

Habitats Regulations Assessment: Site Report for Kirksanton

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

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 Kirksanton.

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 HRA Screening and Appropriate Assessment components of the Habitats Regulations Assessment (HRA) of the proposals for Kirksanton. This site was nominated into the Strategic Siting 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 main HRA Report that accompanies the revised draft Nuclear National Policy Statement (NPS). Part II of the HRA report for the 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 assessed to be potentially suitable for the deployment of new nuclear power stations by 2025, will be listed in the Nuclear NPS; developers will be able to apply to the Infrastructure Planning Commission¹ 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, 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 revised draft 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, by the Infrastructure Planning Commission.

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 Directive² protects habitats and species of European nature conservation importance. Together with the Birds Directive³, 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 Sites of Community Importance (SCI's) are designated and defined 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 are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them⁴. 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 reports⁶.
- 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. Article 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 2010⁷) (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 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 Kirksanton, 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.

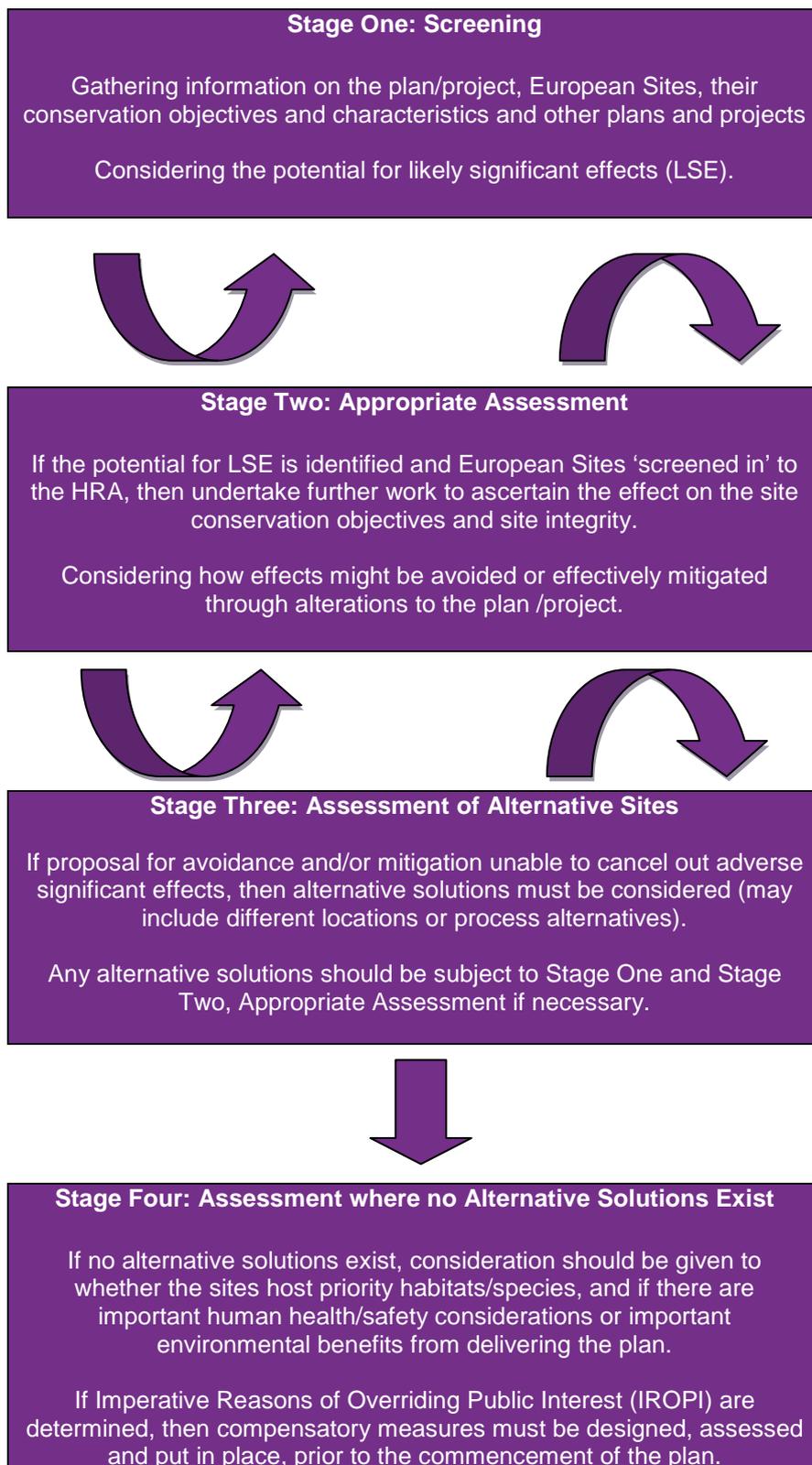
6 The term European Site is used throughout all the Site HRA Reports and in the Main HRA Report, and incorporates SACs, SPAs, SCIs and Ramsar sites.

