DEPARTMENT OF ENERGY & CLIMATE CHANGE

Habitats Regulations Assessment: Site Report for Sizewell

EN-6: Revised draft National Policy Statement for Nuclear Power Generation

Planning for new energy infrastructure

October 2010

Habitats Regulations Assessment of the revised draft Nuclear National Policy Statement

Habitats Regulations Assessment (HRA) screening and Appropriate Assessment (AA) of the revised draft Nuclear NPS including potentially suitable sites, has been undertaken in parallel with the Appraisal of Sustainability (AoS). These strategic assessments are part of an ongoing assessment process that will continue with project level assessments. Applications to the IPC for development consent will need to take account of the issues identified and recommendations made in the strategic, plan level HRA/AA; and include more detailed project level HRA as necessary.

The Habitats Regulations Assessment is provided in the following documents:

HRA Non-Technical Summary

Main HRA of the revised draft Nuclear NPS

- Introduction
- Methods
- Findings
- Summary of Sites
- Technical Appendices

Annexes to the Main HRA Report: Reports on Sites

- Site HRA Reports
- Technical Appendices

All documents are available on the website of the Department of Energy and Climate Change at www.energynpsconsultation.decc.gov.uk

This document is the Habitats Regulations Assessment Site Report for Sizewell.

This document has been produced by the Department of Energy and Climate Change based on technical assessment undertaken by MWH UK Ltd with Enfusion Ltd and Nicholas Pearson Associates Ltd.

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1 Introduction

This HRA Report

1.1 This report sets out the Habitats Regulations Assessment (HRA) Screening and Appropriate Assessment (AA) components of the HRA of the proposals for Sizewell. This site was nominated into the Strategic Sites Assessment (SSA) process to be considered as a potentially suitable site for the deployment of a new nuclear power station(s) by 2025. This site report is one of the Site HRA Reports comprising Part III of the HRA Report that accompanies the revised draft Nuclear National Policy Statement (NPS) published for public consultation in Autumn 2009. Part II of the HRA report for the revised draft Nuclear NPS sets out details of the HRA process, methods, findings and summary of the individual assessments at the nominated sites. Part I of the HRA report is a Non-Technical Summary.

1.2 This HRA has been undertaken at a strategic level and is part of an ongoing assessment process that started in July 2008 and will continue with project level assessments. Sites that are found to be potentially suitable for the deployment of new nuclear power stations will be listed in the revised draft Nuclear NPS; developers will be able to apply to the Infrastructure Planning Commission[1] for development consent to develop new nuclear power stations at those sites.

1.3 Each development consent will need to be accompanied by a project level HRA report, alongside an Environmental Statement reporting the findings of a detailed Environmental Impact Assessment (EIA). The proposals will also be subject to various other regulatory and licensing requirements.

The Nuclear National Policy Statement

1.4 The revised draft Nuclear NPS sets out a list of sites that, following the Strategic Siting Assessment, have been found to be potentially suitable for the siting of new nuclear power stations by 2025, and the framework by which development consent decisions on sites should be made.

[1] The Government announced in June 2010 its intention to amend the Planning Act 2008 and abolish the IPC. In its place, the Government envisages that a Major Infrastructure Planning Unit (MIPU) will be established within the Planning Inspectorate. Once established, the MIPU would hear examinations for development consent and would then make a recommendation to the Secretary of State. It would not itself determine applications and decisions would be taken by the relevant Secretary of State. These proposed reforms require primary legislation. Until such time as the Planning Act 2008 is amended, the IPC will continue as set out in that Act. As a result, the NPSs will provide the framework for decisions by the IPC on applications for development consent for major infrastructure projects, and under the new arrangements will provide the framework for recommendations by the MIPU to the Secretary of State.

HRA Process

1.5 The Habitats Directive[2] protects habitats and species of European nature conservation importance. Together with the Birds Directive[3], the Habitats Directive established a network of internationally important sites designated for their ecological status. Special Protection Areas (SPAs) are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds. Special Areas of Conservation (SACs), and European Offshore Marine Sites (EOMS) are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. Internationally important wetlands are designated under the Ramsar Convention 1971. UK Government policy states that the Ramsar sites and potential SPAs are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them[4]. These sites combine to create a Europe-wide 'Natura 2000' network of European Sites, which are hereafter referred to as 'European Sites'[5] in this and other HRA reports[6].

1.6 HRA tests whether the impacts identified as arising from a proposal, plan or project are likely to have a significant effect on European Sites of nature conservation importance. Articles 6(3) of the Habitats Directive requires an 'appropriate assessment' to be undertaken on proposed plans or projects which are not necessary for the management of the European Site, but which are likely to have a significant effect on one or more European Sites either individually, or in combination with other plans, programmes or projects. In England and Wales this requirement was transposed into UK law by the Conservation of Habitats and Species Regulations 2010[7]) (the 'Habitats Regulations'). The process of fulfilling the requirements of the Directive and the Regulations is now in practice referred to as HRA, and Appropriate Assessment (AA) if required, forms a stage within the overall HRA process

1.7 The full details of the HRA method and process, including the key principles and any assumptions made in this plan level HRA of the revised draft Nuclear NPS and nominated sites, are outlined in Part II of the HRA Report. This report covers the screening and Appropriate Assessment (AA) stages of the HRA for the nominated site at Sizewell, as outlined in Table 1. It takes into account the information contained within the site nomination submitted to Government by the nominator

2 Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML
3 Council Directive 79/409/EEC on the protection of wild birds: http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1979/L/01979L0409-20070101-en.pdf
4 ODPM, 2005, Planning Policy Statement 9: Biological and Geological Conservation; and ODPM Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System
5 Though they do not form a part of the Natura 2000 network, Ramsar sites are included within the definition of 'European Sites' for the purposes of this report.
6 The term European Site is used throughout all the Site HRA Reports and in the Main HRA Report, and incorporates SACs, SPAs, EOMS and Ramsar sites.
7 Regulation 106 applies the requirements and controls in relation to plans under the regulations to National Policy Statements designated under the Planning Act 2008.

(EDF Energy) on 31 March 2009[8]. The HRA process is typically iterative and assessments have been revised on the basis of commentary from the Statutory Consultees.

8 http://www.energynpsconsultation.decc.gov.uk

Table1: Habitats Regulations Assessment: Summary Overview of Key Stages [9]

Stage One: Screening

Gathering information on the plan/project, European Sites, their conservation objectives and characteristics and other plans and projects

Considering the potential for likely significant effects (LSE).

Stage Two: Appropriate Assessment

If the potential for LSE is identified and European Sites 'screened in' to the HRA, then undertake further work to ascertain the effect on the site conservation objectives and site integrity.

Considering how effects might be avoided or effectively mitigated through alterations to the plan /project.

Stage Three: Assessment of Alternative Sites

If proposal for avoidance and/or mitigation unable to cancel out adverse significant effects, then alternative solutions must be considered (may include different locations or process alternatives).

Any alternative solutions should be subject to Stage One and Stage Two, Appropriate Assessment if necessary.

Stage Four: Assessment where no Alternative Solutions Exist

If no alternative solutions exist, consideration should be given to whether the sites host priority habitats/species, and if there are important human health/safety considerations or important environmental benefits from delivering the plan.

If Imperative Reasons of Overriding Public Interest (IROPI) are determined, then compensatory measures must be designed, assessed and put in place, prior to the commencement of the plan.

9 Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission DG Environment (2001), http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

2 HRA Screening of Sizewell

2.1 The nominated site[10] at Sizewell is situated on the Suffolk coast, north-east of Ipswich and to the south of Lowestoft. The nearest towns are Leiston, Aldeburgh and Saxmundham. The location of the site is shown in Figure 1.

Screening

2.2 The screening process forms the first stage of any HRA and is focused on the 'likely significant effect' (LSE) test. The aim of the LSE test is to determine whether the plan either alone, or in-combination with other plans and projects is likely to result in a significant effect at European Site[s]. This is essentially a risk assessment process that seeks to understand whether there are any mechanisms for identified impacts arising from the plan to adversely affect the European Sites (i.e. a cause-effect pathway)[11]. The key questions asked are:

- would the effect undermine the conservation objectives for the European Site?
- can significant effects be excluded on the basis of objective information?

2.3 The tasks undertaken to complete the Screening Assessment for Sizewell is described below.

European Site Identification and Characterisation

2.4 European Sites within a 20km radius of the nominated site were scoped into the screening process as set out in Table 2 and Figure 2. This area of search reflects guidance recommendations[12], but also takes into account that distance is in itself not a definitive guide to the likelihood or severity of impacts known to arise from developments. For example, inaccessibility/ remoteness is typically more relevant, and factors such as the prevailing wind directions, river and groundwater flow direction will all have a bearing on the relative distance at which an impact can occur. It should be noted that an area of land can be covered by more than one European designation.

10 as proposed through the nominations process
11 Appropriate Assessment of Plans (Therivel, May 2008)
12 Communities and Local Government (2006) Planning for the Protection of European Sites: Appropriate Assessment – Guidance for Regional Spatial Strategies and Local Development Documents.

Table 2: European Sites within 20km of the nominated site

	Designation	Distance from nominated site[13]
Alde-Ore and Butley Estuaries	**SAC**	**5.5km**
Alde-Ore Estuary	**SPA**	**5.5km**
Alde-Ore Estuary	**Ramsar**	**5.5km**
Benacre to Easton Bavents Lagoons	**SAC**	**14.5km**
Benacre to Easton Bavents Lagoons	**SPA**	**14.5km**
Dew's Ponds	**SAC**	**11km**
Minsmere to Walberswick Heaths and Marshes	**SAC**	**Adjacent**
Minsmere to Walberswick	**SPA**	**Adjacent**
Minsmere to Walberswick	**Ramsar**	**Adjacent**
Orfordness-Shingle Street	**SAC**	**8km**
Staverton Park and The Thicks, Wantisden	**SAC**	**16km**
Sandlings	**SPA**	**0.7km**
Outer Thames Estuary	**SPA**	**Adjacent**

2.5 The Outer Thames Estuary SPA (SPA)[14] is also included within this HRA process, using the boundary of the potential SPA set out in the November 2009 consultation. As such, a precautionary approach has been taken for this site during its assessment at both the HRA Screening Assessment and Appropriate Assessment stages.

2.6 **Appendix 1** details the characteristics of the thirteen European Sites scoped into the HRA Screening Assessment. The characterisations include an overview of the sites:

- ecological features;
- their qualifying features/ reasons for designation;
- conservation objectives and the condition status of their constituent Sites of Special Scientific Interest (SSSIs) where available;
- environmental conditions necessary to support European Site integrity; and
- site vulnerabilities, including any key pressures or trends known to be affecting the European Sites.

13 Distance measured is from nearest site boundary

14 In November 2009 Natural England, Countryside Council for Wales and the Joint Nature Conservation Committee launched a consultation on 10 new possible marine SACs and two new potential SPAs in English, Welsh and offshore waters around the UK, including the Outer Thames Estuary pSPA (see http://www.naturalengland.org.uk/ourwork/marine/sacconsultation/default.aspx). The consultation closed in February 2010. The Outer Thames Estuary was officially classified as an SPA in August 2010. There were minor revisions to the boundary, but these were not deemed to significantly affect the outcome of this assessment.

Nominated site Review and Identification of Likely Impacts

2.7 The nomination report[15] identifies approximately 117 hectares of land to the north of the existing nuclear power stations (Sizewell A and B), including both the proposed area of the power station footprint (approx. 30-50 ha) as well as permanent ancillary and temporary construction facilities that would be linked by an access road. The nomination also includes a secondary area to the south of Sizewell A and B power stations, between Sizewell Wents and the hamlet of Sizewell. This area has been identified because it may be needed to accommodate ancillary facilities to meet operational requirements. The nominated site boundary is drawn at the high water mark, however some works beyond this boundary will be necessary in relation to the construction of coastal defences and cooling water infrastructure. In addition the nomination documents identifies requirements for off-site works to highway and rail infrastructure. The nominator was not required to provide details of the proposed development at this stage.

2.8 From the nomination documents[16] it is assumed that the nomination is for a nuclear power station development, incorporating:

- up to two nuclear reactors;
- construction stage areas and facilities, including a Marine Off-Loading Facility;
- infrastructure and facilities related to the operation of a nuclear power station, such as transmission infrastructure;
- a new permanent access road along the north and west of the nominated site;
- cooling water infrastructure including cooling water intake and outfall structures;
- coastal and flood protection measures; and
- interim radioactive waste storage facilities.

2.9 The full range of potential impacts on environmental conditions and biodiversity arising from the development of new nuclear power stations are outlined and discussed in Part II of the HRA Report. Impacts of particular relevance to this nominated site include: direct habitat loss, fragmentation and disturbance as well as effects on water quality and air quality. These issues are discussed in detail in the HRA Screening Assessment task below.

15 Strategic Siting Assessment for the development of new nuclear power stations in the UK - Site Nomination Report for Sizewell (EDF, 2009); this and other documents at http://www.nuclearpowersiting.decc.gov.uk/nomination/sizewell/
16 Op. cit.

Identification and Consideration of Other Plans, Programmes and Projects

2.10 It is a requirement of Article 6(3) of the Habitats Directive that HRA examines the potential for plans and projects to have a significant effect either individually or 'in combination' with other plans, programmes and projects (PPPs). The aim is that plans and projects are evaluated within the context of the prevailing environmental conditions and that account is taken of their effects.

