Ford energy from waste

FORD ENERGY RECOVERY FACILITY AND WASTE SORTING AND TRANSFER FACILITY, FORD CIRCULAR TECHNOLOGY PARK

SHADOW HABITAT REGULATIONS ASSESSMENT

JUNE 2020

TERENCE O'ROURKE

Viridor

GRUNDON

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1.0 Introduction

1.1 This report has been prepared in support of a planning application for the proposed Ford energy recovery facility (ERF) and waste sorting and transfer facility (WSTF).

1.2 The stack location lies within 10km of one statutory designated terrestrial site of European importance: Duncton to Bignor Escarpment Area of Conservation (SAC). Natural England has also requested that consideration be given to the potential for habitats that act as functionally linked land to the Arun Valley Special Protection Area (SPA) could be affected by the proposals. The location of the site relative to these sites is shown in figure 1.

1.3 These sites receive statutory protection under the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019 (the 'Habitats Regulations'), which transpose the requirements of the European Council Directives on the Conservation of Natural Habitats and of Wild Fauna and Flora (42/43/EEC) and the Conservation of Wild Birds (2009/147/EC) into domestic legislation. The Habitats Regulations afford a high level of protection to sites supporting habitats or rare species (other than birds) considered scarce or vulnerable at a European community level (SACs) and areas that hold significant populations of certain bird species (SPAs).

1.4 Under the Habitats Regulations, West Sussex County Council (WSCC) is a competent authority, responsible for ensuring that development management decisions do not adversely affect the integrity of European sites. This document provides information for the Habitats Regulations Screening Assessment that WSCC will need to undertake in determining the planning application for site. This document screens the proposed development for likely significant effects on the European site both alone, and in combination with other plans and projects.

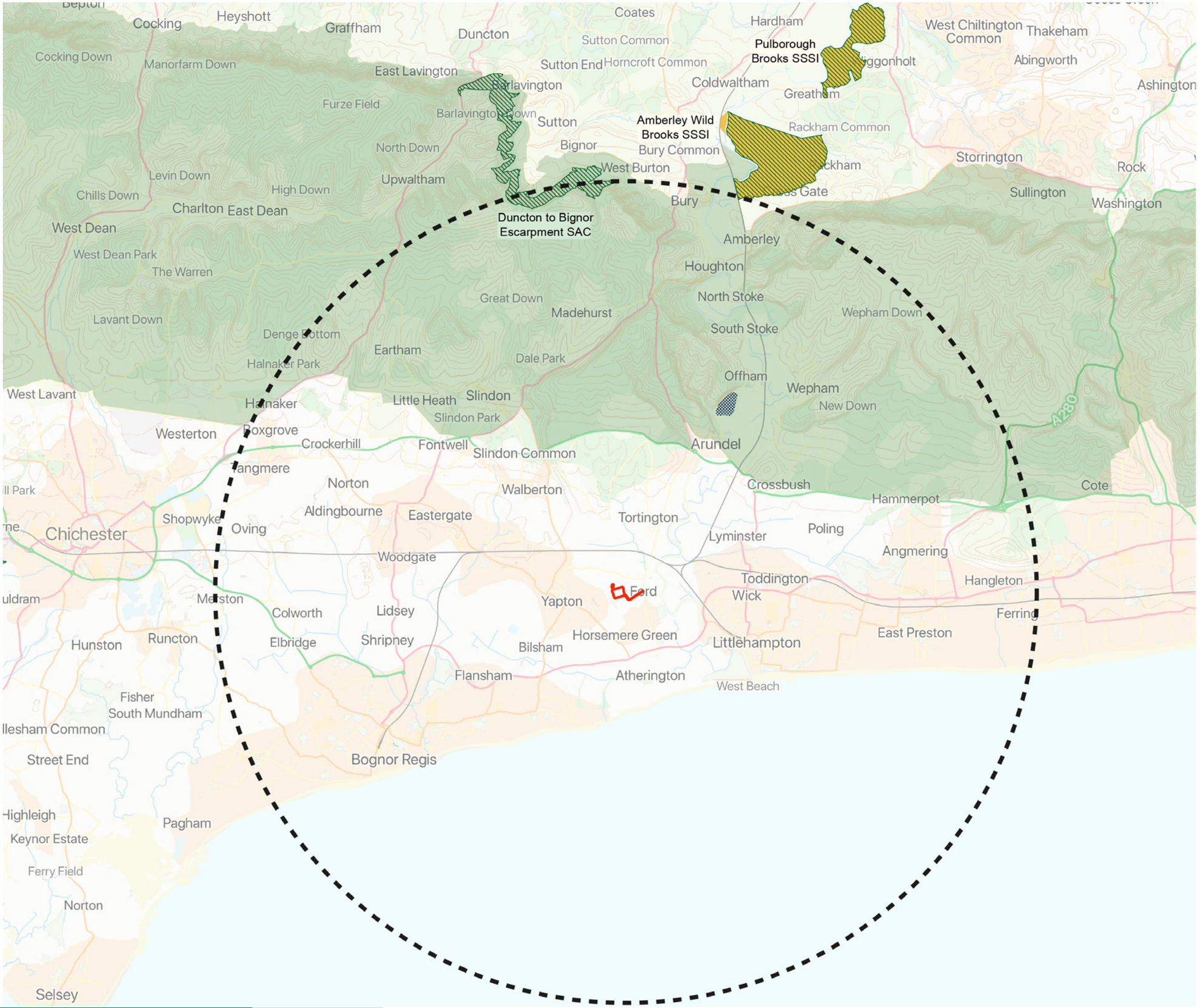


Figure 1 Location of protected sites referred to in the report

2.0 Legislative context and tests of the Habitat Regulations

2.1 SACs and SPAs form part of a network of nature protection areas across the European Union known as Natura 2000 sites, and are protected in the determination of a planning application. Under Regulation 63 of the Habitats Regulations the competent authority is responsible for assessing whether land use plans or proposed developments could adversely affect a Natura 2000 site. This requires a process known as a Habitat Regulations Assessment (HRA) encompassing two tests required under Regulation 63(1) of the Habitats Regulations.

2.2 Test 1: having ascertained that the plan is not directly connected to, or necessary for site management for nature conservation, the first test of the HRA, commonly referred to as a screening test, considers whether or not a plan or project is likely to have a significant effect on a European site either alone or in combination with other plans or projects. A significant effect is any effect that would undermine the conservation objectives for the respective European site and may include physical loss and/or damage of a habitat, disturbance effects, and changes to water availability, deposition of contaminants through changes in air quality etc.

2.3 Test 2: The second test of the HRA is relevant to those plans or projects that are screened as likely to have a significant effect alone or in combination with other plans or projects, and requires an appropriate assessment. The role of the appropriate assessment is to consider the implications of the plan or project for the conservation objectives of the European sites in question, and determine whether they will have an adverse effect on the integrity of the site. In carrying out an appropriate assessment, a local authority must have regard to the manner in which the project is proposed to be carried out, or to any conditions or restrictions subject to which it proposes that the consent, permission or other authorisation should be given.