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.

(RWE npower) on 31 March 2009⁸. The HRA process is typically iterative and the assessments have been revisited on the basis of commentary from the Statutory Consultees and comments from the public consultation.

⁸ www.energynpsconsultation.decc.gov.uk

Table 1: Habitats Regulations Assessment: Summary Overview of Key Stages⁹



⁹ Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(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 Kirksanton

2.1 The nominated site¹⁰ is situated on the Cumbria coast, north of Barrow-in-Furness, and comprises approximately 131 hectares of land located south and west of Kirksanton and south-east of Southfield, encompassing parts of Silecroft Golf Course and Haverigg Wind Farm and is adjacent to the boundary of the Lake District National Park. 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 Kirksanton are described below.

European Site Identification and Characterisation

2.4 European Sites within a 20km radius of the nominated site were scoped into the HRA screening process as set out in Table 2 and Figure 2. This area of search reflects guidance recommendations¹², 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. Appendix 1 details the characteristics of the nine European Sites scoped into the Screening Assessment. The characteristics include an overview of the sites':

- Ecological features
- Their qualifying features / reasons for designation

10 Nomination documents at www.energynpsconsultation.decc.gov.uk

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.

- Conservation objectives and the condition status of their constituent Sites of Special Scientific Interest (SSSI) where available
- Environmental conditions necessary to support site integrity; and
- Site vulnerabilities, including any key pressures or trends known to be affecting the sites.

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

	Designation	Distance from nominated site ¹³
Drigg Coast	SAC	16.5km
Duddon Estuary	SPA	Adjacent
Duddon Estuary	Ramsar	Adjacent
Duddon Mosses	SAC	7.5km
Morecambe Bay	SAC	Adjacent
Morecambe Bay	SPA	12km
Morecambe Bay	Ramsar	12km
Roudsea Wood and Mosses	SAC	19km
Subberthwaite Blawith and Torver Low Commons	SAC	13.5km

Nominated Site Review and Identification of Likely Impacts

- 2.5 The nominated site includes land for onshore construction and operation (anticipated to be approximately 30-50 hectares). Additional land in coastal / marine areas outside the nominated site will also be required for coastal defences, a construction-phase Marine Off-Loading Facility and inlet / outfall pipes. The nominator was not required to provide details of the proposed development at this stage.
- 2.6 From the nomination documents¹⁴ it is assumed that the nomination is for a nuclear power station development, incorporating:
- at least one nuclear reactor;
 - construction areas and facilities, including a Marine Off-Loading Facility;
 - infrastructure and facilities related to the operation of a nuclear power station, such as highways and transmission infrastructure;
 - cooling water infrastructure, including cooling water intake and outfall structures;
 - coastal and flood protection measures; and

¹³ Distance measured is from nearest site boundary

¹⁴ Op. cit.

- interim radioactive waste storage facilities.
- 2.7 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 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 Screening Assessment task below.

Identification and Consideration of Other Plans, Programmes and Projects

- 2.8 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 the effects of other plans.
- 2.9 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 process should take account of reasonably foreseeable impacts (as opposed to every conceivable effect)¹⁵.
- 2.10 For the purposes of this assessment consideration was given to:
- Regional and Local Development Plans delivering planned spatial growth
 - Major Development Schemes (including transport plans/ airport expansion) where relevant
 - Coastal Tourism Strategies
- 2.11 Where relevant, reference was also made to:
- Draft Coastal Habitat Management Plans
 - Catchment Abstraction Management Strategies
 - Shoreline Management Plans
 - River Basin Management Plans
 - Minerals and Waste Development Frameworks
- 2.12 A summary of the key plans referred to in the in-combination assessment process is provided in **Appendix 2**. Further specific discussion is included in Section 3 where relevant.

¹⁵ Tyldesley, D. (2009), The Habitats Regulations Assessment of Local Development Documents. Revised Draft Guidance for Natural England, Natural England, Sheffield.