2.11 Plan level HRA practice has shown that the in-combination assessment is most relevant where plans might otherwise be screened out because their individual contribution is inconsequential. The requirement is that the HRA assessment process should take account of reasonably foreseeable impacts (as opposed to every conceivable effect)[17].

2.12 For the purposes of this assessment consideration was given to:

- Local Development Framework Documents;
- Major Development Schemes (including transport plans/ airport expansion) where relevant; and
- Tourism and Recreation Strategies.

2.13 Where relevant, reference was also made to:

- Coastal Habitat Management Plans;
- Catchment Abstraction Management Strategies;
- Shoreline Management Plans;
- River Basin Management Plans; and
- Minerals and Waste Development Frameworks.

2.14 A summary of the key plans referred in the in-combination assessment process is provided in **Appendix 2**. Further specific discussion is provided in section 3 where relevant.

Screening Assessment

2.15 The following sections outline the issues arising from the Screening Assessment (LSE test) undertaken at **Appendix 3**, for the nominated site at Sizewell. The Screening Assessment indicated that development at the nominated site at Sizewell has the potential to adversely affect European Sites as a result of:

- **Water Resources and Quality Impacts;**
- **Habitat (and Species) Loss and Fragmentation;**

17 Tyldesley, D. (2009) The Habitats Regulations Assessment of Local Development Documents. Revised Draft Guidance for Natural England. Natural England, Sheffield

- **Disturbance (Noise, Light and Visual); and**
- **Air Quality.**

2.16 Each of these issues is considered in turn below. It should be noted however, that because there are no European Sites which lie directly in front of the nominated site (i.e. between the nominated site itself and the high water mark) the potential for loss of qualifying habitats or supporting habitats for qualifying species as a result of 'coastal squeeze' impacts has been discounted during the Screening Assessment and is not considered further as a topic within this report.

Water Resources and Quality Impacts

European Sites for which no significant effects are likely (see Appendix 3):

- Benacre to Easton Bavents Lagoons SAC / SPA
- Dew's Ponds SAC
- Staverton Park and The Thicks, Wantisden SAC

European Sites for which significant effects are likely (see below):

- Minsmere to Walberswick Heaths and Marshes SAC
- Minsmere to Walberswick SPA / Ramsar
- Sandlings SPA
- Alde-Ore and Butley Estuaries SAC
- Alde-Ore Estuary SPA / Ramsar
- Orfordness-Shingle Street SAC
- Outer Thames Estuary SPA

2.17 The quality of fresh and marine water that feeds and supports European Sites is a key determinant in ensuring the integrity of habitats and dependant species. Poor water quality from toxic compounds that may also bind to sediments can lead to death of aquatic life and increase the vulnerability of species to disease. Nutrient enrichment in water (eutrophication) can affect the availability of oxygen, changing habitat composition with direct impacts on dependant species.

2.18 The HRA Screening Assessment reviewed the potential for impacts on water resources and quality arising from the construction, operation and decommissioning phases of a new nuclear power station at the nominated site. Issues include:

- increased/ altered drainage from earthworks and excavations and potential sedimentation changes;
- alteration of flow through abstraction and the return of additional water volumes to the aquatic system;
- changes to water temperature creating 'thermal plumes' as a result of controlled discharges;

- the potential for toxic contamination (for example from anti-fouling agents associated with cooling water systems) from accidental leakage may interact or combine with routine non-radioactive or radioactive discharges that will be subject to discharge consents regulated by the Environment Agency.

2.19 Of the thirteen European Sites screened, eight sites identified as possessing specific vulnerabilities relating to the likely effects of the development on the water resource.

Minsmere to Walberswick Heaths and Marshes SAC
Minsmere to Walberswick SPA, Ramsar

2.20 Minsmere to Walberswick Heaths and Marshes SAC is vulnerable to the potential effects on water quality from earthworks/ excavations, infrastructure provision (sedimentation, pollution incidents for example oil spillage from ships landing at offloading facility). Shingle plant communities (a primary qualifying interest feature) are particularly vulnerable to changes in nutrient loading, salinity and water temperature, all of which can encourage excessive algal growth leading to smothering of the vegetation. This could in turn lead to impacts on qualifying interest features for Minsmere to Walberswick SPA / Ramsar (populations of breeding Little Tern are dependent on open vegetation within shingle features). Changes to the thermal regime of the coastal waters as a result of direct sea water cooling could affect the structure of plankton and benthic communities which in turn could affect qualifying interests through a reduction in prey availability. Waterfowl, including Avocet, also a qualifying interest feature, are subject to accumulation of toxins through the food chain, and vulnerable to changes in palatability and abundance of prey caused by toxic contamination. Key supporting habitats for this species includes the artificial lagoons within the Minsmere RSPB reserve and such features are highly vulnerable to the introduction of synthetic and non-synthetic compounds.

2.21 Changes to water levels within the SAC, SPA and Ramsar could occur as a result of construction activities adjacent to or within watercourses associated with Sizewell Belts SSSI as well as de-watering activities to isolate the nominated site during construction[18]. Sizewell Marshes SSSI lies adjacent and to the west and south of the nominated site and a small part of this SSSI occurs within the nominated site. This SSSI lies adjacent and to the south of the SAC, SPA and Ramsar and impacts on water quality and quantity potentially affecting the SSSI could also result in impacts on these European Sites, should hydrological connectivity between the two areas be ascertained.

18 Site Nomination Report for Sizewell (EDF Energy) assessed, at a strategic level, the potential impact of the excavation and dewatering of the construction site on Sizewell Marshes SSSI. It also states that such impacts would be subject to detailed investigations at the local level.

2.22 Sizewell lies directly adjacent to the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar designation and the Screening Assessment indicates that the **potential for significant impacts on these European Sites should be considered further through Appropriate Assessment.**

Sandlings SPA

2.23 Sandlings SPA comprises 6 widely dispersed component sites designated for their breeding populations of Nightjar and Woodlark. The closest part of the SPA to Sizewell is an area of remnant heathland / acid grassland known as The Walks within Leiston-Aldeburgh SSSI (0.65km to the south-west of the closest part of the nominated site). Potential impacts on water quality could arise as a result of drainage from earthworks / excavations associated within infrastructure provision close to this part of the SPA[19] and could result in the condition of key supporting habitats for Nightjar and Woodlark becoming unfavourable (as measured by attributes such as vegetation form and composition) as a result of nutrient loading / sedimentation. Both qualifying species are vulnerable to even minor changes to their nesting habitat. **This issue should be considered further through Appropriate Assessment at this site to determine the nature and extent of the potential significant effects identified.**

Alde-Ore and **Butley** Estuaries SAC
Alde-Ore **Estuary** SPA, Ramsar

2.24 Alde-Ore and Butley Estuaries SAC is particularly vulnerable to contamination from toxic compounds, with the intertidal mudflats, sandflat and salt marshes (which are the primary qualifying features of the SAC) highly vulnerable to the introduction of synthetic and non-synthetic compounds, with littoral sediments acting as a sink for such compounds. The estuaries within the SAC have been designated as an entire unit including the water column which has been included because of its importance not only in the biological functioning of the system, but also as the means by which sediment is mobilised and transported. The interest features of the Alde-Ore Estuary SPA (important breeding and wintering bird assemblages including Avocet, Little Tern, Marsh Harrier, Sandwich Tern, Lesser Black-backed Gull and Redshank) are dependent on the mudflat, sandflat and salt marsh habitats. Contamination is a particular issue for these species either through direct contact or accumulation of toxins through the food chain.

19 British Energy's Environmental Scoping Report (November 2008) cited Sizewell Railhead Halt as a potential key transport link to Sizewell during construction. From here, vehicle access could be along Lover's Lane which runs adjacent to Sandlings SPA at The Walks. In addition access to the secondary ancillary area identified in the Site Nomination which lies to the south of the existing power stations would likely be along this lane.

This range of issues is also directly relevant for the Alde-Ore Estuary Ramsar designation.

2.25 Sizewell lies approximately 8km north along the coastline of the Alde-Ore and Butley Estuaries SAC and the Alde-Ore Estuary SPA and Ramsar. Beyond Southwold, down to Thorpe Ness there is a weak southerly net drift of coastal sediments (although little sediment moves south beyond Thorpe Ness)[20]. As such there is the potential for this movement to provide a pathway for radioactive and non-radioactive discharges between the nominated site and habitats within the SAC and through accumulation within the food chain, upon bird populations found within the SPA and Ramsar designations. The HRA Screening Assessment indicates that it is uncertain whether or not such a movement of sediments between Sizewell and these European Sites is strong enough to result in a likely significant effect on these sites. As such, the **potential for significant impacts on these European Sites should be considered further through Appropriate Assessment.**

Orfordness – Shingle Street SAC

2.26 Orfordness – Shingle Street SAC is designated for its coastal lagoons at the mouth of the Ore estuary as well as annual vegetation of drift lines and perennial vegetation of stony banks found along the 15km long spit at Orfordness. The closest part of the SAC to Sizewell is approximately 8km south along the coast. The net southerly drift of coastal sediments described above could provide a possible pathway for radioactive and non-radioactive discharges (for example sedimentation, oil spillages from accidents) to impact upon the vegetated shingle plant communities which are particularly vulnerable to the effects of smothering. Storm conditions could then provide appropriate conditions for pollutants to enter into the lagoons when the shingle bar is overtopped. Both habitats are also vulnerable to nutrient loading and some of the lagoons are already nutrient enriched possibly due to the presence of the very large breeding gull colonies. The HRA screening indicates that it is uncertain whether or not the pathway between Sizewell and Orfordness – Shingle Street SAC is strong enough to result in a likely significant effect on this site. As such, the **potential for significant impacts on this European Site should be considered further through Appropriate Assessment.**

Outer Thames Estuary SPA

2.27 Outer Thames Estuary SPA lies immediately adjacent to Sizewell and is under consideration for designation for its internationally important numbers of wintering Red-throated Diver *Gavia stellata*.

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20 Posford Haskoning (2002) *Suffolk Coast and Estuaries Coastal Habitat Management Plan, Living with the Sea* LIFE Nature Project.

2.28 Red-throated Divers have a high sensitivity to toxic contamination through non-synthetic compounds (e.g. heavy metals and hydrocarbons) and a moderate sensitivity to the introduction of synthetic compounds (e.g. PCBs). For example, direct mortality of Red-throated Divers can occur as a result of heavy oils reducing the waterproofing of the birds feathers, causing them to lose body heat, become exhausted and eventually drown (especially if a spill were to occur when the birds become flightless during their autumn moult in September and October). Indirect effects can also occur as a result of toxins / pollutants deteriorating prey fish species either through mortality, reduced palatability or through accumulation of toxins within the food chain.

2.29 Red-throated Divers also have a moderate sensitivity to non-toxic contamination as a result of changes in nutrient and organic loading, as well as changes in thermal regimes, changes in turbidity and changes in salinity. Such sources of non-toxic contamination can effect species composition and species richness within coastal waters, resulting in a reduction of prey items for Red-throated Divers. Increased turbidity can also result in reduced visibility of prey items.

2.30 The Screening Assessment indicates that the potential for significant effects on the Outer Thames Estuary SPA through water quality pathways. As such, the **potential for significant impacts on this European Site should be considered further through Appropriate Assessment.**

Habitat (and Species) Loss and Fragmentation

European Sites for which no significant effects are likely (see Appendix 3):

- Benacre to Easton Bavents Lagoons SAC / SPA
- Dew's Ponds SAC
- Staverton Park and The Thicks, Wantisden SAC

European Sites for which significant effects are likely (see below):

- Minsmere to Walberswick Heaths and Marshes SAC
- Minsmere to Walberswick SPA / Ramsar
- Sandlings SPA
- Alde-Ore and Butley Estuaries SAC
- Alde-Ore Estuary SPA / Ramsar
- Orfordness-Shingle Street SAC
- Outer Thames Estuary SPA

2.31 Habitat loss and fragmentation in relation to European Site integrity can occur naturally (for example tree fall, changing flow patterns in aquatic systems) or as a result of human intervention. Direct anthropogenic impacts (for example through road building, flood defences) can result in barriers to migration, remove habitats areas which are immobile and cannot easily be recreated, change nutrient flows, or remove area habitat connectivity.