2.4 A recent European Court Judgment (ECJ) People Over Wind and Sweetman v Coillte Teoranta (C-323/17) has altered the process of screening for likely significant effects by overturning the 2008 Hart District Council vs. Secretary of State judgment (2008), known as Dilley Lane. This Dilley Lane judgment stated "*there is no legal requirement that a screening assessment…. must be carried out in the absence of any mitigation measures that form part of that plan or project*."

2.5 The recent People Over Wind and Sweetman ruling states that "*it is not appropriate, at the screening stage, to take account of measures intended to avoid or reduce the harmful effects of the plan or project on that site"*. This means that mitigation measures must be excluded from assessing whether a project is likely to have a significant effect, either alone or in combination with other plans and projects.

2.6 A likely significant effect is any effect that is likely to undermine the site's conservation objectives, in light of the characteristics and specific environmental conditions of the SAC or SPA.

Conservation objectives

2.7 Conservation objectives are identified for all European sites and cover all features that qualify the site for classification or designation. The conservation objectives

apply under the Habitats Regulations, Habitats Directive and Wild Birds Directive, and must be considered during a Habitats Regulation Assessment, including an Appropriate Assessment.

3.0 Description of development

3.1 The proposed Ford ERF and WSTF encompass the following elements:

- A single stream ERF – located on the eastern half of the application site and with a design capacity to treat 275,000 tonnes per annum (tpa) of non-hazardous, non-recyclable, residual waste material. A mixture of commercial and industrial (C&I) waste and municipal solid waste (MSW) will be the main sources of waste for the facility and this will be sourced principally from within the West Sussex county area, but also from the neighbouring counties of East Sussex, Hampshire and Surrey. Towards the centre of the building will be the steam turbine generator. This is designed to utilise high pressure steam from water heated by the combustion processes and generate approximately 31 MW of electrical power, of which approximately 28 MW will be exported to the local electrical distribution network (equivalent of powering approximately 68,250 homes over the lifetime of the plant) and the remainder will be used within the ERF. The proposals will also be able to export up to 10 MWth of heat in the form of steam or hot water in the future, should off-site recipients be identified. The ERF building will also include education, administrative and welfare facilities.
- A WSTF – located on the western half of the application site and with a capacity to process up to 20,000 tpa non-hazardous waste. The WSTF will take MSW and C&I wastes collected from local householders, businesses and industries principally from within the West Sussex county area, but also from the neighbouring counties of East Sussex, Hampshire and Surrey.
- Buildings and structures ancillary to the ERF and WSTF – these include: a gatehouse, five weighbridges, vehicle workshop, air cooled condensers, electricity transformer, pump houses, storage tanks (diesel, fire water), staff and visitor parking and internal roads.
- Landscape planting – principally along the north, east and western boundaries of the site in order to screen the lower part of the buildings and the activity on the site at ground level.
- Drainage – a proposed surface water network for the developed site and a proposed foul water network discharging domestic foul and trade effluent into a local sewer.

3.2 No modifications or specific measures have been included in the design of the plant to reduce impacts on the European sites. As highlighted in the air quality chapter and technical reports (ES Technical Appendix C) prepared by Fichtner Consulting Engineers Ltd no additional mitigation measures have been embedded in the design beyond those required by legislation, regulated by the Environment Agency, under the Environmental Permit.

4.0 Description of the SAC

4.1 The following section sets out the location, designation criteria and conservation objectives of the Duncton to Bignor Escarpment Area of Conservation (SAC), the sole terrestrial site included in this HRA screening. The location of this site relative to the application site is shown in figure 1. Consideration of the potential for land within or close to the site to act as functionally linked land to the Arun Valley SPA is detailed in section 6.

4.2 The SAC is selected for the presence of the Annex 1 habitat: *Asperulo – Fagetum* beech forest. It occurs on steep scarp slopes and on more gently sloping hillsides in mosaic with ash woodland, scrub and grassland. Much of the woodland is beech high forest but with some old pollards. Rare species present include white helleborine, yellow bird's nest and green hellebore. The woods also have a rich mollusc fauna. The site covers 211.84ha. A copy of the SAC citation is included in Appendix 1.

4.3 The conservation objectives for the SAC have been prepared by Natural England. With regard to the site and the natural habitats for which the site has been designated (the 'qualifying features' listed below), and subject to natural change; the conservation objectives aim to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring**:**

- The extent and distribution of qualifying natural habitats
- The structure and function (including typical species) of qualifying natural habitats
- The supporting processes on which qualifying natural habitats rely

4.4 The supplementary advice on conserving and restoring site features, which accompanies the conservation objectives, sets an objective for air quality of: maintaining, as necessary, the concentrations and deposition of air pollutants to at, or below, the site-relevant critical loads or levels given on the Air Pollution Information System (APIS) website.

5.0 Air quality modelling results and evaluation

5.1 Fichtner were appointed to undertake an assessment of the impacts on air quality during the construction and operational phases of the proposed scheme. Full details of this assessment process are detailed in ES Technical Appendix C. This section presents a brief summary of the assessment work where relevant to the European sites. Further technical information can be found in Technical Appendix C.

5.2 Dust was screened out as a potential impact on the European site in line with the methodology outlined within the 2014 Institute of Air Quality Management (IAQM) guidance document *Guidance on the assessment of dust from demolition and construction*. The intention of the IAQM guidance is that 500 m is the distance from the area of muddy ground where dust could be deposited by vehicles leaving the site and re-suspended by vehicles using the road network.

5.3 The SAC is over 9km from the site boundary and the route used by construction vehicles on the public highway, up to 500 m from the site entrance. The effect of dust from trackout on the European site can be screened out.

5.4 As the European site considered in this assessment is well beyond 50m from the boundary of the application site no detailed assessment of impacts related to dust is required in line with the IAQM guidance (see ES Technical Appendix C).

5.5 The assessment of process emissions from the proposed ERF undertaken by Fichtner covered a range of pollutants that are known to have impacts on ecosystems above certain levels. The list of pollutant assessments and the critical levels used for the assessment are set out in table 1.

Pollutant	Concentration (µg/m^3)	Measured as
Nitrogen oxides (as nitrogen dioxide)	75	Daily mean
	30	Annual mean
Sulphur dioxide	10	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity
	20	Annual mean for all higher plants
Hydrogen fluoride	5	Daily mean
	0.5	Weekly mean
Ammonia	1	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity
	3	Annual mean for all higher plants

Table 1: Pollutants and relevant critical levels used for the ecological assessment

5.6 The Environment Agency's Operational Instruction documents explain how to assess atmospheric emissions from new or expanding Integrated Pollution Prevention and Control (IPPC) regulated industry applications, issued under the Environmental Permitting Regulations at ecologically sensitive sites. The process to follow to satisfy the requirements of the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019 is outlined.

5.7 Operational Instruction 67_12 Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation sets out the screening criteria for ecological receptors, see table 2.