Screening Assessment

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

- **Water Resources and Quality Impacts**
- **Habitat (and Species) Loss and Fragmentation**
- **Coastal Squeeze**
- **Disturbance (Noise, Light and Visual)**
- **Air Quality**

2.14 Each of these issues is considered in turn below.

Water Resources and Quality Impacts

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

- Drigg Coast SAC
- Duddon Mosses SAC
- Roudsea Wood and Mosses SAC
- Subberthwaite Blawith and Torver Low Commons SAC

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

- Duddon Estuary SPA / Ramsar
- Morecambe Bay SAC / SPA / Ramsar

2.15 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.

2.1 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.
- 2.16 All of the nine European Sites screened are identified as possessing specific vulnerabilities relating to the water resource, but only five are considered vulnerable to effects arising from the development of the nominated site (see Appendix 3 for further information).
- 2.17 The nominator's report¹⁶ states that a nuclear power station at the nominated site employing direct seawater cooling would draw water from the Irish Sea and pump it to the power station site. It also notes that, owing to the absence of significant rivers or freshwater bodies in the vicinity of the nominated site, if indirect cooling is used, this would also require abstraction of water from the Irish Sea. Given this, the possibility of freshwater abstraction for cooling and associated impacts on distant freshwater sources such as West Water SAC and the River Derwent and Bassenthwaite Lake SAC has been discounted in the following Screening Assessment. It should however be noted that this may require reassessment at the project level, including screening of impacts, should water required for construction (or decommissioning) be derived from freshwater sources or should cooling water strategies change and freshwater sources be sought.
- 2.18 Natural England has raised concerns in relation to potential impacts on migratory fish species present as qualifying features of European Sites, which have not been included within the Screening Assessment on account of their distance from the nominated site. These concerns relate to possible impacts arising on Atlantic Salmon, Sea Lamprey and River Lamprey, which occur within the River Eden SAC, the River Ehen SAC and the River Derwent and Bassenthwaite Lake SAC, as a result of water quality impacts associated with discharges into the Irish Sea. Natural England acknowledges that there is little information on the coastal migration routes used by these species. This information gap has been noted and would need to be addressed at the project level to inform the screening process for project level HRA.

Morecambe Bay SAC / SPA / Ramsar

- 2.18 Morecambe Bay SAC is adjacent to the south-west boundary of the nominated site and is vulnerable to the potential effects on water quality from earthworks or excavations and infrastructure provision (for example, sedimentation, pollution incidents such as oil spillage from ships landing at off-loading facility). Shingle vegetation and salt marsh communities (primary qualifying interest features) are particularly

16 RWE Siting Study: Kirksanton Nomination Form: Supporting Statement (March 2009), www.energynpsconsultation.decc.gov.uk

vulnerable to changes in nutrient loading, salinity and water temperature, all of which can encourage excessive algal growth leading to smothering of the vegetation as well as a change in composition leading to unfavourable condition.

Duddon Estuary SPA / Ramsar

- 2.19 Organic or nutrient loading could also reduce the availability of food for qualifying interests of Duddon Estuary SPA, Ramsar by increasing growth of algal mats notably in the intertidal mud and sand flats and the intertidal and subtidal boulder and cobble skew communities. Algal blooms can reduce water quality by causing the removal of oxygen or occasionally by the release of toxins. Such deterioration in water quality can impact on marine communities and cause a reduction in food availability for qualifying interests whilst the reduction in water clarity caused by algal blooms can reduce the visibility of prey items for species such as Sandwich Tern. Any release of toxins could impact on important bird assemblages of the SPA/Ramsar through accumulation within the foodchain and their ability to feed could also be affected by changes in the palatability and abundance of prey items caused by toxic contamination. Changes to sediment regimes and increased turbidity /siltation could result in mortality of filter feeding shellfish, upon which many of the qualifying species feed (for example, Knot are selective feeders, specialising in molluscs such as cockles).
- 2.20 In addition, Natterjack Toads are present as a qualifying interest of Duddon Estuary Ramsar and are known to use pools within the dune slacks for breeding. Any deterioration in water quality as a result of toxic and non-toxic contamination could therefore result in habitat becoming unsuitable or even direct mortality given their absorbent skins and high vulnerability to pollutants.
- 2.21 No direct impacts on Morecambe Bay SPA, Ramsar as a result of the predicted localised effects on water resources and quality are anticipated given that the nominated site lies over 10km to the north-east from the closest point of the SPA. However, indirect effects could occur on qualifying interests which may utilise habitats outside of Morecambe Bay SPA and which fall within Duddon Estuary SPA and surrounding land and hence may be subject to the effects of water quality impacts arising as a result of the development of the nominated site. Interchange of bird populations between the two designated sites has been assumed due to the fact that the following supporting habitats are present within both designated sites: intertidal mudflat and sandflat communities, intertidal and subtidal boulder and cobble skew communities and saltmarsh communities. Movement of qualifying birds between Morecambe Bay SPA and adjacent Duddon Estuary is also noted within South Walney and Peil Channel Flats SSSI citation which notes that until recently, Foulney Island regularly supported a large population of breeding Sandwich Tern as well as occasionally Little

