European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features

Lee Valley Special Protection Area (SPA)
Site code: UK9012111

Photo of Amwell Quarry by Flying Fern - Herts & Middlesex Wildlife Trust

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About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Lee Valley SPA. This advice should therefore be read together with the SPA 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 ('SACO') 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	Lee Valley Special Protection Area (SPA)
Location	Essex, Hertfordshire, London Borough of Haringey and London Borough of Waltham Forest
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Classification Date	22 September 2000
Qualifying Features	See section below
Designation Area	447.87 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)	Amwell Quarry SSSI , Rye Meads SSSI, Turnford & Cheshunt Pits SSSI and Walthamstow Reservoirs SSSI
Relationship with other European or International Site designations	The boundary of this SPA overlaps with that of the Lee Valley Ramsar site
Other information	Natura 2000 Standard Data Form for Lee Valley SPA

Site background and geography

The Lee Valley SPA comprises a series of embanked water supply reservoirs, sewage treatment lagoons and former gravel pits that display a range of man-made and semi-natural wetland and valley bottom habitats. The site stretches over a distance of 16 miles northward along the River Lea to the north of London and is with the North Thames Basin National Character Area.

Lee Valley SPA lies roughly parallel and to the east of the A10 between Finsbury Park, London and Ware in Hertfordshire. Walthamstow Reservoirs are situated to the south of the M25 motorway which cuts across the site. The SPA crosses both the East Anglian Plain and London Basin Natural Areas. All of the component SSSIs lie within the Lee Valley Regional Park.

Parts of the SPA are managed as nature reserves by the Herts and Middlesex Wildlife Trust (HMWT) and the RSPB.

All the habitats within the SPA are man-made. Walthamstow Reservoir, constructed in the latter half of the nineteenth century, comprises of ten relatively small and shallow water storage basins. Several of these are fringed by sloping earth banks and together with the presence of wooded islands form distinctive habitat features.

In recent years Thames Water, in partnership with London Borough of Waltham Forest and London Wildlife Trust, have enhanced the Reservoirs for wildlife. In 2017 they were opened to the general public as the Walthamstow Wetlands.

Rye Meads SSSI comprises of wet meadows, disused and operational effluent lagoons and Rye House marsh. These three areas provide a variety of different habitats including open water habitats swamp communities, tall fen communities, marshy grassland and scrub. The meadows are the last substantial remnants of ancient floodplain on the rich alluvial soils of the Lee Valley. The site supports one of the largest areas of tall fen vegetation in the county and provides a valuable habitat for birds and locally uncommon plants.

Amwell Quarry SSSI is a former gravel pit site in the Lee Valley near Ware, which supports nationally important numbers of wintering wildfowl, along with outstanding assemblages of breeding birds and of dragonflies and damselflies. The site includes two large lakes which were excavated between 1973 and 1990, and a variety of associated wetland, grassland and woodland habitats.

The Turnford and Cheshunt Pits SSSI include ten former gravel pits ranging in age from North Metropolitan Pit which is among the oldest pits in the Lee Valley to Hooks Marsh Lake which was not excavated until the 1970s, and cover a span of over 40 years. Because of the profusion of pits and islands, several of the pits have extensive shorelines; North Metropolitan Pit alone having an estimated shoreline of about 7.2km.

Also included in the site are all the associated areas of marsh, grassland, ruderal herbs, scrub and woodland; part of the Small River Lee; and a further water body, Hall Marsh Scrape, which was constructed specifically for use by waterfowl. The pits are of national importance for wintering gadwall and shoveler.

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 listed in the Wild Birds Directive**

  During the non-breeding season the SPA regularly supports:

  A021 *Botaurus stellaris*; Great bittern

  This site supports nationally important numbers of this Annex 1 species during the winter months and when the SPA was classified in 2000 this represented 6% of the total British wintering population.

  The reed-bed habitat is vital to the species, providing them with feeding areas and locations to hide. The majority of bittern are found in the Turnford and Cheshunt Pits site while Amwell Quarry and Rye Meads also support the species. Walthamstow Reservoirs also occasionally supports bittern.

- **Qualifying individual species not listed in the Wild Birds Directive**

  During the non-breeding season the SPA regularly supports:

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

  The site supports internationally important numbers of gadwall during the wintering period and when the SPA was classified in 2000 this represented 1.5% of the North West European wintering population.