Threshold	European site
Y (% threshold long-term)	1%
Y (% threshold short-term*)	10%
Z (% threshold)	70%
*Short-term considers both daily and weekly	

Table 2: Screening criteria for ecological receptors

5.8 Where:

- Y is the long term process contribution (PC) calculated as a percentage of the relevant critical level or load; and
- Z is the long term predicted environmental concentration (PEC) calculated as a percentage of the relevant critical level or load

5.9 Critical levels and critical loads are the ambient concentrations and deposition fluxes below which significant harmful effects to sensitive ecosystems are unlikely to occur. Critical levels of air pollution and critical loads of pollutants have been identified by the United Nations Economic Commission for Europe (UNECE).

5.10 Critical loads are defined as: " *a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*".

5.11 Critical levels are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge*".

5.12 It is important to distinguish between a critical load and a critical level. The critical load relates to the quantity of pollutant deposited from air to the ground, whereas the critical level is the gaseous concentration of a pollutant in the air.

5.13 Operational Instruction 67-12 states that if the PC is less than 1% critical level and load then emissions from the application are not significant, and if the PEC is less than 70% critical level and load it can be concluded 'no likely significant effect' (alone and in-combination).

5.14 AQTAG 17 - Guidance on in combination assessments for aerial emissions from EPR permits states that "*Where the maximum process contribution (PC) at the European site(s) is less than the Stage 2 de-minimis threshold of the relevant critical level or load [i.e. the criteria detailed in Table 2], the PC is considered to be inconsequential and there is no potential for an alone or in-combination effects with other plans and projects.*"

Critical levels

5.15 The air quality modelling undertaken by Fichtner shows that the annual mean NOx PC is 0.02 µg/m^3, 0.06% of the critical level for Duncton to Bignor Escarpment SAC. The NOx daily (24 hour) PC is 0.36 µg/m^3, 0.48% of the critical level for the SAC. The annual mean PC combined with the baseline will be below the annual

mean critical level of 30 µg/m^3 for the protection of vegetation and ecosystems with the development in operation. The NOx daily (24 hour) PC at the same point is also below the daily mean critical level of 75 µg/m^3 for the protection of vegetation and ecosystems **(see** ES Technical Appendix C, parts 1 - 3).

5.16 As the mean annual and daily PC is below 1% and 10% of the relevant critical levels for NOx no adverse impacts on vegetation and ecosystems within the Duncton to Bignor Escarpment SAC are predicted as a result of the development.

5.17 The air quality modelling undertaken by Fichtner shows that the annual mean sulphur dioxide (SO_2) PC is 0.01 µg/m^3, 0.02% of the critical level for the SAC. The annual mean ammonia (NH_3) PC is 0.01 µg/m^3, 0.05% of the critical level for the SAC. The weekly and daily mean for hydrogen floride is 0.11% and 0.06% of the relevant critical level for the SAC. The annual mean PC for SO_2 combined with the baseline level is below the annual mean critical level of 10 µg/m^3 for the protection of lichens and bryophytes with the development in operation. The annual mean PC for NH_3 combined with the baseline level is below the annual mean critical level of 1 µg/m^3 for the protection of lichens and bryophytes with the development in operation.

5.18 As the mean annual PC is below 1% of the relevant critical levels for hydrogen floride, sulphur dioxide and ammonia no adverse impacts on vegetation and ecosystems within Duncton to Bignor Escarpment SAC are predicted as a result of the operation of the facility.

Critical loads

5.19 The APIS website provides a critical load of 10-20kgN/ha/yr for the Annex 1 habitat *Asperulo-Fagetum* beech forests. Across the SAC the maximum rate of nitrogen deposition is 23.2kgN/ha/yr. The average and minimum baseline rates of nitrogen deposition across the SAC exceed the upper limit of the critical load range given for this habitat type.

5.20 The deposition modelling undertaken by Fichtner shows a maximum rate of nitrogen deposition (PC) within the SAC of 0.014kgN/ha/yr. This represents 0.014% of the lower end of the critical load given for the Annex 1 habitat within the SAC.

5.21 The Annex 1 woodland habitat within the SAC is experiencing levels of nitrogen deposition over the upper limits of the critical loads identified for this habitat. Excessive nitrogen deposition is considered to lead to decreases in mycorrhiza, changes in ground vegetation, changes in soil fauna and loss of epiphytic lichens and bryophytes.

5.22 Little information is currently available on the long-term impact of high levels of nitrogen deposition on the Annex 1 habitat within the SAC. Although not specifically undertaken in relation to the SAC, condition assessments undertaken to evaluate the condition of Sites of Special Scientific Interest (SSSI) offer some information that can be used to evaluate the condition of the SAC.

5.23 In this case, the whole of the Duncton to Bignor Escarpment SSSI (which covers the same extent as the SAC) was considered to be in favourable condition in 2008, with the exception of one unit covering 3.67ha, which was considered to be

unfavourable recovering. This assessment of unfavourable recovering in this unit related to areas of grassland within the SSSI, not the beech woodland that forms the Annex 1 habitat, which was considered to be in favourable condition.

5.24 Comments on individual units note ash and beech with abundant growth of epiphytic lichens and bryophytes in Unit 8 which would suggest air quality was good at the time of assessment. The APIS website shows that background nitrogen deposition was higher in 2008 (closer to 25kg/N/ha/yr) but the condition assessments did not highlight any significant changes in plant composition. The favourable condition assessment would suggest that the woodland habitats within the SAC are in good condition and that current levels of nitrogen deposition are not adversely affecting the extent and distribution of qualifying natural habitats.

5.25 The APIS website shows the main sources of nitrogen (ranked by total nitrogen deposition) affecting this SAC are European imports (33%), UK livestock (20%) and international shipping (12%). These proposals are unlikely to add significantly to the current baseline levels of nitrogen deposition that already occur within the site, with only a very minor increase in the PEC predicted.

6.0 Evaluation of the potential of land within and around the site to be functionally linked to the Arun Valley SPA

6.1 The Arun Valley SPA supports a herd of wintering Bewick's swan. The number of Bewick's swan over-wintering on the SPA has decreased in the long-term having previously increased. This has triggered WeBS Alerts for the long, medium and short-term and the period since baseline.

6.2 The number of over-wintering Bewick's swan within southern England have fluctuated throughout the period recorded by WeBS making interpretation of the underlying trend difficult. The numbers over-wintering in Great Britain have been decreasing in the long-term having previously increased. The trend on this site follows regional and British trends suggesting the declines that triggered the WeBS alerts are the result of broad-scale population trends.

6.3 The increasing proportion of regional numbers supported by the Arun Valley SPA suggest the environmental conditions remain relatively favourable and also indicates that this site is becoming increasingly important on a regional scale for this species.

6.4 Natural England consider that supporting habitat outside of the SPA includes improved pasture, autumn-sown crops, over-wintered stubbles and oil seed rape. During the day the birds feed on pastures within the SPA or at a range of sites to the south of the SPA, between Arundel and Amberley (Thomas, 2014, and data supplied by the Sussex Ornithological Society). Bewick's swans tend to roost overnight on disturbance-free floodwaters at Pulborough Brooks, Amberley Wildbrooks or the Arundel Wildfowl and Wetlands Trust (WWT) Reserve (the WWT reserve is outside the SPA).