Sandlings SPA

2.32 The Environmental Scoping Report[21] notes the potential for Sizewell Railhead Halt to be used as a key means for transporting construction materials to Sizewell. The report also notes that the vehicular link between the halt and Sizewell could potentially be along Lover's Lane and it is possible that this may involve upgrading / widening works to this route. It should be noted however that the nominator's report did not specify access routes to and from the nominated site. These impacts relate to Sandlings SPA and specifically The Walks within Leiston-Aldeburgh SSSI which is bordered by Lover's Lane to the north. In addition, existing transmission lines from Sizewell B dissect The Walks and it is also possible that this corridor may be chosen for new overhead or underground transmission lines, connecting Sizewell to the grid. However, the type and extent of such infrastructure arrangements are currently unknown. This area (reported as being in unfavourable recovering condition) is designated for its breeding populations of Woodlark and Nightjar, both of which are vulnerable to even minor changes to their habitat, particularly with regards to vegetation characteristics and the amount of bare ground available for nest sites. In addition, the effects of habitat fragmentation (for example. as a result of clearance of vegetation for new access roads and offsite facilities) within areas outside of the SPA (notably land in the Goose and Kenton Hills former heathland) which could potentially be utilised by foraging Nightjars should also be investigated further. **The potential for significant impacts on this European Site should be considered further through Appropriate Assessment.**

Minsmere to Walberswick Heaths and Marshes SAC
Minsmere to Walberswick SPA, Ramsar

2.33 Minsmere to Walberswick Heaths and Marshes SAC lies immediately adjacent to the northern boundary of Sizewell. The construction phase includes a potential new marine landing facility and coastal defences as well as cooling water culverts which will result in loss of coastal habitat in front of Sizewell and immediately adjacent to the SAC. The shingle beach in front of the power station was extensively disturbed during

21 British Energy (November 2008) Proposed Nuclear Development at Sizewell: Environmental Scoping Report

construction of Sizewell B and has subsequently been replanted with plant communities taken from the nominated site prior to construction.[22] As well as a loss of 'buffer' area adjacent to the SAC, construction of such infrastructure within the coastal margin could lead to eradication of the adjacent seed bank and prevent recolonisation of nearby shingle habitat within the SAC. Tidal regimes and natural erosional forces are critical to the maintenance of SAC qualifying features, notably the vegetation communities associated with the shingle banks. Degradation of this habitat could occur as a result of the temporary marine landing facility interrupting sediment flows along the coast resulting in accretion north of the structure with potential for smothering of shingle habitat as a result. Depending on the height and layout of the buildings, shading of the vegetated shingle plant communities could also result in potential impacts on the integrity of these features. As a result of changes to habitat structure, composition and quality, there could also be indirect effects for the qualifying interest features of Minsmere to Walberswick SPA and Ramsar, notably Little Terns which nest within the shingle habitats. Other impacts could include loss of buffer habitats to the north of the nominated site which may occasionally be used by other qualifying species such as Marsh Harriers, Nightjar and Woodlark. **The potential for significant impacts on these European Sites should be considered further through Appropriate Assessment.**

Orfordness – Shingle Street SAC
Alde-Ore and Butley Estuaries SAC
Alde-Ore Estuary SPA, Ramsar

2.34 The qualifying features for Orfordness-Shingle Street SAC are the result of the coastal area being an 'active process site'. Any development or activity that restricts natural processes is likely to damage the interest features of the site. Damage could potentially be caused by activities such as the construction of potential marine landing structures and defences at Sizewell, as well as the removal of material from the sea bed for the installation of a direct cooling system. Whilst it is understood that there is a net southerly movement of material along the coast from north of Sizewell (Dunwich Cliffs) to Orfordness spit, it is uncertain whether interruption of this flow could lead to erosion of the shingle feature and lagoons supported by it and hence cause a likely significant impact on the integrity of the SAC's qualifying features.

2.35 Such changes to Orfordness itself and in particular the possibility of depletion of the shingle bar could also result in indirect effects on Alde–Ore and Butley Estuaries SAC and also Alde-Ore Estuary SPA, Ramsar. The Alde-Ore estuary is the only bar-built estuary in the UK with a shingle bar. Habitats formed through accretion, including the

22 AEA Energy & Environment (April 2008) Environmental Product Declaration of Electricity from Sizewell B Nuclear Power Station, Technical Report.

qualifying mudflats, sandflats and saltmarsh, are dependent upon the protection from wave action that the bar provides and consequently erosion of this feature could lead to indirect habitat losses (especially at the mouth of the estuary) within these European Sites also.

2.36 Further investigation into the coastal sediment flows between the nominated site and Orfordness SAC and the role this shingle feature plays in maintaining the estuarine habitats within the Alde-Ore and Butley Estuary SAC and Alde-Ore Estuary SPA, Ramsar would be required to determine the likelihood and significance of this in relation to the conservation objectives for the SAC, SPA and Ramsar. **The potential for significant impacts on these European Sites should be considered further through Appropriate Assessment.**

Outer Thames Estuary SPA

2.37 Potential direct impacts to habitats within the Outer Thames Estuary SPA could arise during the construction, operation and de-commissioning of cooling water culverts, marine landing facility and infrastructure, upgraded coastal protection and any channel dredging operations that are required. The physical loss of and damage to supporting habitat (shallow coastal waters and areas in the vicinity of sub-tidal sandbanks) is a key sensitivity of the SPA, as it can lead to the loss of foraging sites for Red-throated Divers. The link between this species and benthic communities is not well understood, but it is thought that the strong association Red-throated Divers have with sandbanks is due to this habitat's functional role (as nursery, spawning, feeding or in providing shelter) in supporting prey species such as Gadoids, Sprat, Herring and Sandeel. Other significant effects on supporting habitats could occur through indirect pathways, including changes to coastal sediment regimes as a result of coastal defences and construction of a marine landing facility. **The potential for significant impacts on this European Site should be considered further through Appropriate Assessment.**

Disturbance (Noise, Light and Visual)

European Sites for which no significant effects are likely (see Appendix 3):

- Benacre to Easton Bavents Lagoons SAC / SPA
- Dew's Ponds SAC
- Staverton Park and The Thicks, Wantisden SAC
- Minsmere to Walberswick Heaths and Marshes SAC
- Alde-Ore and Butley Estuaries SAC
- Alde-Ore Estuary SPA / Ramsar
- Orfordness-Shingle Street SAC

European Sites for which significant effects are likely (see below):

- Minsmere to Walberswick SPA / Ramsar
- Sandlings SPA
- Outer Thames Estuary SPA

2.38 Disturbance to habitats and species can arise from a number of sources. While recreational activities are frequently implicated in disturbance events, sources are multifarious and can include traffic, construction activity and intermittent sounds (for example alarms/ sirens). The impacts on bird species of disturbance events are particularly significant and tend to occur on a continuum where the most disturbing activities are those that are irregular, unpredictable loud noise events and movement or vibration of a long duration. Less disturbing are regular, frequent, quiet and predictable patterns of sound or vibration with limited vibration[23].

Minsmere to Walberswick SPA, Ramsar

2.39 Breeding Little Terns are highly sensitive to non-physical disturbance and are a qualifying interest feature of Minsmere to Walberswick SPA which lies adjacent to the northern boundary of Sizewell. Noise and visual disturbance may cause nesting Little Terns to abandon eggs or chicks and there is currently a high exposure score for this site. Woodlarks and Nightjar (also qualifying features of the SPA) are also vulnerable to the effects of disturbance related to flushing by dogs and humans. Waders including Avocet, Gadwall and Teal (all of which are interest features for the SPA or Ramsar designations for this site) expend unnecessary energy and have reduced feeding times as a result of responding to disturbance events. Displacement between feeding sites can also place pressures on available resources, placing additional pressures on supporting habitats.[24] The net effect of these disturbance events is a direct negative impact on species survival.

2.40 The HRA Screening Assessment has identified that increased disturbance is likely from a range of sources (lighting, noise and vibration) and may divert birds from their chosen roosting and feeding sites. These disturbance sources and effects may be equally relevant offsite through the construction of marine landing sites and improved road/ rail access. Furthermore, the additional workforce required during the construction period in particular has the potential to be very large and consequently cause increased disturbance through recreation / human presence in the area and this is of particular concern for breeding Little Tern, Woodlark and Nightjar. **Given the extended construction phase of the development and identified sensitivities**

23 Scott Wilson (Nov 2008) EcoTowns: Sustainability Appraisal and Habitats Regulations Assessment.
24 Gill, Sutherland & Norris (1998) The consequences of human disturbance for estuarine birds. RSPB Conservation Review 12. 67-72.

of the designated species within Minsmere to Walberswick SPA / Ramsar to disturbance events, the potential for significant effects should be considered further through Appropriate Assessment.

Sandlings SPA

2.41 As discussed above, both Nightjar and Woodlark are highly sensitive to disturbance when nesting and these species are also qualifying interest features for Sandlings SPA, the closest part of which is The Walks and an area that could possibly be subject to infrastructure improvement works (for example possible access route from Sizewell to Sizewell Railhead Halt). Increased disturbance could arise as a result of any construction works in this area as well as an increased volume of traffic within close proximity to the SPA. In addition the influx of people into the area, especially during the construction phase could exert additional recreational pressures on the SPA. **Given the extended construction phase of the development (6-7 years)** [21] **and identified sensitivities of the designated species within Sandlings SPA to disturbance events, the potential for significant effects should be considered further through Appropriate Assessment.**

Outer Thames Estuary SPA

2.42 Red-throated Divers are known to have a high sensitivity to non-physical disturbance during the winter, which can result in displacement from feeding grounds. Disturbance can either cause birds to cease feeding or fly away and, in response, they could either increase their energy requirements at their existing (disturbed) feeding grounds or move to alternative, but often less favoured feeding or roosting sites. Impacts as a result of noise and visual disturbance could lead to significant effects on the SPA, should Red-throated Divers use habitats in close proximity to the nominated site. However, increased disturbance could arise as a result of any increase in shipping movements associated with the new marine landing facility, whilst the influx of people into the area, especially during the construction / de-commissioning phase could exert additional recreational pressures on the SPA. **Given the identified sensitivities of the qualifying interest within the SPA to disturbance events, the potential for significant effects should be considered further through Appropriate Assessment.**

Air Quality Impacts

European Sites for which no significant effects are likely (see Appendix 3):

- Benacre to Easton Bavents Lagoons SAC / SPA
- Dew's Ponds SAC
- Staverton Park and The Thicks, Wantisden SAC
- Alde-Ore and Butley Estuaries SAC
- Alde-Ore Estuary SPA / Ramsar
- Orfordness-Shingle Street SAC

European Sites for which significant effects are likely (see below):

- Minsmere to Walberswick Heaths and Marshes SAC
- Minsmere to Walberswick SPA / Ramsar
- Sandlings SPA
- Outer Thames Estuary SPA

2.43 The effects of changing and poor air quality at European Sites vary according to the pollutant type, (acid deposition, ammonia, nitrogen oxides, ozone and sulphur dioxide) and the nature of the receiving environment. The key pollutants that are of concern for terrestrial habitats are sulphur dioxide (SO_2), ammonia (NH_3) and nitrogen oxide (NO_x). Deposition of nitrogen can lead to soil enrichment and sulphur dioxide to acidification; altering the species composition, with impacts on associated species.

2.44 Background air quality in the UK has improved progressively and is expected to continue to improve significantly over the next 15 years with tightening emissions standards and moves towards 'cleaner' energy generation. Pollution levels for all key pollutants in the rural area around Sizewell are typically low[25].

The HRA Screening Assessment noted the potential for impacts on air quality at a local level arising from the construction, operation and decommissioning phases of Sizewell. These impacts are considered to arise in particular from the construction/ development and decommissioning processes (for example fugitive dust and airborne particulates). Increased traffic generation is also of concern during development phases, and major roads within 0.2km have the potential to increase nitrogen and carbon emissions impacts from vehicles[26] .

2.45 The assessment also noted the potential for radioactive releases to the atmosphere, but that regulatory sources indicate aerial (radioactive)

25 AEA Energy (2007) Air Pollution in the UK.
26 Department for Transport (2003) Transport Analysis Guidance, the Local Air Quality Sub-Objective TAG Unit 3.3.3.

emissions to be low and cause little (human) and biodiversity radiation exposure[27].

Minsmere to Walberswick Heaths and Marshes SAC
Minsmere to Walberswick SPA / Ramsar

2.46 The HRA Screening Assessment identified that Minsmere to Walberswick Heaths and Marshes SAC could be impacted by potential changes to local air quality. In particular nitrogen deposition is an identified vulnerability for the clifftop heathland present within the SAC whilst vegetation of shingle habitats is vulnerable to the effects of smothering from airborne particulates. The potential for resulting changes to the vegetation structure and composition could also result in impacts on the qualifying interest features of the SPA and Ramsar. **The potential for adverse effects on the integrity of these European Sites should therefore be considered further through Appropriate Assessment.**

Sandlings SPA

2.47 The HRA Screening Assessment also identified supporting habitats within Sandlings SPA could be impacted by potential changes to local air quality. Air quality is an identified vulnerability for key supporting habitats for qualifying features (Nightjar and Woodlark) with acid grassland and heathland both being vulnerable to the effects of nutrient enrichment through nitrogen deposition. **The potential for adverse effects on the integrity of these European Sites should therefore be considered further through Appropriate Assessment.**

Outer Thames Estuary SPA

2.48 An increase in airborne pollutants could potentially impact upon on the species composition and abundance of prey items of Red-throated Divers as a result of nutrient loading within coastal waters. Whilst air quality is not a specific identified vulnerability for the SPA, given the proximity of the site (immediately adjacent), and, in line with the precautionary principle, further investigation into the impacts of nutrient loading from airborne pollution should be undertaken. **The potential for adverse effects on the integrity of this European Site should therefore be considered further through Appropriate Assessment.**

27 Environment Agency (2005) Measuring Environmental Performance, Sector Report for the Nuclear Industry.

Conclusions and Recommendations

2.49 In line with the screening requirement of the Habitats Directive and Regulations, an assessment was undertaken to determine the likely significant effects of the development at Sizewell on the thirteen European Sites that lie within 20km of the nominated site. The Screening Assessment and conclusions were informed by:

- The information gathered on the European Sites – **Appendix 1**;
- The summary analysis of potential environmental impacts generated by the development activities arising from Sizewell;
- Consideration, where necessary, of other plans and projects that have spatial/ contextual relevance – **Appendix 2**
- Government guidance[28] which indicates that HRA for plans is typically broader and more strategic than project level HRA and that it be undertaken at a level that is proportionate to the available detail of the plan.