  Gadwall favour gravel pits and reservoirs during the winter period where they feed on seeds, leaves and stems of water plants. Each of the supporting SSSIs support gadwall in numbers which are sufficient to qualify them as being of national importance.

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

  The site supports internationally important numbers of shoveler during the winter period, and when the SPA was classified in 2000 this represented 1.0% of the North West/Central European wintering population.

  Shoveler are found throughout the site and in winter they frequent shallow water areas on marshes, flooded pasture, reservoirs and lakes with plentiful, marginal reeds or emergent vegetation.

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
Gadwall	Non-breeding	Winter													
Great bittern	Non-breeding	Winter													
Shoveler	Non-breeding	Winter													

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: A021. *Botaurus stellaris*; Great bittern (Non-breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting non-breeding habitat**	Restore the extent and distribution of suitable supporting habitat (either within or outside the site boundary) which supports Great bittern for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding). The habitat mosaic within the Lee Valley SPA includes: Standing open water and canals: (345 hectares) Fen, reedbed, marsh and swamp (19.2 hectares)	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. Bittern roost at a number of locations within the Lee Valley and mainly feed within or near reedbeds of large waterbodies. Whilst the habitat target is SPA focused, it should be noted the SPA population of overwintering bittern may also be reliant on supporting habitat which lies outside the SPA boundary but mostly within the Lee Valley Park boundary. For example, the LVRPA managed wetlands of Stanstead Innings are adjacent to the northern boundary of Rye Meads SSSI, and coupled with the non-SSSI, SPA northern wetland areas of the HMWT Rye Meads nature reserve provide additional and complementary reedbed habitat for overwintering bittern. This whole area has been enhanced for bittern and its nature conservation interest since the early 2000's in accordance with a national LIFE bid and is now included in the Lee Valley wide Bittern roost watch with regular winter sightings of bittern (pers comm, RSPB and Rye Meads Ringing Group).	Habitat extent based on estimates made from habitat maps and aerial photographs in 2006 (held by Natural England). WHITE & HARRIS 2010. LEE VALLEY REGIONAL PARK AUTHORITY, 2000; 2016 (see Biodiversity Objectives)
Supporting habitat (both within and outside the SPA): function /supporting process	**Water quality/ quantity**	Where the supporting habitats of Great Bittern 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 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.	NATURAL ENGLAND, 2015.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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 Great Bittern 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. In general, these measures currently include dynamic wetland management (water level control, pool and ditch creation), rotational reedbed cutting and scrub/tree management. There may be a need to provide supplementary food (e.g. rudd), notably in hard weather.	NATURAL ENGLAND, 2015. ENGLISH NATURE, 2005. RSPB, 2016. HMWT, 2014
Supporting habitat (both within and outside the SPA): function/ supporting process	**Air quality**	Maintain 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 www.apis.ac.uk .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Non-breeding population	**Population abundance**	Restore the size of the non-breeding Great Bittern population to a level which is consistently above an average of 6 individuals (5 year peak mean count), [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 contribute 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 abundance 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 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 abundance targets. Unless otherwise stated, the population size will be that measured using standard methods such as peak mean counts. 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. The figures referenced are those WeBS counts submitted to BTO. Survey results suggest the SPA's over-wintering Great Bittern population declined	JNCC, 2000. WHITE & HARRIS 2010.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			between 1999/2000- 2008/09 (White & Harris 2010). The Mean of Peaks of consecutive 5 Year periods during this time is 7 (99/00-04/05) and 4.2 (05/06 – 08/09). The key factor affecting the number of wintering Great Bitterns in the Lee Valley appears to be milder winter weather. The two peak counts of 11 and 7 during the 1999/2000 – 2008/09 period were in the coldest winters of 2002/03 and 2008/09 respectively. Habitat quality is regarded to be a secondary factor, with reedbed quality having improved in a number of Valley sites. Since 2008/09, the Mean of Peaks for the latest 5 Year period 2009/10 – 2014/15 is as low as 2, with count peaks of 4 and 5 during 2011/12 and 2012/13 respectively. This indicates an ongoing decline in the population of over-wintering Great Bittern. It should be noted that the Lee Valley remains a good place to see bittern and additional sightings and records (obtained as part of the Lee Valley Bittern Roost Watch counts and site survey activities) suggest there are more Great Bitterns over-wintering than the WeBS figures indicate. However, the apparent declining population is regarded as a concern requiring targeted restoration.	
Supporting habitat (both within and outside the SPA): structure	**Vegetation characteristics**	Maintain the cover of scrub-free areas of reed-bed with common reed *Phragmites australis* at or above 90% cover and with a diverse age structure (typically at least 30% of the reedbed should be uncut with the remainder <7 years old with <20% cut in any year).	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful feeding/concealment and 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. Rotational reedbed management is undertaken in accordance with site management plans.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014 LEE VALLEY REGIONAL PARK AUTHORITY, 2000; 2016.(see Biodiversity Objectives)
Supporting habitat (both within and outside	**Minimising disturbance caused by human activity**	Restrict the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding	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.	NATURAL ENGLAND 2015 RSPB 2016