6.5 As Bewick's swan will fly up to 10km from their roost sites to feed (Stroud et al, 2016). A distance of 10km around roost sites has been used to define impact risk zones for foraging Bewick's swan in the Arun Valley. Any losses of habitat within these zones may impact the ecological integrity of this species.

6.6 Both Pulborough Brooks and Amberley Wildbrooks are over 10km from the site (See Figure 1). Arundel WWT reserve lies within 6km of the site indicating the farmland around the site could potentially be used by feeding Bewick's swan during the day time. It should be noted that the size of the wintering flock has significantly reduced in the last decade and the arrival time of the wintering birds has got progressively later with birds not arriving until December. Lower numbers of birds and a shorter winter occupancy of sites reduces the likelihood of birds being present on or near the site.

6.7 Records of sightings of Bewick's swan within 2km of the site supplied to Lindsay Carrington Ecological Services (LCES) by Sussex Biological Records Centre as part of the ecological impact assessment (EcIA) preparation shows only sporadic records of Bewick's swan in the local area. Since 1980 there have been 28 records of birds; 9 are in the period 1980-1990, 15 in the period 1991-2000, two in the period 2001-2010 and two between 2011 and 2017.

6.8 This pattern of occurrence would suggest there is no regular use of the arable land around the site by wintering Bewick's swan. This is supported by the location of records which are variously described as Arun Valley Ford, Arun Valley (Arundel

to Littlehampton), Arun Valley Ford Station, Climping Country Park, Lyminster Country Park, Arundel Tortington and Arun Valley (Bury to Houghton). The site contains no suitable foraging or roosting habitat for Bewick's swan.

6.9 The area around Ford is considered to be sufficiently distant from the Arun Valley SPA not to be functionally linked to the SPA for the overall assemblage of wildfowl.

6.10 Natural England guidance (supplementary advice on conserving and restoring site features) for the Arun Valley SPA has specifically removed air pollution as a factor that could adversely impact on restoring the site to favourable conservation status, noting there are no expected negative impact on species due to impacts on the species' broad habitat. It is expected that this assessment also applies to any functionally linked land outside the SPA boundaries, especially farmland subject to additions of inorganic fertilisers.

7.0 Likely significant effect (LSE) test

7.1 The first test of Regulation 63 of the Habitats Regulations requires an assessment of whether the emissions from the scheme or any other activities, are likely to have a significant effect on the European site in question, either alone or in combination with other plans and projects.

7.2 As noted in section 3 no specific measures to reduce the impact on emissions on the European site have been included as part of the project. Therefore, this project can be screened for likely significant effects in line with the recent People Over Wind ruling.

Identification of thresholds for critical loads and levels

7.3 The APIS website was consulted to determine the appropriate critical loads and levels for use in the assessment of likely significant effects. Fichtner used this information when undertaking the modelling work. This process is explained in section 5 along with an evaluation of the air quality modelling results.

Screening for air quality LSE

7.4 The air quality modelling has not identified any mean annual process contributions of over 1% of the relevant critical level for oxides of nitrogen, hydrogen floride, sulphur dioxide and ammonia. Using Environment Agency guidance it is therefore possible to screen out likely significant effects related to air quality associated with the project at this stage on the SAC.

7.5 Nitrogen deposition from the proposal also falls below 1% of the lower end of the relevant critical load for habitats within the SAC. Using Environment Agency guidance it is therefore possible to screen out likely significant effects related to air quality associated with the project at this stage for the European site.

7.6 It should be noted that background levels of nitrogen deposition within the Duncton to Bignor Escarpment SAC exceed the upper limit of the critical load given for the Annex 1 habitat. This would suggest that nitrogen deposition is already at a level that could be adversely impacting on the interest features of this site. However, the SSSI condition assessment identifies the whole site as being in favourable condition. This suggests that overall the broad habitat types support a typical range of species.

Screening for loss or impacts on functionally linked land LSE

7.7 The site supports no habitat that would provide suitable foraging or roosting habitat for Bewick's swan. The surrounding arable land could provide suitable foraging habitat for Bewick's swan depending on cropping patterns. There is no evidence to suggest Bewick's swan are anything other than sporadic visitors to the wider area around the site, with less than annual occurrences recorded (birds recorded four years out of ten in 1980 to 1990 and 1991 to 2000, with four records in the period 2011-2017), with no records in the period 2001 to 2010).

7.8 There is no evidence to suggest that this land is functionally linked to the Arun Valley SPA and, although there may be localised disturbance during construction, nothing to indicate the proposal will prevent Bewick's swan using arable fields in

this area once the site is operational. No likely significant effects are anticipated on wintering Bewick's swan.

7.9 The Arun Valley SPA is considered sufficiently distance from the site for it not to be considered functionally linked land for species associated with the overall site assemblage (other than Bewick's swan).

8.0 Alone and in-combination

8.1 The air quality modelling has not identified any likely significant effects on the SAC alone. None of the other projects identified for consideration in the in-combination assessment have the potential to contribute additional sources of aerial pollutants that could act in-combination with this proposal. The very small contribution of pollutants to critical levels and loads across the SAC and the absence of other projects that would be significant contributors to aerial pollutants support the conclusion of no likely significant effects on the interest features of the European site in-combination with other plans and projects.

8.2 The land within and around the application site are not considered to act as functionally linked land to the Arun valley SPA. In the absence of any regular, sustained used of this land by Bewick's swan no likely significant effects, alone or in-combination with other plans and projects are anticipated.

9.0 Conclusion

9.1 The air quality modelling undertaken by Fichtner has not identified any mean annual process contributions of over 1% of the relevant critical level for oxides of nitrogen, hydrogen floride, sulphur dioxide and ammonia within the SAC. Nitrogen deposition from the proposal also falls below 1% of the lower end of the relevant critical load for the Annex 1 habitat within the European site.

9.2 Using Environment Agency guidance it is therefore possible to screen out likely significant effects related to air quality associated with the project at this stage for the European site.

9.3 The land within and around the application site is not considered to be used with any regularity by wintering Bewick's swan associated with the Arun Valley SPA. It is not considered that this land represents functionally-linked land for this interest feature of the European site.

9.4 This project has been subject to a HRA screening process which has concluded there will be no likely significant effects on interest features of the terrestrial European sites, either alone, or in-combination with other plans and projects.

References

Stroud, D.A., Bainbridge, I.P., Maddock, A., Anthony, S., Baker, H., Buxton, N., Chambers, D., Enlander, I., Hearn, R.D., Jennings, K.R, Mavor, R., Whitehead, S. & Wilson, J.D. – on behalf of the UK SPA & Ramsar Scientific Working Group (eds). 2016. The status of UK SPAs in the 2000s: the Third Network Review. JNCC, Peterborough.