2.50 The HRA Screening Assessment identified a number of key impacts arising from the development of the nominated site for a new nuclear power station, and the potential for significant effects at nine of the European Sites scoped into the screening process. These findings are summarised in Table 3 below. The potential for 'in-combination' effects with other plans and projects was also identified.

Table 3: Summary of Likely Significant Effect Screening

European Sites within 20km of nominated site at Sizewell	Water Resources and Quality	Habitat Loss and Fragmentation	Disturbance (Noise, Light, Visual)	Air Quality
Alde-Ore and Butley Estuaries SAC	?	?	✗	✗
Alde-Ore Estuary SPA	?	?	✗	✗
Alde-Ore Estuary Ramsar	?	?	✗	✗
Benacre to Easton Bavents Lagoons SAC	✗	✗	✗	✗
Benacre to Easton Bavents Lagoons SPA	✗	✗	✗	✗
Dew's Ponds SAC	✗	✗	✗	✗

28 Planning for the Protection of European Sites: Appropriate Assessment - Guidance For Regional Spatial Strategies and Local Development Documents, at http://www.communities.gov.uk/documents/planningandbuilding/pdf/160442.pdf

Minsmere to Walberswick Heaths and Marshes SAC	✓	✓	✗	✓
Minsmere to Walberswick SPA	✓	✓	✓	✓
Minsmere to Walberswick Ramsar	✓	✓	✓	✓
Orfordness-Shingle Street SAC	**?**	**?**	✗	✗
Staverton Park and The Thicks, Wantisden SAC	✗	✗	✗	✗
Sandlings SPA	✓	✓	✓	✓
Outer Thames Estuary SPA	✓	✓	✓	**?**

Key		
Likely Significant Effect	✓	**further Appropriate Assessment required**
No Likely Significant Effect	✗	**no further Appropriate Assessment required**
Significant Effect Uncertain	**?**	**precautionary approach taken and further Appropriate Assessment required**

2.51 It is recommended that the HRA proceeds to the next stage of 'Appropriate Assessment' in relation to the nine European Sites where the potential for likely significant effects (✓) or significant effect uncertain (**?**) has been identified. This next stage of the HRA process is outlined in the section 3 of this report.

3 HRA Appropriate Assessment of Sizewell

Scoping and Additional Information Gathering

3.1 To support the Appropriate Assessment (AA) phase, additional information was gathered on the European Sites and environmental condition, in line with the specific issues identified by the HRA Screening Assessment (**Appendix 4**). This additional information included, air quality data and trends, available from the UK Air Pollution Information System (APIS) and water quality and abstraction data produced by the Environment Agency as well as information retrieved from The Wetland Bird Survey (WeBS) Alerts.

Assessing the Impacts (in-combination) Appropriate Assessment

3.2 The HRA Screening Assessment considered whether the impacts arising from proposed development at Sizewell have the potential to affect the integrity of the European Sites scoped into the assessment process. This was done by making an assessment against the conservation objectives for each European Site (detailed in Appendix 1). The following sections summarise the analysis undertaken to determine whether the effects are likely to have an adverse effect on European Site integrity, either alone or in-combination with other plans and projects (detailed in Appendix 2).

Water Resources and Quality

3.3 Current Environment Agency data[29] indicates that (where assessed) the ecological and chemical status of the coastal and estuarine environments near to Sizewell is assessed as 'moderate' and 'good' respectively. By 2015 the Environment Agency predicts that the ecological status will increase to 'good' and that chemical status will remain 'good'. Current assessments for the coastal water quality, further south from Sizewell along the Essex coastline indicate that the ecological and chemical status of the environments here are the same as those surrounding Sizewell but the prediction here is that the ecological status will remain 'moderate' or worse until 2015.The ecological status of the rivers around Sizewell range from being assessed as 'poor' to 'moderate' – the chemical condition of these rivers has yet to be assessed. Groundwater chemical quality around Sizewell is assessed by the Environment Agency as being 'poor'.

3.4 Radioactive discharges (including potential accidental discharges from waste storage) are subject to targets monitored by the Environment Agency and of the non-radioactive discharges, nitrate contributions are

29 The data used in this assessment is taken from the Draft River Basin Management Plan, which was the most up to date plan available at the time. Draft plans were presented to the Government for approval in September 2009, with final plans published in December 2009..

considered to be the most significant (research cited by the Environment Agency in the nuclear sector report). In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges.

3.5 Under the Habitat Regulations, it is also a requirement that competent authorities review all authorisations, consents, licences and permissions on European designated sites. This is known as the Review of Consents (RoC). Any existing abstraction and discharge licences at Sizewell will therefore undergo review. Activities which could have an adverse impact will not be renewed unless it can be shown that there will not be an adverse effect on European Sites. Similarly any new permissions will only be granted if applications show that there will not be an adverse impact on site integrity.

Minsmere to Walberswick Heaths and Marshes SAC
Minsmere to Walberswick SPA, Ramsar

3.6 Environmental condition data for Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar (Appendix 1, site characterisations) indicate that measurements taken from the mouth of the River Blyth which runs through these sites before entering the sea, scored 'moderate' and 'good' ecological and chemical statuses respectively. It was noted however that dissolved inorganic nitrogen is currently achieving 'less than good' ecological status for this river and as such any further nutrient loading should be avoided.

3.7 Whilst current water quality indicators show ecological and chemical levels around Sizewell to be 'moderate' or higher, it is not possible (without further information on discharge levels and quality) to conclude that both radioactive and non-radioactive discharges will not have an adverse effect on Minsmere to Walberswick Heaths and Marshes SAC or Minsmere to Walberswick SPA and Ramsar.

3.8 Sizewell and part of the SAC, SPA and Ramsar sites fall within the River Yox catchment area (WRMU4). This catchment drains to the Sizewell Belts and then to the north via an artificial channel (the Leiston Brook) eventually to join the Minsmere River approximately 2km to the north of the nominated site before discharging to the North Sea through a sluice gate. No water is available for further licensing within this unit at low flows although water may be available at higher flows with appropriate restrictions (i.e. new licences may be considered for non-consumptive uses)[30].It may therefore be a requirement for any new developments at Sizewell to provide water supply strategies.

30 This is where all abstracted water is returned to the source a relatively short distance downstream of the abstraction point. for example. hydropower generation, fish farming (Environment Agency (January 2008) East Suffolk Catchment Abstraction Management Strategy)

3.9 The maintenance of hydrological conditions that sustain specialist freshwater wetland vegetation communities, subject to natural variation is one of the conservation targets, as detailed within the favourable condition tables for the component Minsmere to Walberswick Heath and Marshes SSSI.

3.10 Freshwater levels within key supporting habitats for the SPA and Ramsar are also used as a measure for determining favourable condition for a number of the qualifying interests, notably Bittern and Marsh Harrier. As noted within the Screening Assessment, the construction of a power station has the potential to adversely affect freshwater levels and thus the ability of these qualifying species to survive. In addition, there is an increasing risk of saline flooding of habitat that supports the freshwater interests and recently coastal surge events and periods of intense and sustained rainfall have also led to freshwater flooding of the nominated site because of the limited drainage capacity of the sluice and this has been shown to have an impact on the Bittern population that rely on stable freshwater water levels within the extensive area of reedbed at Minsmere[35].

Effects in Combination with Other Plans and Projects

3.11 Possible adverse impacts in terms of water quality and quantity on Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar and their qualifying interest features could arise as a result of the following mechanisms identified within the Environmental Management Plan for the decommissioning of Sizewell A[31] (see Appendix 2):

- Mobilisation of existing contamination by direct rainwater infiltration due to changes in ground coverage and the creation of temporary open excavations and;
- The potential contamination of ground and groundwater due to contaminated water entering those external drains that run to soakaways.
- Inadvertent contamination of soils and/or groundwater arising from temporary storage of contaminated soils, wastes or materials.
- Changes in groundwater flow/water table regime beneath nearby European Sites designated for their ecological value due to on site dewatering operations, if any.
- Changes in water quality in the North Sea due to the potential release of turbid and/or contaminated water from decommissioning activities on the nominated site.

3.12 Whilst mitigation for all of the above potential impacts is described within the Environmental Management Plan, residual risks and impacts remain and have been assumed in this assessment. Given the likely concurrent decommissioning of Sizewell A as well as Sizewell B

31 Sizewell A Nuclear Power Station Environmental Management Plan Issue 2 (2007)

(estimated decommissioning date is 2035[32]), cumulative effects on water quality and quantity could be significant.

3.13 The recently published Shoreline Management Plan[33] describes the preferred management strategies for the constituent cells, including Dunwich to Minsmere. The intent of the SMP for this stretch in the long term is to adapt but maintain the Minsmere Sluice (subject to this not impinging on sediment movements) and managed realignment to the north end of Minsmere. Further detail of this strategy is provided within the Blyth Estuary Flood Risk Management Strategy[34] and Minsmere Flood Risk Management Project[35].With regards the Sizewell to Thorpeness management cell, the aim of the plan is to maintain the defence of Sizewell but to generally allow the natural development of the coast, whilst not precluding local management to reduce the rate of erosion. Possible in-combination effects that could arise as a result of the proposed flood risk management strategies in terms of water quality include saline inundation of freshwater habitats, changes to water temperature and sediment regimes as well as short-term construction impacts from the construction and / or maintenance of sea defences such as localised sedimentation and risk of contamination from pollution events.

3.14 **Given that water abstraction requirements and discharge qualities and locations for Sizewell are currently not defined, a precautionary approach requires that at the strategic level potential adverse effects be assumed for Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar in relation to water quality and abstraction, until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.**

Sandlings SPA

3.15 The six component sites which comprise Sandlings SPA are dispersed over several Water Resource Management Units (WRMUs).The closest part of the SPA to the nominated site (The Walks) lies within the same catchment as the nominated site (River Yox WRMU). As described above, no water is available for further licensing within this unit at low flows and it may therefore be a requirement for any new developments at Sizewell to provide water supply strategies. Current water quality within Leiston Beck which this catchment drains into is currently

32 www.british-energy.com
33 Lowestoft Ness to Languard Point: Subcell 3c – Draft Policy Summary PDZ4: Dunwich Cliffs to Thorpeness (March, 2009)
34 Blyth Estuary Flood Risk Management Strategy: Environmental Report Non-technical Summary (Spetember 2007)
35 Minsmere Flood Risk Management Project: Preferred Option Information Document (November 2008)

assessed as having ‘moderate’ ecological status with dissolved oxygen levels currently achieving ‘less than good’ status.

3.16 Much of the remainder of the SPA falls within the Hundred River WRMU, into which any surface run off from Sizewell A currently discharges. It is not understood at this stage how drainage will operate within the nominated site and whether or not the proposed development will also discharge into this catchment. The current ecological status of water quality within the Hundred River is ‘moderate’, although two elements are noted to be achieving ‘less than good’ status these are: dissolved oxygen and phosphate.

3.17 Whilst water quality is not an identified vulnerability for the nominated site, pathways exist which could result in a localised degradation in water quality as a result of both abstraction in an area that is currently already at or nearing capacity in terms of consumptive abstraction licences as well as a reduction in the ecological and chemical status of watercourses which discharge into the same catchment as part of the SPA through sedimentation, pollution incidents etc.

Effects in Combination with Other Plans and Projects

3.18 Possible in-combination effects that could arise as a result of the concurrent decommissioning of Sizewell A (as well as possibly B) are described in paragraph 3.11 and are also of relevance for Sandlings SPA.

3.19 The Suffolk Coastal Local Development Framework (2006-2021) sets out policies for potential future development in and around Leiston (Policies SP7 and SP9) which lies just 700m to the west of Sandlings SPA at its closest and also identifies new housing opportunities for Woodbridge (Policy SP10) which lies close to Rendlesham Forest (part of the SPA). Future development in these areas could result in an increased demand for water resources as well as an increase in municipal discharge with a lowering of water quality in the receiving watercourses.

3.20 As a result of both decommissioning activities on the nominated site as well as future housing developments as identified within the LDF cumulative effects in terms of water quantity and quality could be significant.

3.21 **Given that water abstraction requirements and discharge qualities and locations for Sizewell are currently unknown, a precautionary approach requires that at the strategic level potential adverse effects be assumed for Sandlings SPA in relation to water supply and abstraction, until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse**

effects on European Site integrity is considered further in the avoidance and mitigation section of this report.

Alde-Ore and Butley Estuaries SAC
Alde-Ore Estuary SPA, Ramsar
Orfordness - Shingle Street SAC

3.22 Environmental condition data for the overlapping and adjacent Alde-Ore Butley Estuaries SAC and Alde-Ore Estuary SPA and Ramsar and Orfordness – Shingle Street SAC indicates (from measurements taken from the tidal reaches of the rivers Alde and Ore) that water quality is of 'moderate' ecological status (chemical status is yet to be assessed), although phosphate was noted to be currently achieving 'less than good' ecological status. Nitrate levels are also noted as being high and the high levels of nitrates and phosphates are likely to be related to diffuse pollution from agricultural land[36].

