	**All features** **Restrict** the frequency, duration and/or intensity of disturbance of nesting, roosting, foraging, feeding, moulting and/or loafing birds so that the feature is not significantly disturbed	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. Disturbance associated with human activity may take a variety	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			of forms including noise, light, sound, vibration, trampling, presence of people, animals and structures. There are public and permissive footpaths through the countryside around the site. More footpaths, bridleways and cycleways were added recently as part of the Abberton Scheme. These are set well back from the shoreline or screened to prevent bird disturbance. Fishing is restricted to the western causeway and a short length of shoreline near the main dam on a limited number of days and requires a permit. No swimming, sailing or other boating is permitted in the reservoir.	
Supporting habitat (both within and outside the SPA): structure	**Landscape**	**Wigeon only** **Maintain** open and unobstructed terrain within and around feeding and roosting areas.	This feature is known to favour large areas of open terrain, largely free of obstructions, in and around its roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within feeding and roosting habitat to detect approaching predators, or to ensure visibility of displaying behaviour. An open landscape may also be required to facilitate movement of birds between the SPA and any off-site supporting habitat.	
Supporting habitat (both within and outside the SPA): structure	**Vegetation characteristics**	**Wigeon only** **Maintain** the extent and distribution of predominantly short (<5 cm) swards in areas used for feeding.	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/ rearing/ concealment/ roosting. Many bird species will have specific requirements that conservation measures will aim to maintain, for others such requirements will be less clear. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may adversely affect the feature.	Personal communication (C Williams, NE)
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: Attribute relating to **number of water bodies of optimal size** removed as not relevant as the site is a permanent reservoir. Attribute relating to food availability of coastal species removed as this is a freshwater site.				

Table 3: Supplementary Advice for Qualifying Features: Waterbird assemblage

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Assemblage of species	**Assemblage abundance**	**Restore** the overall abundance of the non-breeding assemblage to a level which is above 34,000 whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will sustain the assemblage population and contribute to viable local, national and bio-geographic populations of its component species. Assemblage abundance is the annual sum of peak counts of each assemblage component species (at any time of year, though peaks tend to occur in the non-breeding season), unless otherwise stated. Five year peak means are the average of these annual peak sums for the relevant period. An assemblage component is any waterbird using the site. Due to the dynamic nature of assemblage component populations, this target may be subject to periodic review. However, the target assemblage abundance is considered to be the minimum standard for conservation or restoration measures and therefore where at any time the assemblage abundance is greater than the target value given, any measure or impact assessment should take account of the greater abundance. This meets with the obligation to avoid deterioration of a European site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects giving rise to the risk of such deterioration or disturbance. 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. Whether to maintain or restore depends on the overall assemblage abundance (i.e. the peak mean derived from the summed peak counts of components), and should only change in response to this value, excepting natural change. Fluctuations of individual assemblage component species alone should not necessarily change the target. Assemblage abundance is linked to the demographic rates of assemblage components, including survival (dependent on	Original target is from Abberton Reservoir SPA citation. The most recent data about this feature on this SPA has been derived from BTO WeBS data.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			factors such as body condition which influences the ability to breed or make foraging and / or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured / estimated (particularly for the main or named components) to inform judgements of likely changes to the assemblage and associated impacts on abundance targets. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available. NB. Many SPA citations omitted gulls and terns from their assemblage totals. Assessments of abundance should be consistent with the waterbirds included in citation calculations (often limited to waders and wildfowl).	
Assemblage of species	**Diversity of species**	**Maintain** the species diversity of the bird assemblage.	This will ensure the bird assemblage reflects the diversity of species the SPA supports. Assemblage diversity is a product of species richness (the number of different species present), abundance (population size of each assemblage component species) and relative 'importance' (an assessment of the conservation status of each assemblage component, described below). Each component makes a different contribution to the diversity of the assemblage, and changes to some components may be considered to affect diversity more than others. Negative changes to small numbers of relatively important assemblage components may have a similar overall effect to negative changes in larger numbers of less important components. To meet the target, the populations of each of the 'main component' assemblage species to be maintained or restored are i) those present in nationally important numbers (≥1% GB population); ii) migratory species present in internationally important numbers (≥1% biogeographic population); iii) those species comprising ≥2,000 individuals (≥10% of the minimum qualifying threshold for an internationally-important	BTO WeBS data used to determine maintain component species.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			assemblage); and iv) 'named components' otherwise listed on the SPA citation. In addition to the main components, other components should be considered as these contribute collectively to the assemblage diversity, in particular proportionally abundant populations of species of conservation importance. Examples are those 'red-listed' as Birds of Conservation Concern and/or those listed on Sections 41/42 of the Natural Environment and Rural Communities Act 2006. The species composition of an assemblage may change over time. However, to meet this target, the total number of all native waterbird species contributing to the assemblage species richness should not decline significantly.	
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting non-breeding habitat**	**Maintain** the extent and distribution of habitats which support the assemblage feature during all necessary stages (moulting, roosting, loafing, and feeding) of the non-breeding period. Standing open water: Between 185 ha and 670 ha Wet grassland and fen, marsh and swamp: 6 ha Grassland: 72 ha Arable land: 76 ha within SPA boundary at 2008 (although the assemblage species are more dependent on the larger areas of arable surrounding the site rather than that within it).	Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection. This target will apply to any supporting habitat which is known to occur outside the site boundary. The principal habitats known or likely to support the assemblage feature at this SPA are: **Standing open water** **Improved grassland** **Wet grassland and fen, marsh and swamp** **Arable land** outside the SPA boundary) The surface area of the reservoir sections are as follows: western section is 16 ha, central section is 49 ha and raised eastern reservoir was designed to have a maximum of 604 ha (Personal communication with Essex and Suffolk Water, 2018). The range in the standing open water extent reflects changing water levels due to the draw down and re-filling process undertaken at the site. The grassland and arable targets were calculated from habitat	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			mapping undertaken in 2008. The target was the area within the SPA extent before the raising of water levels.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**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).	The structure and function of habitats which support this SPA feature may be sensitive to changes in air quality. Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats. Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy 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. 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. 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 SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting habitat (both within and outside the SPA): function/ supporting process	**Conservation measures**	**Maintain** management or other measures (whether within and/or outside the site boundary as appropriate) necessary to **Maintain** the structure, function and/or the supporting processes associated with the feature and its supporting habitats.	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site 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.	ENGLISH NATURE (2004) Views about Management: Abberton Reservoir SSSI Natural England (2104) Abberton Reservoir SPA Site Improvement Plan:

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water quality/ quantity**	Where the supporting habitats of the SPA feature are dependent on surface water ensure water quality and quantity is **maintained** to a standard which provides the necessary conditions to support the feature.	For many SPA features which are dependent on wetland habitats supported by surface 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, feeding and roosting habitats. 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 SPA Conservation Objectives but in some cases more stringent standards may be needed to support the SPA feature. Further site-specific investigations may be required to establish appropriate standards for the SPA.	
Supporting habitat (both within and outside the SPA): minimising disturbance	**Minimising disturbance caused by human activity**	**Restrict** the frequency, duration and/or intensity of disturbance affecting moulting, loafing, feeding and/or roosting birds so that the assemblage feature is not significantly disturbed	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level which may significantly affect their behaviour, and consequently impact on the long-term viability of their population. Such disturbing effects can for example result in changes to feeding or roosting behaviour, increased energy expenditure due to more frequent flights, and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). Anthropogenic disturbance of birds may in effect reduce the availability to the birds of suitable habitat through temporary or long-lasting displacement of birds from affected areas and may result in their redistribution within the site or displacement from it. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling and sight of people, animals and structures.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): structure/function	**Quality of supporting non-breeding habitat**	**Maintain** the structure, function and availability of the following habitats which support the main component species of the assemblage feature for all stages (moulting, roosting, loafing, feeding) of the non-breeding period; Standing open water Wet grassland and fen, marsh and swamp Improved Grassland Arable land	The site's ability to support and sustain an assemblage comprising a very large number of birds (in excess of 20,000) made up of a diverse mix of species will be reliant on the overall quality and diversity of the habitats that support them. The feeding and roosting habitats which support the assemblage will occur within, and in some cases outside, the site boundary. This target is applicable to both circumstances. Due to the large number of species and natural fluctuations in the overall composition of an assemblage, it is not practical to provide specific targets relating to each supporting habitat relevant to the assemblage. Generally speaking, the specific attributes of each supporting habitat may include vegetation characteristics and structure, water depth, food availability, connectivity between nesting, roosting and feeding areas both within and outside the SPA. Further advice will be provided by Natural England on a case by case basis. The main component-species of the assemblage at this SPA include: **Wigeon; Gadwall; Mute swan; Shoveler; Teal; Pochard; Tufted duck; Goldeneye; Coot; Pintail; Great crested grebe; Smew; Cormorant; Lapwing; Golden plover; Ruff**	See page 8 for the qualifying criteria for the current main component species.
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

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