Thomas, A.L.R (Ed). 2014. The Birds of Sussex. Sussex Ornithological Society/British Trust for Ornithology.

www.apis.ac.uk

www.magic.defra.gov.uk

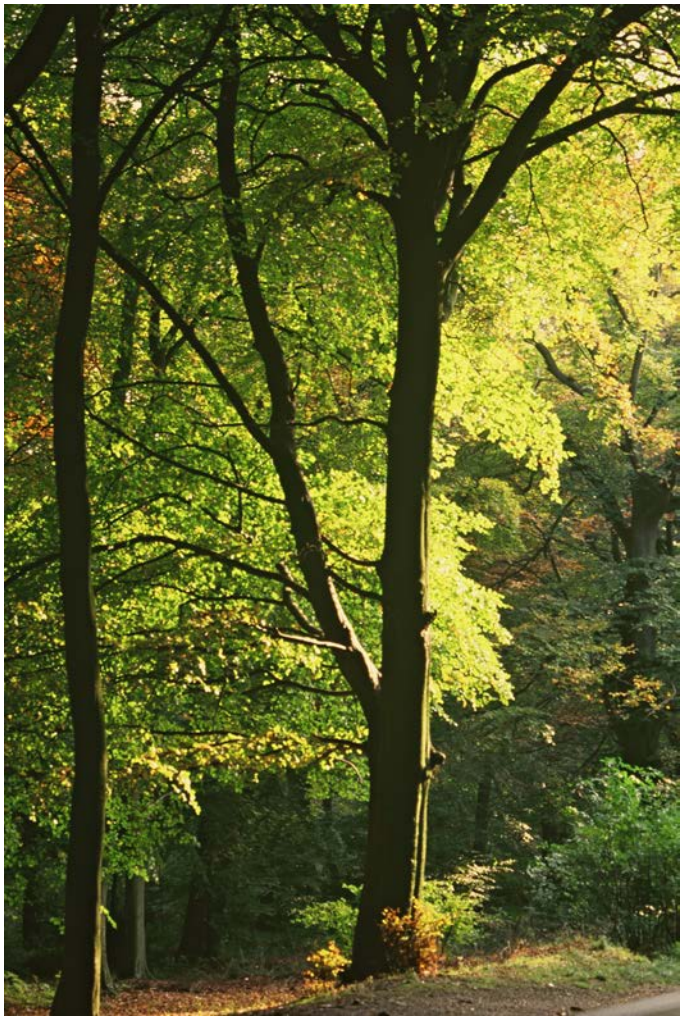
www.bto.org/our-science/projects/wetland-bird-survey

https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Appendix 1

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

Duncton to Bignor Escarpment Special Area of Conservation (SAC)
Site Code: UK0030138



Beech tree *Fagus sylvatica* © Peter Wakely Natural England

Date of Publication: 11 February 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Duncton to Bignor Escarpment SAC. This advice should therefore be read together with the SAC Conservation Objectives available here.

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

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

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

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

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

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

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

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

About this site

European Site information

Name of European Site	Duncton to Bignor Escarpment Special Area of Conservation (SAC)
Location	West Sussex
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	214.47 hectares
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Duncton to Bignor Escarpment SSSI
Relationship with other European or International Site designations	Not applicable

Site background and geography

Duncton to Bignor Escarpment is approximately 214.47 ha in size and is situated within both the South Downs National Character Area (NCA Profile 125) and National Park.

The site itself is an example of mature beech *Fagus sylvatica* woodland located on a steep scarp face of the South Downs. The site has developed over chalk which is overlain in places by a clay-with-flints capping. The resulting soil conditions have produced beech dominated mosaic with: ash *Fraxinus excelsior* woodland, scrub and chalk grassland.

The high habitat quality present at Duncton to Bignor Escarpment has allowed many rare plants to flourish such as white helleborine *Cephalanthera damasonium*, yellow bird's nest *Monotropa hypopitys*, and limestone fern *Gymnopcarpium robertium*.

The scrubby woodland is also home to the largest British colony of the rare snail *Helicodonta obvoluta*, and a notable assemblage of rare moth species, many of which are dependent on the scrubby woodland at Duncton Down.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H9130 Asperulo-Fagetum beech forests**

This Annex I type occurs on circumneutral to calcareous soils. In the UK it mostly corresponds to NVC type W12 *Fagus sylvatica – Mercurialis perennis* woodland, but more calcareous stands of NVC type W14 *Fagus sylvatica – Rubus fruticosus* woodland may also conform to this habitat type. The two NVC types often occur together on a site. Each community has a different associated suite of species which change according to slope and soil type. As slopes become steeper, there is a shift from relatively deep, moist and moderately base-rich soils to thin, dry and strongly base-rich profiles. There is an associated floristic gradient in the woodland understorey, with dense cover of bramble *Rubus fruticosus* on the shallowest slopes gradually being replaced by frequent dog's mercury *Mercurialis perennis* as the gradient increases, and then by sanicle *Sanicula europaea*, wall lettuce *Mycelis muralis* and wood melick *Melica uniflora*.

At Duncton to Bignor Escarpment *Asperulo-Fagetum* beech forests occur here on steep scarp slopes and on more gently-sloping hillsides in mosaic with ash *Fraxinus excelsior* woodland, scrub and grassland. Much of the beech woodland is high forest but with some old pollards. Rare plants present include the white helleborine *Cephalanthera damasonium*, yellow bird's nest *Monotropa hypopitys* and green hellebore *Helleborus viridis*. The woods also have a rich mollusc fauna.