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
the SPA): minimising disturbance		and/or loafing birds so that the Great Bittern feature is not significantly disturbed	Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful 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, the presence of people, animals and structures. Great Bitterns spend a significant amount of time in and amongst reedbed areas with low human disturbance. The favoured reedbeds within the key Lee Valley sites are generally areas not subject to recreational disturbance, although distance from bankside will be a factor that may affect the behaviour of individual birds.	HMWT 2014 LEE VALLEY REGIONAL PARK AUTHORITY. (2000), (2016),
Supporting habitat (both within and outside the SPA): structure	**Landform**	Maintain the extent of wet ditches and/or pools with suitable profiles (typically, with a deep central channel of 1.5-2.5 m deep and one or more 1 m deep with 5 m wide shallow margins).	The physical topography and landform of a site will strongly influence the quality and extent of supporting habitats used by this feature for nesting/rearing, feeding and/or roosting as appropriate. This will also influence the interactions with underlying supporting processes on which the supporting habitat may rely. Any changes or modifications to site topography may adversely affect the ability of the supporting habitats to support and sustain this feature. Rotational management within reedbed and adjacent wetland areas is undertaken in accordance with site management plans.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	**Connectivity with supporting habitats**	Maintain the safe passage of Bitterns moving between roosting and feeding areas	The ability of the feature to safely and successfully move to and from feeding and roosting areas is critical to their adult fitness and survival. This objective will apply both within the site boundary and where birds regularly move to and from off-site habitat where this is relevant. Bitterns clearly move between sites within the Lee Valley and to do this they will need to move safely to and from supporting habitat between individual waterbodies and above/across land outside the SPA. The key SSSI areas within the Valley are Turnford & Cheshunt Pits, Amwell Quarry and Rye Meads. WeBS counts indicate that single birds generally visit Walthamstow Reservoirs once in every five years and this southernmost site probably serves as a harsh winter refuge. The three SSSIs north of the M25 arguably provide adequately connected suitable habitat capable of supporting a favourable SPA population however this is regarded as a baseline requirement for this SPA feature because there are significant barriers to movement between these three SSSI's and the Walthamstow Reservoirs SSSI south of the M25. For example, Bitterns are known to collide with overhead power lines (RSPB Rye Meads record March 2016). , Whilst this situation within the Lee Valley existed at SPA classification it should be recognised that the small populations recorded for and since classification are significant and vulnerable so suitable opportunities to reduce barriers between available sites should be considered and implemented where possible. This is recognised in the landscape section below.	WHITE & HARRIS, 2010.
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water area**	Maintain the number of open waterbodies of optimal size (>0.5 ha), and the percentage cover of pools overall, with shallow water extending at least 30 m landward into surrounding dense vegetation.	This feature depends on the presence and continuity of open water habitat; often requiring water bodies of a particular size to in order to successfully nest, rear their young, feed and/or roost. Changes in water area, and associated marginal habitat, can adversely affect the suitability of supporting open water habitat.	NATURAL ENGLAND, 2015 RSPB 2016 HMWT 2014
Supporting habitat (both within and outside the SPA): structure	**Landscape**	Restore an open and unobstructed terrain which provides safe passage for Bitterns moving between roosting and feeding areas across	This feature is known to favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within nesting, feeding or 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	WHITE & HARRIS, 2010.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		the site.	SPA and any off-site supporting habitat. Bitterns clearly move between sites within the Lee Valley and to do this they need to move safely to and from supporting habitat between individual waterbodies and above/across land outside the SPA. The key SSSI areas within the Valley are Turnford & Cheshunt Pits, Amwell Quarry and Rye Meads. WeBS counts indicate that single birds generally visit Walthamstow Reservoirs once in every five years and is probably serving as a harsh winter refuge. At a landscape level across the whole SPA site, there are significant barriers to movement between the three SSSI's north of the M25 and the Walthamstow Reservoirs south of the M25. For example, Bitterns have been known to collide with overhead power lines (RSPB Rye Meads record March 2016). Whilst this situation within the Lee Valley existed at SPA classification it should be recognised that the small population is significant and vulnerable so suitable opportunities to reduce barriers between available sites should be considered and implemented where possible.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water depth**	Maintain the overall depth of swamp and marginal water which is typically between 30-100cms, and/or within pools and dykes at typically 200-400cms 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 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.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Restore the distribution, abundance and availability of key prey items (e.g. eel, rudd, roach, frogs, toads) at preferred prey sizes (e.g. roach of 6-35 cm).	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. Bitterns are known to favour fish, amphibians and invertebrates.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014
Version Control Advice last updated: Not applicable				
Variations from national feature-framework of integrity-guidance: The attribute for 'Salinity' has not been applied to the Supplementary Advice for Great Bittern within the Lee Valley SPA because the site is entirely freshwater.				