3.23 There is a weak supply of material moving south past Aldeburgh. Beyond Aldeburgh net drifts tend to increase to Orford Ness and once beyond the Ness material moves south to Shingle Street. The entrance to the Alde-Ore estuary retains and controls material moving south[37]. It is these coastal processes that could potentially transport contaminants along the coastline from the nominated site and towards the mouth of the Alde-Ore estuary, where they could accumulate within the estuarine habitats over time.

Effects in Combination with Other Plans and Projects

3.24 Decommissioning of Sizewell A and possibly Sizewell B in the future could lead to changes in North Sea water quality due to the potential for release of turbid and/or contaminated water from decommissioning activities on the nominated site.

3.25 Like Blyth estuary to the north, a coastal flood defence strategy is currently in preparation for the stretch of coastline and estuaries covered by Orfordness-Shingle Street SAC, Alde-Ore Estuary SPA and Ramsar and Alde-Ore and Butley Estuaries SAC. The Aldeburgh Coast and Estuary Strategy has identified a number of options to manage the risk of flooding and coastal erosion, ranging from 'hold the line' to managed realignment and it is these different options that will be the subject of a detailed study. No information is therefore currently available on the preferred option, although all would to varying extents lead to potential effects on water quality. This could include short-term impacts as a result of construction or maintenance of sea defences (for example sedimentation, risk of pollution events) as well as longer term

36 Aldeburgh Coast and Estuary Strategy: Strategic Environmental Assessment: Scoping Consultation Document (March 2009)
37 The Suffolk Coast and Estuaries Habitat Management Plan (CHaMP): Coastal Habitat Management Plan Final Report (October 2002)

changes to sediment regimes, salinity and water temperature (all of which are attributes used to assess favourable condition of the component Alde-Ore Estuary SSSI) should defences be allowed to be breached or managed realignment chosen.

3.26 Set against a backdrop of sea level rise, in terms of water quality, an eroding coastline and high levels of diffuse agricultural pollution, cumulative effects from those plans and projects described above could be significant.

3.27 **Given that water discharges and quality for Sizewell are currently unknown, a precautionary approach requires that at the strategic level potential adverse effects be assumed for Alde-Ore and Butley Estuaries SAC, Alde-Ore Estuary SPA / Ramsar and Orfordness – Shingle Street SAC in relation to water supply and abstraction, until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.**

Outer Thames Estuary SPA

3.28 Assessments made by the Environment Agency in 2004 under the Water Framework Directive (WFD) and updated in the River Basin Management Plans in 2009 indicate that transitional (including estuarine) and coastal waters within the Outer Thames area are at risk of failing to reach the environmental standards that are required under the WFD[38]. In particular, organic source pollution is identified as a potential future risk. Implementation of mitigating measures under the WFD are assisting, and will continue to assist, in addressing coastal water quality issues, and discharges will be further controlled in order to meet 'Good Ecological Status' as specified under the Directive.

3.29 The sheltered coastal areas and transitional water types of the SPA are at most risk from impacts related to water resources and quality (the more exposed offshore areas of the SPA are less at risk, as there is greater dilution and dispersion of contaminants). A number of operators discharge effluent into the Thames Estuary and into adjacent coastal waters and direct discharges into the SPA include low levels of radionuclides, and heavy metals. However, significant dilution afforded to these low inputs, together with the high energy environments associated with sandbanks, mean that currently, Red-throated Divers have a moderate sensitivity to toxic contamination from these sources.

[38] http://www.environment-agency.gov.uk/researc/planning/33292.aspx

Effects in Combination with Other Plans and Projects

3.30 Possible in-combination effects with regards to water quality could occur as a result of the same plans and projects highlighted above in relation to the coastal European Sites (Alde-Ore and Butley Estuaries SAC, Alde-Ore Estuary SPA, Ramsar, Orfordness - Shingle Street SAC and Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA, Ramsar).

3.31 At the time of writing, no other plans or programmes were noted, which specifically address this SPA. However, in combination impacts from the following current and proposed economic activities in the Outer Thames Estuary could however arise.

- Aggregate extraction: The Anglian Offshore (East Coast) region and the Thames Region within which the SPA lies are both strategically important areas for this industry. Crown Estate data[39] indicate that the industry is investigating potential for extraction in areas located partially in the SPA. Whilst marine aggregate extraction is a heavily regulated activity (on-going and new plans or projects), a sudden increase in new licence applications could cause indirect impacts on prey distribution, visibility and abundance through disturbance to the seabed and increased turbidity in the water column.
- Oil and Gas: A number of pipe routes have been reviewed for transporting the CO_2 from The Thames Cluster to the Hewett Gas Field, including an offshore route which would pass through the SPA for approximately 143km.[40] Installation of any such pipeline would cause temporary disturbance to the sea bed with resulting effects on water quality and there is also the low risk that once operational, if the gas pipelines within the SPA were to leak, it could potentially cause toxic contamination.
- Renewables: Construction of the consented Gunfleet Sands and London Array wind farms, both of which fall within the boundary of the SPA, will potentially lead to a short term and localised deterioration in water quality within the SPA through disturbance to the sea bed from piling and cable laying activities. In terms of future development of renewables within the Outer Thames, the Crown Estate has issued an Invitation to Tender to developers for the Round 3 offshore wind farm leasing programme for the delivery of up to 25 GW in capacity of potential new offshore wind farm sites by 2020. The area covered by Round 3 overlaps with 7.8% of the total area of the SPA.
- Cables: A number of operational telecommunication cables pass through the site amounting to a total length of 225km. Most

[39] www.thecrownestate.co.uk/dredge_areas_statistics
[40] Capturing carbon, tackling climate change: A vision for a CCS cluster in the South East, E-ON, April 2009

planned cable laying activity is replacement or upgrading of existing cables and could potentially impact upon water quality, although the effects are likely to be localised and temporary.

- Shipping (including dredging of channels): The Port of London is one of the UK's largest ports and the Port of London Authority (PLA) is the body responsible for ensuring safe navigation in the tidal Thames. Part of the PLA's operations is to ensure that shipping channels and berths are maintained or, in some limited cases, created. This requires occasional maintenance dredging of existing shipping channels that have suffered from siltation or capital dredging where a new channel or berth is required and could lead to water quality impacts. Increased shipping activity (for example, as anticipated with the proposed expansion of port facilities at Felixstowe and Great Yarmouth) could result in an increased likelihood of introduction of toxic contamination within the SPA, particularly with the increase in the number of ship-to-ship oil transfers.
- Land based sources of pollution: Toxic and non-toxic discharges could potentially affect supporting habitats and hence prey availability through contamination of sediment, nutrient loading and changes in turbidity, water temperature and salinity. Point source discharges are currently controlled through licencing by the Environment Agency.
- Development of a new nuclear power station at Bradwell may result in in-combination effects, if new nuclear power stations are built at both Bradwell and Sizewell. An assessment of these potential effects is included in the Habitats Regulations Assessment Main Report.

3.32 **Given that water abstraction requirements and discharge qualities and locations for Sizewell are currently unknown, a precautionary approach requires that at the strategic level potential adverse effects be assumed for Outer Thames Estuary SPA in relation to water quality, until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity is considered further in the avoidance and mitigation section of this report.**

Habitat (and species) Loss and Fragmentation

Minsmere to Walberswick Heaths and Marshes SAC
Minsmere to Walberswick SPA, Ramsar

3.33 The Suffolk Coast and Estuaries Habitat Management Plan (CHaMP)[20] describes the main issues facing the Habitat Behaviour Units (HBU) along this stretch of coastline.

3.34 Habitat Behaviour Units encompassing Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar are subject to substantial erosion forces. Continued coastal defence management work on the immediate coastline potentially damages SAC features (annual vegetation) and SPA and Ramsar interests. The cliffs at Dunwich are eroding rapidly (with a current rate of retreat in the order of 1 to 2m each year) with loss of cliff top heathland vegetation (qualifying interest feature). Significant loss of ecological interest could occur over the long term due to failure of the fronting shingle ridge and tidal inundation of freshwater and brackish wetland habitats to landward.

3.35 The now superseded Shoreline Management Plan (SMP)[41] for this area reports the result of analysis of the beach profiles in front of Sizewell. This suggests that since 1993 accretion has been recorded, except in one location where erosion has been measured and is thought to have been linked to littoral drift being blocked by the temporary beach landing facility which was removed in 1994, following the construction of Sizewell B. These findings provide further support to the concern that accretion along the shoreline to the north of Sizewell could result from the construction of a temporary marine landing facility with resulting impacts on the shingle habitats found here.

Effects in Combination with Other Plans and Projects

3.36 The more recently published Shoreline Management Plan[42] as well as Blyth Estuary Flood Risk Management Strategy[43] and Minsmere Flood Risk Management Project[44] describe the preferred management strategies for the coastline from Dunwich to Minsmere. The proposals are described in more detail above (see paragraphs 3.13 and 3.26) but broadly involve maintenance of the Minsmere Sluice (subject to this not impinging on sediment movements) and managed realignment to the north end of Minsmere. The effects of this strategy (or equally uncontrolled failure of defences within the Blyth estuary) would result in significant change to qualifying interests of the SAC, SPA and Ramsar. Most notable would be the tidal inundation converting SPA, Ramsar and SSSI freshwater grazing marsh and reedbeds (including the extensive Westwood Marshes) to mudflats and saltmarsh in the short and medium term leading to the potential loss of habitats that support populations of Bittern, Marsh Harrier and Bearded Tit[34]. Works to maintain or adapt the Minsmere Sluice could also result in localised impacts to the shingle beach in this area, with resulting impacts on the qualifying vegetated shingle communities.

41 Shoreline Management Plan: Subcell 3c Lowestoft to Harwich (1997)
42 Lowestoft Ness to Languard Point: Subcell 3c – Draft Policy Summary PDZ4: Dunwich Cliffs to Thorpeness (March, 2009)
43 Blyth Estuary Flood Risk Management Strategy: Environmental Report Non-technical Summary (Spetember 2007)
44 Minsmere Flood Risk Management Project: Preferred Option Information Document (November 2008)

3.37 The threats to the qualifying and supporting habitats within the SAC, SPA and Ramsar from controlled or uncontrolled saline inundation as described above, could, without mitigation, significantly affect the integrity of the SAC, SPA and Ramsar in the longer term. The Minsmere Flood Risk Management Strategy does outline compensation measures for the loss of freshwater habitats and it is understood that Natural England and the Environment Agency are liaising to produce regional habitat creation plans to take account of the rapidly evolving coastline (as advised by Natural England)[45]. Further details of such plans would need to be obtained to fully assess the potential for any 'in combination' effects.

3.38 In addition to the potential effects on habitats as a result of coastal flood management strategies, decommissioning of Sizewell A and possibly B may require additional land take for temporary works areas and any associated infrastructure improvements. Whilst this is unlikely to involve direct habitat loss within Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA, Ramsar given that neither Sizewell A nor B fall immediately adjacent to these European Sites, landtake could affect adjacent 'buffer' habitats. This could lead to potential impacts on qualifying interests for example through loss of off-site feeding and roosting areas for bird interests within the SPA and Ramsar as well as loss of adjacent seed sources for habitats within the SAC. Further impacts on habitats could arise as a result of any changes to coastal processes as a result of the interruption of sediment flows along the coastline should temporary landing facilities or dredging be required. Further details of the decommissioning strategies would be required in order to fully assess the in-combination effects.

3.39 The extent of loss / modification to marine and terrestrial habitats from the construction of cooling water culverts, sea defences and a marine landing facility is currently unknown, and its significance in the context of wider habitat changes cannot be assessed at this stage. It is possible that these changes may act cumulatively or accelerate changes identified by the CHaMP in relation to the primary designation features.

3.40 **At this strategic stage, where detailed development proposals are not yet defined, a precautionary approach requires that potential adverse effects be assumed through habitat loss / modification on Minsmere to Walberswick Heath and Marshes SAC and Minsmere to Walberswick SPA and Ramsar sites until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.**

45 Telecon 27th May 2009

Sandlings SPA

3.41 Of the six component SSSI units which comprise Sandlings SPA, four are currently in favourable condition. The closest SSSI unit to the nominated site is Leiston-Aldeburgh SSSI and this unit is assessed as being less than 50% favourable, the remainder classed as unfavourable recovering. This would suggest that the key supporting habitats for Nightjar and Woodlark within this unit at least are currently under environmental stress. This may increase their vulnerability to even minor habitat loss or fragmentation impacts should they arise through infrastructure works, notably along the route of Lover's Lane which bounds the northern boundary of this component unit of the Sandlings SPA.

3.42 Without further information regarding details on infrastructure proposals as well as usage of the affected habitats by Woodlark and Nightjar, it is not possible to conclude that habitat loss / fragmentation impacts will not result in a significant adverse effect on the integrity of the SPA.

Effects in Combination with Other Plans and Projects

3.43 The Suffolk Coastal Local Development Framework (2006-2021) sets out policies for potential future development in and around Leiston (Policies SP7 and SP9) which lies just 700m to the west of Sandlings SPA at its closest and also identifies new housing opportunities for Woodbridge (Policy SP10) which lies close to Rendlesham Forest (part of the SPA). Policy SP5 also sets out how priority will be given to new affordable housing in Aldeburgh and this will include supporting the provision of good public transport links to Leiston (part of the SPA lies immediately adjacent to the Leiston Road which connects the two settlements and hence any improvements to bus routes and associated facilities could involve slight land take).