Table 1: Supplementary Advice for Qualifying Features: H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Maintain the total extent of the feature to 169.47 hectares	There should be no measurable net reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. For this feature, this attribute includes the extent of semi-natural wood-pasture mosaic area; tree'd area; the number of veteran trees (except through natural causes), including dead and living trees. Tree roots (particularly of veteran trees) may extend a considerable distance beyond the boundary of the site. A reduction of woodland - whether at the edge or in the middle of a site will reduce the core area where wood-pasture conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts may interrupt the movement of species between the remaining parts of the woodland, especially those with limited powers of dispersal.	JNCC. 2015. *Duncton to Bignor Escarpment Natura 200 Standard data form*. Available from: http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030138.pdf This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	Natural England. 2015. Priority Habitat Inventory. Spatial Dataset Available from https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england-attribute
Structure and function (including its typical species)	**Vegetation community composition**	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type (s) W12 *Fagus sylvatica - Mercurialis perennis* W14 *Fagus sylvatica – Rubus fruticosus*	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its	**Vegetation structure - canopy cover**	Maintain an appropriate tree canopy cover across the feature, which will typically be between	Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy	This attribute will be periodically monitored as part of Natural England's SSSI Condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		40-90% of the site	density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.	Assessments
Structure and function (including its typical species)	**Vegetation structure - open space**	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10% of area	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known: interest, history, past management and the landscape context. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	**Vegetation structure - old growth**	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - dead wood**	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m3 per hectare of standing or fallen timber or 3-5 fallen trees >30cm per hectare, and >10 standing dead trees per hectare	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - age class distribution**	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function	**Vegetation structure -**	Maintain a graduated woodland edge into adjacent semi-natural	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and	This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	**Woodland edge (graduated edge; buffered; mosaics with other habitats)**	open habitats, other woodland/wood-pasture types or scrub.	dead wood. It plays a critical role in woodland ecosystem functioning. Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations.	England's SSSI Condition Assessments
Structure and function (including its typical species)	**Vegetation structure - age class distribution**	Maintain a diversity (at least 3 species on more base rich sites) of site-native trees (e.g. beech, ash, whitebeam, yew, sycamore, holly) across the site.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Supporting off-site habitat**	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature	Include only where applicable. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.	
Structure and function (including its typical species)	**Browsing and grazing by herbivores**	Maintain browsing/grazing (e.g. by livestock) to sufficient levels to allow tree seedlings and saplings the opportunity to exceed browse height, and which maintain the characteristic structure of the woodland feature	Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			of young trees which shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, bark stripping and a heavily grazed sward.	
Structure and function (including its typical species)	**Regeneration potential**	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate ;	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will Include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and function (including its typical species)	**Tree and shrub species composition**	Maintain a canopy and under-storey of which 95% is composed of site native trees and shrubs: Beech *Fagus sylvatica* Ash *Fraxinus excelsior* Hazel *Corylus avellana* Yew *Taxus baccata*	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).	English Nature. 2005. *Duncton to Bignor Escarpment SAC Citation*. Available from: http://publications.naturalengland.org.uk/publication/6492790347268096 Natural England. 2008. *Definitions of Favourable Condition for designated features of interest at Duncton to Bignor Escarpment*. (Available from Natural England on request) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Structure and	**Key**	Maintain the abundance of the	Some plant or animal species (or related groups of such	Natural England. 2008.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function (including its typical species)	**structural, influential and/or distinctive species**	typical species listed below to enable each of them to be a viable component of the Annex 1 habitat; • Constant and preferential plant species W12 and W14 woodland NVC vegetation types which comprise the H9130 feature within this SAC • White helleborine *Cephalanthera damasonium*	species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural** species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential** species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • **Site-distinctive** species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.	*Definitions of Favourable Condition for designated features of interest at Duncton to Bignor Escarpment*. (Available from Natural England on request) Natural England. 2011. *SAC Citation*. Available from: http://publications.naturalengland.org.uk/publication/6492790347268096 JNCC. 2006. *Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006*. Available from: http://jncc.defra.gov.uk/pdf/Article17/FCS2007-H9130-audit-Final.pdf
Structure and function (including its typical species)	**Soils, substrate and nutrient cycling**	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function	**Root zones of ancient trees**	Maintain the soil structure within and around the root zones of the	The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)		mature and ancient tree cohort in an un-compacted condition	individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water which are essential for root growth. Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during recreational activity may all contribute to excessive soil compaction around ancient trees.	
Supporting processes (on which the feature relies)	**Air quality**	Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the ‘search by site’ tool on the Air Pollution Information System (www.apis.ac.uk).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	**Hydrology**	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	
Supporting processes (on which the feature relies)	**Illumination**	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: Attributes relating to **wood pasture** have been removed as this SAC is an example of high forest habitat.				

European Site Conservation Objectives for Duncton to Bignor Escarpment Special Area of Conservation Site code: UK0030138

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- **The extent and distribution of qualifying natural habitats**
- **The structure and function (including typical species) of qualifying natural habitats, and**
- **The supporting processes on which the qualifying natural habitats rely**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H9130. *Asperulo-Fagetum* beech forests; Beech forests on neutral to rich soils

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the “Habitats Regulations”). They must be considered when a competent authority is required to make a ‘Habitats Regulations Assessment’, including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a Special Area of Conservation (SAC). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term ‘favourable conservation status’ is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

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

Arun Valley Special Protection Area (SPA)
Site Code: UK9020281

Date of Publication: 22 March 2019

About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Arun Valley SPA.

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

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

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

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

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

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

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

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

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

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

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

About this site

European Site information

Name of European Site	Arun Valley Special Protection Area (SPA)
Location	Surrey, East and West Sussex
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	31 May 2000
Qualifying Features	See section below
Designation Area	530.42 ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Amberley Wild Brooks SSSI, Pulborough Brooks SSSI and Waltham Brooks SSSI
Relationship with other European or International Site designations	The site overlaps with Arun Valley SAC (UK0030366) and Arun Valley Ramsar (UK11004). Conservation Objectives for the SAC can be found here; Conservation Objectives for the RAMSAR are not currently available.

Site background and geography

The Arun Valley in West Sussex is located just north of the South Downs escarpment about 15 km inland from the south coast of England. It consists of low-lying grazing marsh, largely on alluvial soils, but with an area of peat derived from a relict raised bog. Variation in soils and water supply lead to a wide range of ecological conditions and hence a rich flora and fauna. Southern parts of the Arun Valley are fed by calcareous springs, while to the north, where the underlying geology is Greensand, the water is more acidic.

The history of management of fields, and their water levels, determines the plant communities present, with drier fields dominated by meadow grasses, Crested Dog's-tail *Cynosurus cristatus* and Perennial Rye-grass *Lolium perenne*. In wetter areas, rushes, sedges and Tufted Hair-grass *Deschampsia cespitosa* are more frequent. Ungrazed fields have developed into fen, scrub or woodland. Fen areas consist of Common Reed *Phragmites australis*, Reed Sweet-grass *Glyceria maxima* and Greater Tussock-sedge *Carex paniculata*, often with scattered elder *Sambucus* sp. and sallow scrub. On firmer ground, there is Alder *Alnus glutinosa*, Willow *Salix* sp., Birch *Betula* sp., and sallow, with Oak *Quercus robur* and Hazel *Corylus avellana* woodland on the driest ground. The ditches and margins between grazing marsh fields have an outstanding aquatic flora and invertebrate fauna. The Arun Valley supports important numbers of wintering waterbirds, which feed in the wetter, low-lying fields and along ditches.

The Arun Valley SPA is situated within the South Downs National Character Area (NCA Profile 125). The South Downs area consists of dramatic white chalk cliffs and downland which create a sense of openness, whilst both enclosure and remoteness can be found in woodland and even in close proximity to urban areas. The Arun, Adur, Cuckmere and Ouse Rivers in the area dissect the chalk ridge in its eastern half, separating it into blocks, as they drain south to the sea.

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 Annex I of the Wild Birds Directive (Article 4.1)

- *A037 Cygnus columbianus bewickii, Bewick's swan* (non-breeding)

During the time of site notification, the SPA supported 115 individuals representing at least 1.6% of the wintering population in Great Britain (5 year peak mean 1992/93 - 1996/97).