Table 2: Supplementary Advice for Qualifying Features: A051. *Anas strepera* Gadwall (Non-breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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 suitable habitat (either within or outside the site boundary) which supports Gadwall for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding): Standing open water: 345 hectares	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. Gadwalls overwinter at a number of waterbodies within the Lee Valley. Whilst the habitat target is SPA focused, it should be noted the population of overwintering gadwall may be reliant on supporting habitat which lies outside the SPA boundary but mostly within the Lee Valley Park boundary (eg King George V Reservoir and Holyfield Lake).	NATURAL ENGLAND, 2006. Habitat extent estimated from habitat maps and aerial photographs.
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 Gadwall.	See the notes for these attributes in Table 1 above.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014
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 non-breeding Gadwall and its supporting habitats.		
Supporting habitat (both within and outside the SPA): function/sup porting	**Air quality**	Maintain 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).		More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
process				Air Pollution Information System (www.apis.ac.uk).
Non-breeding population	**Population abundance**	Maintain the size of the non-breeding Gadwall population at a level which is above an average of 456 individuals (5 year peak mean), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	See the notes for these attributes in Table 1 above. The population of Gadwall within the SPA has shown an increase since Classification. The bulk of the population is centred on the gravel pits, although Rye Meads does support significant numbers and birds may visit the deeper reservoirs of the Lee Valley in severe weather conditions (White & Harris 2010). There is some evidence during the 1999/00 – 2008/09 period that indicate gadwall numbers spread away from the more established sites of the Lee Valley. Of these, the SPA sites Rye Meads, Walthamstow Reservoirs and the non-SPA King George V Reservoir showed an increasing trend, while other notable sites, such as Amwell Quarry and Turnford & Cheshunt Pits were stable or slightly declining. Availability of food is regarded as a key factor affecting distribution. For example, changes in the abundance of aquatic weed in one of the older gravel pits, (Holyfield Lake) has been attributed to the number of birds present (White & Harris 2010). Regardless, the proportion of birds within the SPA sites has remained steady between 60% and 80% of the total Lee Valley population, with an average between 1999/00 – 2008/09 of 73%	JNCC, 2000. WHITE & HARRIS, 2010.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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 roosting, foraging, feeding, or loafing birds so that the Gadwall feature is not significantly disturbed	See notes for this attribute in table 1 above. Gadwalls habitually gather in numbers in the larger waterbodies in locations that are a reasonable distance from the bankside to feed on submerged aquatic weeds. The key concentrations within the SPA are within the Amwell Quarry and Rye Meads nature reserves and the gravel pits of Turnford & Cheshunt Pits (part of the LVRPA River Lee Country Park). Whilst there are measures in place to manage and minimise recreational disturbance within these sites these should be subject to review in accordance with Management Plan processes. Additional supporting habitat may be provided by the SPA Walthamstow Reservoirs and functionally linked non-SPA sites within the Lee Valley Park, such as the gravel pits Netherhall, Holyfield, Stanstead Abbots and King George V reservoir. The banksides and waterbodies of most of these sites are subject to higher levels of recreational pressure which may impact on gadwall habitat and population without targeted management.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014 LEE VALLEY REGIONAL PARK AUTHORITY, 2000; 2016.(see Biodiversity Objectives)
Supporting habitat (both within and outside the SPA): function/supporting process	**Water depth**	Maintain the availability of standing water of optimal depth, typically <0.25 m deep, over at least 50% of the total standing water area.	Gadwall 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.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014
Supporting habitat (both within and outside the SPA): function/supporting process	**Food availability within supporting habitat**	Maintain a high cover/abundance of preferred food plants (e.g. sweet-grass *Glyceria fluitans,* creeping bent *Agrostis stolonifera,* stoneworts *Chara,* pondweeds *Potomageton, Ceratophyllum* spp., *Ruppia*).	The availability of an abundant food supply is critically important for successful 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. Gadwalls gather in numbers where there is abundant food in the form of submerged aquatic weeds. In the Lee Valley, the extensive rafts of Nuttall's Pondweed *Elodea nuttallii* are a favoured food source. They tend to disperse from a site when the food resource is depleted, or may be forced out by hard weather.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014 LEE VALLEY REGIONAL PARK AUTHORITY, 2000; 2016.(see Biodiversity