3.44 Sandlings Forest Recreation Strategy[46] sets out the Forestry Commissions proposals in relation to a wide range of issues including the promotion of sustainable transport access, improvements in overnight capacity as well as enhanced facilities and public rights of way. Whilst no specific details are provided within the strategy, there is the potential for localised impacts relating to habitat loss / fragmentation where additional land take is needed to accommodate such visitor facilities.

3.45 Whilst these future developments are unlikely to result in significant direct habitat losses from within the SPA, there could be significant indirect effects should 'buffer' habitats or off-site habitats used infrequently by Woodlark and Nightjar be lost or become fragmented. Such in-combination effects could potentially be significant.

46 Sandlings Forest Recreation Strategy (Forestry Commission, 2005)

3.46 **At this strategic stage, where detailed development proposals are not yet defined a precautionary approach requires that potential adverse effects be assumed through habitat loss / modification on Sandlings SPA until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.**

Orfordness – Shingle Street SAC
Alde-Ore and Butley Estuaries SAC
Alde-Ore Estuary SPA, Ramsar

3.47 The maintenance of coastal processes is a key environmental factor determining the integrity of the shingle plant communities and saline lagoons which form the qualifying interests of the Orfordness – Shingle Street SAC. The feed of shingle that is transported around Thorpe Ness moves south beyond Aldeburgh to form the beaches of Orford Spit and Ness. Orfordness is defined as a downdrift accretion ness with downdrift accretion accompanied by erosion on the updrift side. The erosion includes the 'roll over' of shingle on to the backing marsh[20]. Orfordness presently comprises three main elements: a storm beach which is undergoing erosion in the north, together with some intermittent shingle spreads, an extensive spit to the south which is still experiencing accretion and the central ness which forms a cuspate foreland[47]. The Environment Agency has been monitoring changes in the shingle beach and nearshore profiles along a series of transect lines since 1992. A preliminary assessment of the results, as reported in Pye (2005)[47] indicated that profile measurements from Aldeburgh north showed net sediment loss over the period 1992-2003, especially from higher parts of the profile whilst other locations (notably Slaughden and Aldeburgh south) showed net gain, especially on the upper beach and this can be mainly attributed to sediment nourishment in these locations. Width of shingle barrier, measured at least once during the reporting cycle is a measure used by Natural England in assessing the favourable condition of the component SSSI units with the target being no trend towards a decline in width of barrier, subject to natural change.

3.48 The Alde-Ore estuary is in many respects not a typical estuary; essentially it consists of two tidal rivers, the Alde-Ore and the Butley River, with a tidal basin near the head of the Alde and does not display the trumpet plan shape which is characteristic of many typical estuaries. The unusual morphology of the Alde-Ore results primarily from the development and southwards growth of the Orfordness spit during the later Holocene[48]. Freshwater input and tidal ranges for the River Alde

47 Pye, K. (2005) Alde and Ore Estuary Flood Management Strategy- Assessment of Background Evidence and Recommendations for Further Action: External Investigation Report EX509

and Butley River are relatively small and consequently tidal flows in and out of the estuaries are relatively weak. These factors suggest that the maintenance of the shingle barrier at Orfordness is essential for the maintenance of estuary morphology. Favourable condition tables for the component Alde – Ore Estuary SSSI cite 'no change in creek bathymetry or width/length/bank angle of creeks from an established baseline, subject to natural change' as a target. Any depletion of the shingle barrier, in-conjunction with the effects of sea level rise, therefore has the potential to compromise conservation objectives for both Alde – Ore and Butley Estuaries SAC and Alde – Ore Estuary SPA, Ramsar.

3.49 Without further assessment regarding the location, size and design of the proposed coastal defences and any marine landing facility as well as the extent and location of any dredging activities, it is not possible to conclude that the construction, operation and decommissioning of Sizewell will not result in the degradation of the shingle bank itself through a reduction in source material.

Effects in Combination with Other Plans and Projects

3.50 Decommissioning of Sizewell A and possibly Sizewell B in the future could lead to effects on coastal processes in much the same way as described previously for the current nomination i.e. both through the removal of material as a result of dredging operations (for example if needed to maintain shipping access to the nominated site) or should a temporary marine landing facility be required.

3.51 The Aldeburgh Coast and Estuary Strategy has identified a number of options to manage the risk of flooding and coastal erosion, ranging from 'hold the line' to managed realignment and it is these different options that will be the subject of a detailed study. No information is therefore currently available on the preferred option, although all would to varying extents lead to potential direct and indirect effects on habitats within the SAC, SPA and Ramsar designations. For example, the option of 'hold the line' would involve the construction of hard defences along the shore at Slaughden, resulting in likely damage to habitats within the adjacent Alde-Ore and Butley Estuaries SAC and furthermore is considered unlikely to prevent the loss of remaining saltmarsh habitat[47] The option of 'advance the line' would result in increased erosion pressure on saltmarsh habitats to the seaward side of any new barrier, whilst a controlled or uncontrolled breach of the Slaughden defences would result in significant changes to habitats within the Alde-Ore estuary. In particular a breach of the defences would result in a high risk of increased mudflat and saltmarsh erosion in these areas unless large scale managed realignment and saltmarsh reactivation are carried out in parallel. Further detailed studies and consultation on the possible effects of the various options is currently

underway, the results of which would be needed to fully assess the in-combination effects.

3.52 However, in the context of rising sea levels and eroding coastline, it is considered that cumulative effects from those plans and projects described above could be significant.

3.53 **At this strategic stage, where detailed development plans that include the extent of additional land take (both temporary and permanent) for construction are unknown, a precautionary approach requires that potential adverse effects be assumed through habitat loss / modification on Orfordness - Shingle Street SAC, Alde – Ore and Butley Estuaries SAC and Alde – Ore Estuary SPA, Ramsar until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.**

Outer Thames Estuary SPA

3.54 The maintenance in favourable condition of key supporting habitats (shallow coastal waters and areas in the vicinity of sub-tidal sandbanks) forms a conservation objective for the Outer Thames Estuary SPA. Loss of sandbank habitat within the SPA could result in significant effects on Red-throated Divers, which rely on this habitat for feeding. It is thought that sandbanks may have a functional role (as nursery, spawning, feeding or in providing shelter) in supporting fish species that form the prey of Red-throated Divers. Overall sensitivity of the Red-throated Divers to damage to supporting habitat is considered to be moderate.

3.55 Sandbanks are dynamic systems and are therefore constantly changing. The Thames Estuary is subject to two distinct tidal influences. North Sea tides enter the estuary from the northeast and are responsible for the formation of sandbanks running in a northeast – south west direction in the northern part of the estuary. The second tidal influence is from the English Channel; these tides enter the southern part of the estuary around the North Kent coast and influence the formation of banks lying in an east – west orientation in the southern part of the estuary.

3.56 Any disturbance, which interferes with the hydrological regime in the vicinity of sandbanks, can be detrimental, as maintenance of sandbanks is dependent on current direction and speed. Adjacent coastal development and construction of sea defences can potentially change hydrological regimes.

3.57 Without further assessment regarding the location, size and design of the proposed coastal defences and any marine landing facility, as well as the extent and location of any dredging activities, it is not possible to conclude that the construction, operation and decommissioning of Sizewell will not result in the degradation of key supporting habitats for the Outer Thames Estuary SPA.

Effects in Combination with Other Plans and Projects

3.58 Possible in-combination effects with regards to habitat loss and damage could occur as a result of the same plans and projects highlighted above in relation to the coastal European Sites (Alde-Ore and Butley Estuaries SAC, Alde-Ore Estuary SPA, Ramsar, Orfordness - Shingle Street SAC and Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA, Ramsar).

3.59 At the time of writing, no other plans or programmes were noted, which specifically address this SPA. However, in combination impacts from the following current and proposed economic activities (described previously under Water Quality impacts) in the Outer Thames Estuary could however arise:

- Aggregate extraction: Whilst marine aggregate extraction is a heavily regulated activity (on-going and new plans or projects), a sudden increase in new licence applications could cause loss of / damage to supporting habitats through extraction and dredging.
- Oil and Gas: Installation of any proposed gas storage pipelines could result in short-term damage to sandbank habitats and associated communities.
- Renewables: Construction of the consented Gunfleet Sands and London Array wind farms, both of which fall within the boundary of the SPA, will potentially lead to short-term damage of sandbank habitats and communities as a result of piling and cabling works.
- Shipping: Channel dredging for navigation, as well as the creation of shipping lanes, are likely to result in some damage and loss of sandbanks and species they support.

3.60 It is considered that cumulative effects from those plans and projects described above could be significant. Development of a new nuclear power station at Bradwell may result in in-combination effects, if new nuclear power stations are built at both Bradwell and Sizewell. An assessment of these potential effects is included in the Habitats Regulations Assessment Main Report.

3.61 **At this strategic stage, where detailed development plans that include the extent of additional land take (both temporary and permanent) for construction are unknown, a precautionary approach requires that potential adverse effects be assumed through habitat loss / modification on Outer Thames Estuary SPA until greater site specific detail (including on technology and**

mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.

Disturbance (Noise, Light, Visual)

Minsmere to Walberswick, SPA, Ramsar

3.62 Information retrieved from Wetland Bird Survey (WeBS) reports for Minsmere to Walberswick SPA and Ramsar[49] suggests that bird populations currently using the site have not shown any significant decline in numbers, although coverage of the bird species present on site is not comprehensive. No published studies on the disturbance of birds within Minsmere to Walberswick SPA and Ramsar were found. However published studies on disturbance impacts more generally highlight vulnerabilities for qualifying interests of the SPA, namely Woodlark and Nightjar[50] and Little Tern[51]. Most studies relate to recreational disturbance and highlight the significance of disturbance from dog walkers and close proximity to humans. Site information for the SSSI units underpinning the SPA and Ramsar sites indicates that currently just under 50% of the habitats supporting the interest feature species are in favourable condition. Given that this potentially reduces the area of alternative habitat that is available to birds away from disturbed areas this could further compound the effects of disturbance on qualifying interests.

3.63 Sizewell lies directly adjacent to the SPA designation. Without knowing the full extent and nature of the development proposals, it is not possible to determine how the nature or timing of the development may affect interest feature birds or to conclude that there will be no adverse effect on the integrity of the SPA.

Effects in Combination with Other Plans and Projects

3.64 The decommissioning of Sizewell A and possibly B in the future is in itself likely to result in an influx of people into the area as a result of the additional workforce required. This could also result in an increase in visitor numbers to the SPA and Ramsar and lead to increased disturbance.

3.65 The in-combination effects arising from the aforementioned increase in population both within the wider area as well as in close proximity could result in significant disturbance effects on the qualifying interests of the SPA and Ramsar.

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49 http://www.bto.org/webs/alerts/alerts2008/Results/UK9009101/9009101.htm
50 Footprint Ecology (2005): A summary of the evidence base for : Disturbance effects to Annex 1 bird species of the Thames Basin Heaths
51 Footprint Ecology: Little Terns at Great Yarmouth: Disturbance to birds and implications for strategic planning, Footprint Ecology

3.66 **Given that the nature, location and duration of disturbance events associated with the construction, operational and decommissioning phases are not yet defined, a precautionary approach requires that at this strategic level, potential adverse effects be assumed for Minsmere to Walberswick SPA and Ramsar sites until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on European Site integrity identified is considered further in the avoidance and mitigation section of this report.**

Sandlings SPA

3.67 No published studies relating to disturbance of birds within Sandlings SPA were found. However published studies on disturbance impacts more generally highlight vulnerabilities with regards recreational pressures for the qualifying interest species, Woodlark and Nightjar. Recreational disturbance and particularly disturbance from dog walkers can result in reduced densities of breeding pairs of both species within an area. Nests which failed were significantly closer to paths, tended to be closer to the main points of access to heaths, in areas with higher footpath density, notably of high levels of use, and in more sparsely vegetated locations. The flushing rate of Nightjars from the nest was associated with the height of vegetation around the nest and the extent of nest cover[50].

3.68 Site information for the SSSI units underpinning Sandlings SPA indicates that currently approximately 65% of the habitats are in favourable condition, and this suggests that there may be insufficient suitable alternative habitats within the SPA away from areas that could potentially be subjected to disturbance impacts as a result of the proposed development.

Effects in Combination with Other Plans and Projects

3.69 The possible disturbance effects arising as a result of the increase in the population of both the wider area and local area (Decommissioning of Sizewell A and B) as described above also relate to Sandlings SPA.

3.70 In addition, Sandlings Forest Recreation Strategy describes strategies for improved access to the Forest, an indirect effect of which is likely to be that greater numbers of people are encouraged to visit. Again, this is likely to result in increased disturbance with regards ground-nesting qualifying bird interests for Sandlings SPA, especially if a large number of the additional visitors are accompanied by dogs.

3.71 Overall, the in-combination effects resulting from the above-mentioned plans could result in significant disturbance effects on the qualifying interests of the SPA and Ramsar.

3.72 **Given that the nature, location and duration of disturbance events associated with the construction, operational and decommissioning phases are not yet, a precautionary approach requires that at this strategic level, potential adverse effects be assumed for Sandlings SPA until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on site integrity identified is considered further in the avoidance and mitigation section of this report.**

Outer Thames Estuary SPA

3.73 Red-throated Divers are particularly sensitive to noise and visual disturbance from human activity and the screening assessment noted the potential for construction and decommissioning phases in particular to create significant disturbance events. This could lead to displacement of birds from favoured feeding areas and could affect their chances of survival.