Qualifying assemblage of species (Article 4.2)

During the non-breeding season the SPA regularly supports an assemblage of waterfowl with the area regularly supporting 27,241 individual waterfowl (5 year peak mean for 1992/93 to 1996/97) including: Shoveler *Anas clypeata*, Teal *Anas crecca*, Wigeon *Anas penelope*, Bewick's Swan *Cygnus columbianus bewickii.*

Broad habitat types present within Arun Valley SPA which support wintering non-breeding birds include:

- MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows
- MG13-related; Inland wet grassland
- S5 *Glyceria maxima* (Reed Sweet-grass) swamp
- S22 *Glyceria fluitans* (floating-sweet grass) water-margin vegetation
- Network of ditch systems

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
Bewick's Swan	*Non-breeding*	*Winter*													*Includes analysis of data from SPA's WeBS Counts*
Waterbird Assemblage	*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: A037. *Cygnus columbianus bewickii*; Bewick's swan (Non-breeding)

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 population at a level which is at or above 115 individuals (calculated at a 5 year peak mean at time of notification), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent of 33 (5 year peak mean from 2012/13-2016/17).	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 (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, restoration will be needed in this case 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	The latest data can be requested via the BTO website: https://www.bto.org/volunteer-surveys/webs/data

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Populations of both the NW European Bewick's and numbers occurring within Britain have declined during the last 20 years. Populations can also fluctuate year to year depending on the harshness of winters in Europe; fewer birds will cross the North Sea during mild winters and might explain recent declines in numbers visiting. It should also be noted that the worldwide population of Bewick Swan has seen a significant decline Although principal reasons for decline in numbers of Bewick's Swan visiting the site are likely to be as a result of off-site issues, a restore target has been set until it has been confirmed there are no onsite issues affecting this species.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Maintain cover/abundance of preferred food plants (e.g. *Potamogeton, Ceratophylum, Zannichellia, Myriophyllum, Chara* spp.).	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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat (both within and outside the SPA): extent and	**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 the feature for all necessary stages of the non-breeding/wintering	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 on the nature, age and accuracy of data collection. This target may	Figures for habitat extent are calculated from the Webmap tool using latest Ordnance Survey mapping. More detailed information for

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
distribution		period (moulting, roosting, loafing, feeding) Open Water and land within the SPA: 530.42ha. The grassland community types throughout the SPA and within each component SSSI are a complex mosaic of species-rich & species-poor neutral grassland, floodplain, open water transition and valley fens	apply to supporting habitat which also lies outside the site boundary. Supporting habitat includes improved pasture, autumn-sown crops, over-wintered stubbles and oil seed rape outside the SPA. Bewick's swan is an overwintering species on the Arun Valley and regularly occur in nationally and internationally important numbers in the area, and whilst not restricted to using this habitat, they will feed on species-poor wet grassland, probably to maximise their intake of the most productive grasses and their associated invertebrates, to maintain their food reserves during the cold winter months. Principle habitats within and surrounding the site include; Grazing marsh, water fen and reedbeds, mesotrophic – species rich and poor grasslands, surrounding arable land, open water, rivers and ditches. In the Arun Valley, Bewick's swans tend to roost overnight on disturbance-free floodwaters at Pulborough Brooks, Amberley Wildbrooks or the Arundel WWT Reserve. They then feed during the day on pastures within the SPA or at a range of sites to the south of the SPA, between Arundel and Amberley (Thomas, 2014, and data supplied by the Sussex Ornithological Society). However, Bewick's swans will fly up to 10km from their roost sites to feed (Stroud et al, 2016). This distance, plus suitable habitat, has been used to define impact risk zones for foraging Bewick's swans in the Arun Valley. Any losses of habitat within these zones may impact the ecological integrity of this species	each component part of the SPA may be available from Natural England. . This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments Thomas (ed.). 2014. Birds of Sussex Stroud et al (eds) 2016. The status of UK SPAs in the 2000s: the Third Network Review. JNCC. Peterborough. Impact risk zones can be found on www.magic.gov.uk
Supporting habitat (both within and outside the SPA): function/ supporting process	**Connectivity with supporting habitats**	Maintain the safe passage of birds 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 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.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Maintain the availability of cereal grains, rape, potatoes and sugar beet, where these sources are locally important to feeding flocks,	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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Maintain cover/abundance of preferred food plants (e.g. *Lolium perenne, Glyceria fluitans, Phleum pratense, Rorippa amphibia, Alopecurus geniculatus*).	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.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat (both within and outside the SPA): function/ supporting process	**Hydrology/ flow**	Maintain the hydrology of a waterbody used as a feeding site such that water levels continue to fluctuate by 5-15% each month. Generally, in wet ditches water depth at least 0.5 m in minor ditches and 1 m in major drains. 90% of channel length should reach this target	Changes in source, depth, duration, frequency, magnitude and timing of water supply or flow can have important implications for this feature. Such changes may affect the quality and suitability of habitats used by birds for nesting, drinking, preening, rearing, feeding or roosting. Unless these have already been undertaken, further site-specific investigations may be required to fully inform conservation measures for this feature and/or the likelihood of impacts on this attribute. Within the ditch systems the levels characteristic of the site, in relation to both freeboard and water depth, should be maintained. High water levels are particularly important in spring and early summer for semi-aquatic riparian invertebrates. Bewick's Swan and the majority of water bird assemblage species for which the site is classified require large bodies of in field water and water levels maintained within the ditch systems.	More detailed information for each component part of the SPA may be available from Natural England. Arun Valley SPA Site Improvement Plan, Natural England (2014) This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat (both within	**Water depth**	Maintain the availability of standing water of <1 m deep, over at least 50% of the total	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	More detailed information for each component part of the SPA may be available from Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
and outside the SPA): function/ supporting process		standing water area. Generally, in wet ditches water depth at least 0.5 m in minor ditches and 1 m in major drains. 90% of channel length should reach this target	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.	England.
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 restored to a standard which provides the necessary conditions to support the feature Total phosphorus <0.1 mg L-1;	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. There's a risk that undetected deterioration in the quality of water entering the ditch systems is impacting upon SPA/SCI/Ramsar species. An important food source for Bewick's swan is *Potamogeton* spp. (pond weeds), which also requires good water quality, as do the majority of aquatic plant species. The rivers Arun and Stor are failing on phosphate levels. There may also be a risk of increased levels of nutrients entering the site through flooding, especially if the river banks are not maintained (see issue of changes in water levels). The classified bird species are also vulnerable to increased levels of nutrient enrichment as there is an increased likelihood of certain disease. Increase in growth of vegetation from sustained nutrient enrichment can make the habitat unsuitable for many bird species.	Natural England (2014) Site Improvement Plan, Arun Valley