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Availability of food is regarded as a key factor affecting distribution. For example, changes in the abundance of aquatic weed in Holyfield (one of the older Lee Valley gravel pits) has been linked to the number of birds present (White & Harris 2010).	Objectives) WHITE & HARRIS, 2010.
Version Control Advice last updated: n/a				
Variations from national feature-framework of integrity-guidance: none				

Table 3: Supplementary Advice for Qualifying Features: A056. *Anas clypeata*; Northern shoveler (Non-breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting non-breeding habitat**	Restore the extent and distribution of suitable habitat (either within or outside the site boundary) which supports Northern Shoveler for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding): Standing open water: 345 hectares	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 may apply to supporting habitat which also lies outside the site boundary. The key sites for Northern Shoveler in the Lee Valley SPA are the component SSSI's, namely: Walthamstow Reservoirs, Turnford & Cheshunt Pits, Rye Meads and Amwell Quarry. Whilst the habitat target is SPA focused, it should be noted the population of overwintering Northern Shoveler may occasionally be reliant on supporting habitat which lies outside the SPA boundary but mostly within the Lee Valley Park boundary (eg King George V Reservoir, William Girling Reservoirs and Ponders End Lake).	Estimated from aerial photographs and habitat mapping in 2006.
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 Northern Shoveler	See notes for this attribute in table 1 above.	NATURAL ENGLAND 2015
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 Shoveler and its supporting habitats.	See notes for this attribute in table 1 above. The Shoveler is a surface feeding duck, using its large spatulate bill to feed on zooplankton in the shallow margins of waterbodies. In the Lee Valley, this species may be highly mobile as food resources are depleted and will often utilise different roosting and feeding sites, accounting for levels of levels of disturbance (White & Harris 2010). With the cessation of gravel winning in the valley, there has been a loss of the associated early-successional habitats, notably the shallow deltas of silt and sands produced from the gravel washing process. However, the major habitat change has been the rapid and continuing growth of tree cover around the gravel pit lakes. Shoveler is a key species most likely to be	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			affected by the loss of early successional habitats. Targeted rotational management including scrub / tree clearance and provision of shallow margins is necessary throughout the Valley to ensure adequate habitat is available. This should specifically include SPA sites, (notably Turnford & Cheshunt Pits, Amwell Quarry) and functionally linked Lee Valley Park sites. Furthermore, this should be coupled with adequate measures to manage recreational activities on banksides and open water to ensure an adequate extent of suitable feeding and roosting areas.	
Supporting habitat (both within and outside the SPA): function/supporting process	**Air quality**	Maintain concentrations and deposition of air pollutants 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 Air Quality attribute in Table 1	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).
Non-breeding population	**Population abundance**	Restore the size of the non-breeding Shoveler population to a level which is above an average of 406 individuals (5 year peak mean), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	See notes for this attribute in table 1 above. The key sites in the Lee Valley are the component SSSIs, namely: Walthamstow Reservoirs, Turnford & Cheshunt Pits, Rye Meads and Amwell Quarry. The population of Northern Shoveler within Lee Valley SPA has shown a slight decrease since Classification. The key SPA sites at Amwell and Turnford & Cheshunt Pits experienced a population decline during the 1999/00 – 2008/09 period, along with the functionally linked non- SPA Holyfield gravel pits. The SPA Walthamstow reservoirs and non-SPA Chingford reservoirs show population trends that appear to be related to water levels and available food resource. For example, after draining at King George V (Chingford reservoirs) the low water levels may initially benefit Northern Shoveler by providing an abundant food resource until depleted. Once levels are raised the habitats will take time to replenish the available food (White & Harris 2010).	JNCC, 2000 WHITE & HARRIS 2010