3.74 Initial results of monitoring undertaken from some operational offshore wind farms, has shown displacement of 80-100% divers from the development footprint and the surrounding buffer area (although further work is required to corroborate these findings). This disturbance is thought to be due to disturbance caused by the turbines and boat-based maintenance activities. Other research has found that Red-throated Divers usually take off ahead of boats of all sizes, which may disturb individuals as far as 2 km away.[52]

3.75 During survey work carried out within the Greater Thames between 1989 and March 2005, Red-throated Divers were found to occur throughout the entire area of the Outer Thames Estuary, but were at greatest density and with greatest frequency off the coast of Suffolk and over sandbanks in the centre of the estuary and those extending towards the coast of south Essex and part of north Kent (Natural England map dated April 2010). These findings would indicate that presence of Red-throated Divers along the coastline immediately adjacent to the nominated site at Sizewell must be assumed.

3.76 As the nominated site lies directly adjacent to the SPA and, given that the full extent and nature of the development proposals is currently unknown, it is not possible to determine how the nature or timing of the development may affect interest feature birds or to conclude that there will be no significant effect.

[52] Outer Thames Estuary pSPA: Draft Consultation Impact Assessment (November, 2009)

Effects in Combination with Other Plans and Projects

3.77 Possible in-combination effects with regards to disturbance could occur as a result of the same plans and projects highlighted above in relation to the coastal European Sites (Alde-Ore and Butley Estuaries SAC, Alde-Ore Estuary SPA, Ramsar, Orfordness - Shingle Street SAC and Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA, Ramsar).

3.78 At the time of writing, no other plans or programmes were noted, which specifically address this SPA. However, in combination impacts from the following current and proposed economic activities (described previously under Water Quality impacts) in the Outer Thames Estuary could however arise.

- Aggregate extraction: A sudden increase in new licence applications could cause significant localised disturbance through extraction and dredging and associated shipping activities.
- Oil and Gas: Installation and operational maintenance of any proposed gas storage pipelines could result in increased disturbance within the SPA as a result of increased shipping movements.
- Renewables: Two operating wind farms (Kentish Flats and Scroby Sands) are fully and partially located within the site respectively. In addition, Gunfleet Sands and London Array wind farms will fall within the SPA. Construction on Phase 1 (up to 175 turbines) of the London Array wind farm project is likely to start in spring 2011 and will cover an area of approximately 100km. Phase 2 of the London Array project has consent but permission to construct is dependent on the results of monitoring from Phase 1 demonstrating no significant impact on the Red-throated Diver population. The noise from pile driving the monopiles and the noise and visual presence of vessels used for construction are likely to disturb and displace Red-throated Divers[53]. There is a licence condition for the development, which specifies that from 1 November to 31 March, all vessels involved in construction operations must approach the site from the south using main shipping channels and leave by the same route to minimise any potential disturbance to Red-throated Divers.
- Fisheries: The Thames Estuary supports important commercial fisheries, as well as estuarine and marine recreational angling. Approximately 180 fishing commercial fishing boats operate within the area of the estuary. The presence of additional vessels in the future within the SPA could potentially disturb and displace Red-throated Divers, particularly in the areas where there are more productive fisheries. In addition, fishing could directly reduce the abundance of fish that the designated species feed upon, both through extraction of target species and as by-catch.

[53] Outer Thames Estuary pSPA Draft Consultation Impact Assessment, November 2009

- Shipping: Channel dredging for navigation, as well as the creation of new shipping lanes, are likely to result in additional disturbance to Red-throated Divers within the SPA in the future.
- Recreation: There is a high level of use of the site by all forms of recreational vessels. The majority of these activities are restricted to inshore waters of the estuaries and coast, although there are a large number of yacht clubs within the site which use waters further offshore. The presence of people using the water for recreation and the associated noise could disturb and displace Red-throated Divers. However, such effects are lessened to a certain extent by that fact that recreational activity is at its lowest when the birds are present within the Outer Thames Estuary.

3.79 Overall, the in-combination effects resulting from the above-mentioned plans and economic activities could result in significant disturbance effects on the qualifying interests of the SPA. Development of a new nuclear power station at Bradwell may result in in-combination effects, if new nuclear power stations are built at both Bradwell and Sizewell. An assessment of these potential effects is included in the Habitats Regulations Assessment Main Report.

3.80 **Given that the nature, location and duration of disturbance events associated with the construction, operational and decommissioning phases have not yet been determined, a precautionary approach requires that, at this strategic level, potential adverse effects be assumed for Outer Thames Estuary SPA until greater site-specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on site integrity identified is considered further in the avoidance and mitigation section of this report.**

Air Quality

3.81 Information provided by the UK Air Pollution Information System[54] indicates that air quality measured around Sizewell (up to a resolution of 5km) is generally good with pollution levels for all key pollutants (sulphur dioxide, particulates, nitrogen dioxide etc.) typically low.

3.82 The Environment Agency assesses that, non-radioactive aerial emissions (sulphur dioxide, nitrogen oxides and volatile organic compounds) from nuclear power stations are extremely low compared with other regulated industries and the Agency does not consider them to be an environmental priority. The EA's most recent available assessment of radioactive aerial emissions for regulated nuclear power

54 http://www.apis.ac.uk/

stations and specifically for current generation at Sizewell indicates that all fall within authorised limits[55].

Minsmere to Walberswick Heaths and Marshes SAC Minsmere to Walberswick SPA, Ramsar

3.83 Sensitivities and critical loads have however been identified for the interest features within Minsmere to Walberswick Heaths and Marshes SAC which are also supporting habitats for interest features of Walberswick to Minsmere SPA and Ramsar. For some pollutants, current deposition levels are close to or within exceedance level ranges. For both heathland and perennial vegetation of stony banks, current deposition levels for Nitrogen when compared to critical loads for these habitats is in exceedance by a range of 4.4 to -5.6kg/N/yr. The effects of this eutrophication for heathland can be a transition of heather to grass and a decline in lichens whilst for perennial vegetation of stony banks there can be an increase in overall biomass resulting in increased competition. Heathland is also sensitive to increased acidification, with leaching causing a decrease in soil base saturation, increasing the availability of Al3+ ions, the mobilization of which may cause toxicity to plants and mycorrhiza. Deposition is currently at exceedance levels of 0.89 keq/ha/yr. All of these changes have the potential to cause a deterioration in the quality of habitats available to qualifying interests of the SPA and Ramsar.

Effects in Combination with Other Plans and Projects

3.84 Possible adverse impacts in terms of air quality on Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar and their qualifying interest features could arise as a result of the decommissioning of Sizewell A and B. An increase in site dust emissions due to construction, demolition and waste/materials handling operations, use of explosives etc. as well as inadvertent or uncontrolled disturbance or spreading of existing contaminated soils, including movement by windblown dust[56] all of which could impact upon qualifying habitats within the SAC with resulting impacts on SPA and Ramsar interests.

3.85 Whilst mitigation for all of the above potential impacts is described within the Environmental Management Plan, residual risks and impacts remain and have been assumed in this assessment. Given the likely concurrent decommissioning of Sizewell A as well as Sizewell B

55 Measuring Environmental Performance: Sector Report for the Nuclear Industry (Environment Agency, Nov 2005).
http://maps.environment-agency.gov.uk/wiyby/queryController?topic=pollution&ep=2ndtierquery&lang=_e&layerGroups=1&x=321000.0&y=145900.0&extraClause=AUTHORISATION_ID~'AF7282'&extraClause=YEAR~2006&textonly=off&latestValue=&latestField=
56 Sizewell A Nuclear Power Station Environmental Management Plan Issue 2 (2007)

(estimated decommissioning date is 2035[57]), cumulative effects on air quality could be significant.

3.86 **In the context of known air quality conditions and interest feature vulnerabilities, and the possibility of cumulative effects from the decommissioning of Sizewell A, a precautionary approach requires that at this strategic level, potential adverse effects be assumed for Minsmere to Walberswick Heaths and Marshes SAC and Minsmere to Walberswick SPA and Ramsar until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on site integrity identified is considered further in the avoidance and mitigation section of this report.**

Sandlings SPA

3.87 Within Sandlings SPA sensitivities and critical loads have been identified for key supporting habitats for the qualifying interests. All pollutants which have the potential to affect lowland heathland are currently below critical loads for this habitat type within the area. For planted coniferous woodland however, current Nitrogen deposition levels of 13.7kg N/ha/year when compared to published critical loads for this habitat are in exceedence by up to 3.7kg N/ha/year. In forest ecosystems, subject to increased N deposition, effects on the tree components are uncommon and vary with species type and geographical location. However changes to woodland ground flora have been recorded and coarse grasses and ruderal species can become more abundant. Notwithstanding more immediate effects of management practices and other local factors, this effect could potentially impact upon the qualifying interest features of the SPA in the longer term through a reduction in the availability of bare ground and areas of low-growing vegetation suitable for nesting Woodlark and Nightjar.

Effects in Combination with Other Plans and Projects

3.88 Possible adverse impacts in terms of air quality on the qualifying interests of Sandlings SPA could arise as a result of the decommissioning of Sizewell A and B. In particular, an increase in dust along traffic routes due to soiled vehicles or vehicles carrying dust loads could impact upon habitats within Sandlings SPA as it lies adjacent to one of the main access routes into the Sizewell site (Lover's Lane).

3.89 The Suffolk Coastal Local Development Framework (2006-2021) sets out policies for potential future development in and around Leiston (Policies SP7 and SP9) which lies just 0.7km to the west of Sandlings

57 www.british-energy.com

SPA at its closest and also identifies new housing opportunities for Woodbridge (Policy SP10) which lies close to Rendlesham Forest (part of the SPA). Air quality impacts on Sandlings SPA could arise during the construction of these future housing developments.

3.90 The above potential sources of air quality impacts could act cumulatively and result in significant in-combination effects.

3.91 **In the context of known air quality conditions and interest feature vulnerabilities and the possibility of cumulative effects from the decommissioning of Sizewell A, a precautionary approach requires that at this strategic level, potential adverse effects be assumed for Sandlings SPA until greater site specific detail (including on technology and mitigation measures) is known. The potential for mitigation measures to effectively address the potential adverse effects on site integrity identified is considered further in the avoidance and mitigation section below.**

Outer Thames Estuary SPA

3.92 Information provided by the UK Air Pollution Information System indicates that air quality within the area (centred on the nominated site and including the immediately adjacent areas of the SPA, up to a resolution of 5km) is generally good, with pollution levels for all key pollutants (sulphur dioxide, particulates, nitrogen dioxide etc.) typically low.

3.93 Air quality is not specified as a vulnerability for Red-throated Divers or their supporting habitats and given the large size of the SPA (393734.18ha) and the existing conditions recorded at the nominated site, it is considered unlikely that any localised changes to air quality will reach a level that results in impacts on the integrity of the SPA.

3.94 **Air Quality impacts on the Outer Thames Estuary SPA were screened into the appropriate assessment due to the close proximity of the SPA to Sizewell. However, after further consideration, adverse effects on site integrity have been ruled out as a result of either the proposals alone, or in-combination with other plans or projects.**

Avoidance and Mitigation Measures

3.95 Avoidance and mitigation measures can apply both at a strategic policy level in the form of policy amendments/caveats, and in more detail at project level, where they are specific measures applicable to the identified issues at individual sites. This HRA is being undertaken at a strategic level where there are development uncertainties regarding the nature, scale and final footprint of the nominated site. These uncertainties limit the capacity of the HRA to reasonably predict the effects on a European Site[58].

3.96 At this strategic stage, the HRA for Sizewell can make avoidance and mitigation recommendations in relation to Sizewell to inform the strategic siting assessment process and therefore the overall development of the Nuclear NPS. These recommendations may also, subsequently provide guidance to the IPC and potential developers to ensure that the any future development at Sizewell takes into account the findings of this strategic level assessment in more detailed, project level HRA.

3.97 The HRA recommendations for avoidance and mitigation measures in relation to Sizewell are outlined below and summarised in Table 4. Part II of the HRA main report also summarises the measures identified in this report alongside those proposed by other individual site HRA reports.

3.98 This HRA report is part of an ongoing assessment process that would continue with detailed project level HRA to be undertaken at development consent stage and informed by detailed information regarding the development plans at Sizewell including consideration of the impact on local defined habitats not covered by the HRA plan process, . Should project-specific findings during the undertaking of the project level HRA result in additional impacts arising which cannot be mitigated by the avoidance and mitigation measures recommended here, then changes to the development design may be required to ensure adverse effects on the integrity of the European Sites considered are adequately avoided. This could include changes to the scale and layout of the development, the technology applied, and/or alterations to the nominated site boundary and location at Sizewell. Such changes required at the project level should be sufficiently flexible to ensure that all identified impacts are addressed.