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 and where necessary restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain and restore 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, Water Level Management Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Conservation management required at this SPA includes; cutting and grazing of hay meadows, control of water levels, reducing the impact of prolonged flooding, upgrading and maintaining water management infrastructure and ditch management. Maintenance of water control structures, within the site and on feeder ditches, is necessary to ensure that water levels in the ditches can be maintained. Ditch maintenance on a long rotation is required to ensure that flows are maintained, and to ensure a range of successional stages of weed growth in the ditches. This maximises the suite of in-channel and marginal flora and their associated species. Management of wet grassland habitat is necessary to maintain a suitable sward height (5-15cm excluding Juncus spp.) and prevent scrub encroachment. This can be achieved by grazing or cutting, as appropriate.	English Nature (2003), Views About Management Natural England (2014) Site Improvement Plan, Arun Valley This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Supporting habitat (both within and outside the SPA): function/ supporting process	**Hydrology/ flow**	Maintain hydrological processes to ensure water availability in feeding sites, with visible areas of standing shallow water.	Changes in source, depth, duration, frequency, magnitude and timing of water supply or flow can have important implications for this feature. Such changes may affect the quality and suitability of habitats used by birds for nesting, drinking, preening, rearing, feeding or roosting. Unless these have already been undertaken, further site-specific investigations may be required to fully inform conservation measures for this feature and/or the likelihood of impacts on this attribute.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water area**	Maintain the number of large waterbodies of optimal size (typically >10 ha).	This feature depends on the presence and continuity of open water habitat; often requiring water bodies of a particular size to in order to feed and/or roost. Changes in water area, and associated marginal habitat, can adversely affect the suitability of supporting open water habitat.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments.
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 within close proximity of affecting 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, 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, and presence of people, animals and structures.	
Supporting habitat (both within and outside the SPA): structure	**Landscape**	Maintain open and unobstructed terrain within and around roosting and feeding areas, with no overall decrease in field sizes	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**	Maintain The extent and distribution of predominantly short (<10 cm) grassland 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 foraging. 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	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			adversely affect the feature.	
Version Control Advice last updated: **22 March 2019** following stakeholder feedback. Additional explanatory text added to **Extent and distribution of supporting non-breeding habitat** clarifying types of supporting habitat and how the species use the SPA and surrounding landscape. Additional detail added to **Conservation Measures** attribute regarding ditch management.				
Variations from national feature-framework of integrity-guidance: The attribute for **Air Pollution** has been removed as there are currently no critical loads available for this feature. There are no expected negative impact on species due to impacts on the species' broad habitat.				

Table 2: 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 27,241 individual waterfowl (based on a 5 year peak mean around time of notification - 1992/93 to 1996/97), whilst avoiding deterioration from its current level as indicated by the latest 5 year peak mean 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, restoration will be needed in this case 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	The latest data can be requested via the BTO website: https://www.bto.org/volunteer-surveys/webs/data

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			assemblage components, 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 (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). 5 yr peak mean (2012/13 – 2016/17) – 12540 birds	
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	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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 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. From WeBS counts (12/13 to 16/17), the main component species are (including 12/13-16/17 5yr peak mean for each species): • Bewick's swan" – 33 • Wigeon*" - 4541 • Teal*" - 2948 • Shoveler*" - 264 • Pintail " - 289 • Lapwing^ - 4096 • Ruff* - 8 • Black-tailed godwit* - 571 • Green sandpiper* - 13 • Golden Plover – 2 • Kingfisher - 3 * Present in nationally important numbers ^ Population of >2000 individuals " Named component species	

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 habitats which support the assemblage feature during all necessary stages (moulting, roosting, loafing, and feeding) of the non-breeding period of the full open water and land within SSSI/SPA areas of 530.42ha.	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: grazing marsh, and improved grassland. The location of birds depends on the areas of flooding, which may be outside the SPA boundary.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
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 Open Water and land within the SPA: 530.42ha. The grassland community types throughout the SPA and within each component SSSI are a complex mosaic of species-rich & species-poor neutral grassland, floodplain, open water transition and valley fens	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.	
Supporting habitat (both within and outside the SPA): function/supporting process	**Conservation measures**	Maintain and where necessary restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain or 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, Water Level Management Plans, the Views	English Nature (2003), Views About Management Natural England (2014) Site Improvement Plan, Arun Valley

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			about Management Statement for the underpinning SSSI and/or management agreements. Conservation management required at this SPA includes; cutting and grazing of hay meadows, control of water levels, reducing the impact of prolonged flooding, upgrading and maintaining water management infrastructure and ditch management. Maintenance of water control structures, within the site and on feeder ditches, is necessary to ensure that water levels in the ditches can be maintained. Ditch maintenance on a long rotation is required to ensure that flows are maintained, and to ensure a range of successional stages of weed growth in the ditches. This maximises the suite of in-channel and marginal flora and their associated species. Management of wet grassland habitat is necessary to maintain a suitable sward height (5-15cm excluding Juncus spp.) and prevent scrub encroachment. This can be achieved by grazing or cutting, as appropriate.	
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, disrupted incubation of eggs 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 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; Open Water and land: 530.42ha. The grassland community types throughout the SPA and within each component SSSI are a complex mosaic of species-rich & species-poor neutral grassland, floodplain, open water transition and valley fens	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: Shoveler *Anas clypeata*, Teal *Anas crecca*, Wigeon *Anas Penelope* and Bewick's Swan *Cygnus columbianus bewickii*, lapwing, ruff, green sandpiper, black-tailed godwit, golden plover and kingfisher.	This attribute will be periodically monitored as part of Natural England's SSSI Condition Assessments
Version Control Advice last updated: **22 March 2019** following stakeholder feedback. Additional detail added to **Conservation Measures** attribute regarding ditch management.				
Variations from national feature-framework of integrity-guidance: The attribute for **Air Pollution** has been removed as there are currently no critical loads available for this feature. There are no expected negative impact on species due to impacts on the species' broad habitat.				

References

English Nature (2003), Views about Management document for Waltham Brooks SSSI. Available from: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1000711.pdf

Natural England (2014) Site Improvement Plan Arun Valley. Available from: http://publications.naturalengland.org.uk/publication/5353882309885952

Register reference number: UK 9020281
Date of registration: 31 May 2000
Signed [redacted]
On behalf of the Secretary of State for the Environment

EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Area

Name: Arun Valley

Unitary Authority/County: West Sussex

Consultation proposal: Waltham Brooks Site of Special Scientific Interest (SSSI), Amberley Wild Brooks SSSI and Pulborough Brooks SSSI have been recommended as a Special Protection Area because of the site's European ornithological importance. The three component SSSIs encompass a series of wet meadows, alluvial grazing marsh and former raised peat bog.

Boundary of SPA: The SPA boundary is coincident with both Amberley Wild Brooks SSSI and Pulborough Brooks SSSI. The SPA boundary also follows Waltham Brooks SSSI boundary but omits the land lying to the west of the railway.

European ornithological importance of SPA:

Arun Valley SPA is of European importance because:

a) The site qualifies under article 4.1 of the Birds Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed on Annex 1 in any season:

Annex 1 species	5 yr peak mean for 1992/93 - 1996/97	
Bewick's Swan *Cygnus columbianus bewickii*	1151	(1.6% GB)

Unit of population size: I - individual birds wintering

b) The site is used regularly by over 20,000 waterfowl (waterfowl as defined by the Ramsar Convention).

Period	Peak Mean	Waterfowl
1992/93 to 1996/97	27,241I	(waders & wildfowl)

Unit of population size: I - individual birds wintering

All figures from: **Papazoglou, F. & Gilbert, S. 1997. A proposal for a Special Protection Area in the Arun Valley, West Sussex. RSPB. Brighton**

Non-qualifying species of interest

In addition, the site supports nationally important populations of wigeon *Anas penelope*, teal *Anas crecca*, pintail *Anas acuta*, shoveler *Anas clypeata* and Ruff (Annex 1 species) *Philomachus pugnax*. Golden plover *Pluvialis apricaria* and kingfisher *Alcedo atthis*, both Annex 1 species, also occur on Arun Valley SPA.