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The reason for the decline within key SPA and functionally linked sites may involve the availability of suitable feeding areas, the loss of which may be the result, in part, of the maturing habitats in the Lee Valley. The increased population counts at Amwell Quarry since active management intervention after 2010 broadly support this theory. Overall, the proportion of Northern Shoveler within the SPA sites has remained steady between 70% and 90% of the total Valley population, with an average between 1999/2000 – 2008/09 of 83%.	
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 roosting, foraging, feeding, or loafing birds so that the Shoveler feature is not significantly disturbed	See notes for this attribute in table 1 above. Northern Shoveler frequently feed in shallower waters and muddy margins which may bring them into closer proximity to bankside activity. Evidence indicates that Northern Shoveler frequently have differing roosting and feeding sites In urban-fringe locations. Birds tending to move to feed in shallow productive wetlands at night or when undisturbed. Their preference for shallower waters, also means wintering Northern Shoveler are often forced to move on during freezing conditions in search of food. This suggests they are less able to tolerate severe weather and more vulnerable to disturbance by bankside and open water activities. The SPA sites Rye Meads and Amwell Quarry can provide refuge during periods of severe weather and/or high disturbance in the Valley. Other key SPA sites include Walthamstow Reservoirs and Turnford & Cheshunt Pits (part of the LVRPA River Lee Country Park). Whilst measures are in place to manage and minimise recreational disturbance within these sites, the increased sensitivity of Shoveler to bankside activities requires measures to be implemented and regularly reviewed in accordance with Management Plan processes. Additional supporting habitat may be provided by the functionally linked non-SPA sites within the Lee Valley Park, such as Holyfield gravel pit and the King George V Reservoir. The banksides and open water of the latter may be subject to higher levels of recreational pressure which may impact on Shoveler habitat and population without targeted management.	WHITE & HARRIS 2010 WHITE, 1993.

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 depth**	Maintain the availability of standing water at optimal depth, typically <0.3 m deep, over at least 50% of the total standing water area.	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 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.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014
Supporting habitat (both within and outside the SPA): function/ supporting process	**Connectivity with supporting habitats**	Maintain the safe passage of Shoveler moving between roosting and feeding areas	The ability of Northern Shoveler to safely and successfully move to and from feeding and roosting areas is critical to their 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. Evidence indicates that Northern Shoveler may utilise several sites in order to meet all its requirements and may adapt to changing circumstances, notably disturbance, freezing conditions and low water levels. Shoveler frequently have differing roosting and feeding sites In urban-fringe location, tending to move to feed in shallow productive wetlands at night or when undisturbed. Their preference for shallower waters, also means wintering Shoveler are often forced to move on during freezing conditions in search of food.	WHITE, 1993; WHITE & HARRIS, 2010.
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Restore high cover/abundance of preferred food plants (e.g. *Scirpus, Eleocharis, Carex, Potamogeton, Glyceria,* surface plankton). Restore the distribution, abundance and availability of key prey items (e.g. *Hydrobia*, crustaceans, caddisflies, *Diptera*, beetles) 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. These food plants are linked with early successional stages of waterbodies. With reference to the notes in the Conservation Measures section above, it is recognised that targeted rotational management is necessary throughout the Lee Valley and specifically within the SPA sites, (notably Turnford & Cheshunt Pits, Amwell Quarry) and functionally linked Lee Valley Park sites.	NATURAL ENGLAND 2015 RSPB 2016 HMWT 2014 WHITE & HARRIS, 2010.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: None				

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