3.99 Indeed, further environmental studies have already been scoped into the nominator (EDF)'s project EIA and are underway, including the following studies of relevance to some of the data gaps identified throughout this report:[59]

58 The key principles and any assumptions made in this plan level HRA of the Nuclear NPS and nominated sites are outlined in Part II of the HRA Report.
59 British Energy (November 2008) Proposed Nuclear Development at Sizewell: Environmental Scoping Report

- desk based assessment of site hydrology and geology;
- monitoring of the groundwater levels and assessment of groundwater flow direction;
- assessment of hydrodynamics / coastal geomorphology, including gathering updated bathymetric (seabed level) information;
- update of intertidal topographic data is being obtained where necessary;
- data collection on the direction and amplitude of waves, surge and more extreme events (incorporating climate change effects) both offshore and inshore;
- hydrographic surveys;
- assessment of sediment particle size data is being gathered on from both seabed and intertidal areas;
- surveys for breeding birds; intertidal and inshore marine birds and wintering birds;
- botanical survey;
- subtidal and intertidal habitat mapping;
- fish return system / fish and benthic assemblage entrainment studies;
- thermal surveys are being completed using both fixed networks of recording sensors and towed stringers;
- intake and outfall location studies;
- water quality monitoring;
- fish deterrence system; and plankton studies.
- assessment of the potential air quality impact of emissions from construction and daily worker traffic on haul roads
- noise monitoring and modelling

3.100 The project level HRA, in line with the recommendations made in this strategic assessment may (as a result of project specific findings) consider alternative approaches to the development including changes to the nature, scale, technology applied or locational boundaries of the

nominated site in order to avoid adverse effects on the integrity of the European Sites considered.

Water Resources and Quality

3.101 Avoiding adverse effects on surface, ground and estuarine waters is primarily the responsibility of the Water Companies (resource planning) and the Environment Agency (abstraction licensing and discharge regulation).

3.102 Thermal, radioactive and non-radioactive discharges should go beyond complying with existing standards, with radioactive discharges required to be As Low As Reasonably Achievable (ALARA)[60] and that all other discharge levels are required to be an improvement on existing standards. All discharges which lead to adverse effects on the integrity of European Sites should not be permitted. In addition to thermal effects from direct cooling, there are potential water quality issues, in particular nutrient enrichment from anti-fouling agents, which may be associated with the cooling water process.

3.103 The IPC, as guided by the Nuclear NPS, can direct requirements for the efficiency of water use and the protection of water quality. This may include requiring that management measures relating to supply and discharge (including potential effects on European Sites) are in place prior to the implementation of the nominated site proposals, and that decisions relating to best available technology take specific account of the sensitivities of the individual receiving environments. Mitigation for changes to the groundwater and water table regimes (as could occur from de-watering activities) could include placement of physical barriers (for example sheet piles) and recharge barriers to inject back onto the ground an equivalent amount of water to that extracted.

3.104 Adverse effects will effectively be mitigated at the site level through suitable design - including use of Sustainable Drainage Systems (SuDS) - and the selection of appropriate construction methods.

Habitat (and species) Loss and Fragmentation

3.105 Where proposals for design and build remain under development, the Nuclear NPS should seek to prioritise, through the guidance it provides to the IPC, the avoidance of direct habitat impacts that may lead to loss or fragmentation. In particular infrastructure improvements between the nominated site and Sizewell Halt should seek to avoid encroachment into Sandlings SPA.

3.106 In relation to the identified issues at Sizewell this may include for example, avoiding or minimising losses of habitat through site layout

60 ALARA is not a dose limit; it is a practice that has as its objective the attainment of dose levels as far below applicable limits as possible.

and design. It could also include sensitively designed sea defences (soft engineering) and marine landing facilities that do not impede sediment movements along the shore. Connectivity of important wildlife corridors around the nominated site should be maintained and opportunities for habitat creation, restoration and enhancement should be sought where possible and incorporated into the overall mitigation package as good practice. For example, any affected habitats within the coastal fringe should be reinstated using a retained seed bank or translocation as appropriate. Other measures could include the incorporation of protection measures should into water intake systems so as to avoid depleting important food sources for birds, including fish and invertebrates[61].

Disturbance (Noise, Light, Visual)

3.107 Disturbance events in relation to bird species are most significant when they are irregular/ sudden and unpredictable. Noise, light and visual impacts may be managed at a site level through phasing and timing that takes account of breeding and feeding cycles and should be supported by information on flight lines and migration routes as well as feeding and roosting areas. These measures would be included within a construction environmental management plan, which would help to minimise disturbance. The precise detail and the nature of the measures required would need to be agreed with the Statutory Body prior to the commencement of development but could include for example the use of visual screens. These measures would form part of the wider site management plan that developers would be required to agree and implement prior to commencement. Mitigation for an increase in recreational pressure could include requiring contributions from the developer towards wardening and visitor management schemes to reduce disturbance to nesting birds for example temporary closures of Little Tern nesting sites within the shingle beach.

Air Quality

3.108 Air quality impacts have been assessed as having the potential to result in adverse effects on the integrity of the European Sites around Sizewell and it is appropriate that the Nuclear NPS takes account of potential air quality impacts through its direction to the IPC. Requirements should include sustainable transport plans including, for example: the use of non-road transport where possible; the phasing of development; and robust monitoring at sites by operators (and the EA as appropriate) to track changes throughout the lifecycle of proposed operations. In particular, the monitoring should account for the

61 At Sizewell B screens are already used on outfalls within the North Sea and have a system for the return of fish to the sea. Tests by an independent aquatic research laboratory showed that, in all but the most extreme conditions, 80% of most species of fish are successfully returned alive to the North Sea (Sizewell B Power Station: Environmental Statement 2002)

potential for cumulative impacts where the phasing between existing power stations and the new build overlaps.

Table 4: Summary of Avoidance and Mitigation Recommendations

Potential Effects	Avoidance and Mitigation Measures – Recommendations for the IPC
Water Resources and Quality	
• Water Quality	• Direct requirements for the protection of water quality. Such measures could include construction environmental management such as use of containment (for example membranes and bunding), emergency spill response planning, and management of rainwater run-off. • Require suitable discharge quality standards are met to avoid adverse effects • Ensure that cooling water culverts apply modern tunneling techniques and discharge to reduce the impacts of thermal plumes.
• Water Quantity	• Direct requirements for the efficiency of water use • Ensure that volume of cooling water returned to the sea is within capacity of immediate receiving environment and does not adversely affect sediment flow / result in scour • Direct the selection of appropriate construction methods.
• Surface and Groundwater Flow	• Require suitable design, including use of Sustainable Drainage Systems.
• Changes in groundwater flow / water table regime due to on site dewatering operations	• Require placement of physical barriers (for example sheet piles) and recharge barriers to inject back onto the ground an equivalent amount of water to that extracted. • Require provision of compensation flows directly into the feature affected.
Habitat Loss and Fragmentation	
• Direct and Indirect Habitat Loss	• Require site layout/ design to avoid areas of known importance or sensitivity and to mitigate (temporary) habitat losses; for example, any infrastructure improvements between the nominated site and Sizewell Halt should seek to avoid encroachment into Sandlings SPA, whilst development along the coastal fringe should seek to avoid supporting habitats within the Outer Thames Estuary SPA.

Potential Effects	Avoidance and Mitigation Measures – Recommendations for the IPC
	• Require sensitive design for all coastal defence structures and marine landing facilities which are permeable to sediment flows along the coast. • Require reinstatement of affected habitats within the coastal fringe for example through retention of seed bank and subsequent monitoring of vegetation communities. • Maintain connectivity of wildlife corridors around the nominated site and seek opportunities for habitat creation, restoration and enhancement.
• Loss of Surrounding Habitat (construction of associated infrastructure)	• Require site layout/ design to avoid areas of known importance or sensitivity and to mitigate (temporary) habitat losses; • Maintain connectivity of wildlife corridors around the nominated site and seek opportunities for habitat creation, restoration and enhancement.
• Fish impingement	• Protection measures should be incorporated into water intake systems so as to avoid depleting important food sources for birds such as fish/invertebrates.
Disturbance (Noise, Light, Visual)	
• Construction and Decommissioning (including associated infrastructure)	• Minimise need for encroachment of construction into sensitive areas through site design. • Screening of works areas, include height restrictions where necessary to limit disturbance and impacts on migratory paths • Require noise, light and visual impacts to be managed at a site level through phasing and timing that takes account of breeding and feeding cycles and should be supported by information on flight lines and migration routes as well as feeding and roosting areas.
• Recreational Activities	• Increased wardening / visitor management at vulnerable breeding sites for example Little Tern nesting areas
Air Quality	
• Non-particulate emissions arising from construction, operation and decommissioning	• Require sustainable transport plans including, for example: the use of non-road transport where possible; the phasing of development; and robust monitoring by operators at sites to track changes throughout the lifecycle of proposed

Potential Effects	Avoidance and Mitigation Measures – Recommendations for the IPC
	operations. • Promote the use of carbon-efficient forms of transport and construction during the power station lifecycle. • Ensure that monitoring by operators accounts for the potential for cumulative impacts where the phasing between existing power stations and the new build overlaps
• Particulate emissions arising from construction, operation and decommissioning	• Require on and off-site roads to be regularly cleaned of mud/ dust deposits, including use of recirculating wheel washers and road cleaners • Require sheeting or seeding of surfaces / lorries carrying dusty loads, use of wind fences and water sprays as appropriate.

Summary of HRA Findings and Recommendations

3.109 The HRA Screening Assessment identified the likely significant effects on eight of the European Sites as a result of impacts that may arise from the development of a new nuclear power station at the nominated site at Sizewell. These effects were assessed further through the AA stage of the HRA which considered: European Site data; available environmental condition data; and the potential effects of other plans and projects 'in-combination'; in coming to a conclusion on the likelihood that the development of the nominated site for a new nuclear power station will have an adverse effect on European Site integrity.

3.110 Based on HRA experience, professional judgement, and the consultation advice received from the Statutory Consultees, it is reasonable to conclude that the suggested measures may be sufficient to avoid and/ or mitigate the adverse effects on the integrity of European Sites identified. However, the effectiveness of the measures proposed can only be ascertained with certainty through HRA at a project level, where the specific details of developments and primary data sources will be available.

3.111 The conclusions of the HRA are limited by the strategic nature of the assessment process and the information available, which does not allow for a definitive prediction of effects on the European Sites considered. A precautionary approach suggests that AA at this strategic level cannot rule out the potential for adverse effects on the integrity of any of the nine European Sites identified through the screening stage through impacts on water resources and quality, habitat and species loss and fragmentation, disturbance (noise, light and visual) and air quality.

3.112 Table 5 below illustrates those European Sites where adverse effects on site integrity arising from the development cannot be ruled out.

Table 5: Summary of Appropriate Assessment

Potential Effects Arising from Development	European Sites at which adverse effects cannot be ruled out
Water resources and quality	• Alde-Ore and Butley Estuaries SAC • Alde-Ore Estuary SPA • Alde-Ore Estuary Ramsar • Minsmere to Walberswick Heaths and Marshes SAC • Minsmere to Walberswick SPA • Minsmere to Walberswick Ramsar • Orfordness-Shingle Street SAC • Sandlings SPA • Outer Thames Estuary SPA
Air quality	• Minsmere to Walberswick Heaths and Marshes SAC • Minsmere to Walberswick SPA • Minsmere to Walberswick Ramsar • Sandlings SPA
Habitat (and species) loss and fragmentation	• Alde-Ore and Butley Estuaries SAC • Alde-Ore Estuary SPA • Alde-Ore Estuary Ramsar • Minsmere to Walberswick Heaths and Marshes SAC • Minsmere to Walberswick SPA • Minsmere to Walberswick Ramsar • Orfordness-Shingle Street SAC • Sandlings SPA • Outer Thames Estuary SPA
Disturbance (noise, light, visual)	• Minsmere to Walberswick SPA • Minsmere to Walberswick Ramsar • Sandlings SPA • Outer Thames Estuary SPA

3.113 To address the uncertainties inherent in a strategic level HRA, the AA has proposed a suite of avoidance and mitigation measures to be considered as part of the project level HRA (Table 4). At this stage, it is assessed that the effective implementation of the proposed suite of avoidance and mitigation measures may help to address the identified adverse effects on European Site integrity, but that more detailed

project level HRA is required to reach conclusions that are in accordance with the requirements of the Habitats Directive.

3.114 **Further assessment supported by detailed data at project level is therefore required to determine whether nuclear power development at this nominated site could be undertaken without adversely affecting the integrity of European Sites at Sizewell.**

3.115 **Only at the project level HRA can a conclusion of no adverse effect on European Site integrity be made with any confidence.**

Glossary

AA	Appropriate Assessment
AoS	Appraisal of Sustainability
APIS	UK Air Pollution Information System
DECC	Department for Energy and Climate Change
CAMS	Catchment Abstraction Management Strategy
CCW	Countryside Council for Wales
CHaMPs	Coastal Habitat Management Plans
cSAC	Candidate Special Area of Conservation
EA	Environment Agency
EIA	Environmental Impact Assessment
HRA	Habitats Regulations Assessment
ICZM	Integrated Coastal Zone Management
IPC	Infrastructure Planning Commission
LA	Local Authority
LDF	Local Development Framework
LSE	Likely Significant Effect
LTP	Local Transport Plan
NE	Natural England
NH_3	Ammonia
N2K	Natura 2000 sites
NO_x	Nitrogen oxide
NPS	National Policy Statement
PPP	Plans, Programmes and Projects
pSPA	Potential Special Protection Area
Ramsar	Wetland Sites designated by the Ramsar Convention
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SO_2	Sulphur dioxide
SPA	Special Protection Area
SSA	Strategic Siting Assessment
SSSI	Site of Special Scientific Interest

SuDS	Sustainable Drainage Systems
WRMU	Water Resource Management Unit

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