Tern and a small population of Common Tern but these birds have subsequently moved into and bred within Duddon Estuary. It should be noted that this exchange of birds between the two European Sites is a common assumption throughout this report.

- 2.22 The Screening Assessment therefore indicates that the **potential for adverse effects on the integrity of these European Sites 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):

- Drigg Coast SAC
- Duddon Mosses SAC
- Roundsea Wood and Mosses SAC
- Subberthwaite Blawith and Torver Low Commons SAC

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

- Duddon Estuary SPA / Ramsar
- Morecambe Bay SAC / SPA / Ramsar

- 2.23 Habitat loss and fragmentation in relation to European Site integrity can occur naturally (for example, treefall, 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.
- 2.24 The nominator's report¹⁶ notes that there are opportunities to avoid direct habitat loss / fragmentation effects on the adjacent Morecambe Bay SAC given that the south-western site boundary extends beyond the limits of the SAC boundary and marine access to the nominated site can therefore be achieved without the need to pass through designated areas. Whilst the potential for avoidance is acknowledged, given that the exact location and requirements for infrastructure within the coastal margin are still to be determined, at this strategic stage, impacts associated with localised direct habitat loss cannot be ruled out. In particular, impacts could arise as a result of the need for extension of land or improvement to coastal defences within the SAC in order to protect the nominated site from coastal surges and flooding.
- 2.25 Indirect habitat loss / fragmentation effects on the adjacent Morecambe Bay SAC could occur as a result of development along the coastal fringe for the construction of sea defences and cooling water pipework, as a well as a construction phase marine off-loading facility and dredging activities required to maintain marine access during

construction, operation and decommissioning. Impacts could arise as a result of loss of seed sources from adjacent buffer habitats as well as physical loss or degradation of the qualifying interests themselves through the interruption of sediment flows or depletion of sediment sources. For example, dredging could potentially result in increased erosion of habitats, including possibly the sand dunes at Haverigg Haws which lie adjacent to the south-eastern boundary of the nominated site and fall within Morecambe Bay SAC and Duddon Estuary SPA and Ramsar.

- 2.26 Such physical loss or deterioration of habitats through the direct and indirect effects described above could lead to impacts on the qualifying bird interests for not only Duddon Estuary SPA, Ramsar but also those within Morecambe Bay SPA, Ramsar, assuming, as stated above, that there is an interchange between the populations present in both. For example, loss or reduction in area of shallow coastal waters which support Sand Eel, Spratt and other prey items could result in reduced feeding habitat for qualifying interests such as Sandwich Tern. Internationally important populations of species including Knot, Pintail and Redshank are also highly sensitive to removal or reduction of important feeding and roosting habitat such as intertidal mud and sand flats, intertidal and subtidal boulder and cobble skears and saltmarshes. Impingement of fish at the cooling water intake could also lead to localised reductions in the availability of fish and invertebrate prey items for qualifying interests that feed off-shore.
- 2.27 In addition, direct loss or fragmentation of habitats outside of European Sites, such as those present within the nominated site boundary as well as habitats that could be lost for the development of off-site infrastructure and ancillary facilities (land take for these is as yet undefined) could also potentially reduce the availability of feeding and roosting habitat for qualifying interests if found to be using them. High-tide roosts for certain qualifying waterfowl are found outside Duddon Estuary SPA / Ramsar boundary on the landward side¹⁷ with species such as Pink-footed Goose known to favour improved grasslands, cereals, stubbles and root crops as feeding areas¹⁸.
- 2.28 Following comments received from Natural England on a previous draft of this report, it is understood that a large population of Natterjack Toads are present both in the adjacent, designated dune slacks as well as within the nominated site itself. A qualifying interest of Duddon Estuary Ramsar and a European Protected Species in their own right, Natterjack Toads could be directly impacted through a variety of different mechanisms including direct mortality and / or injury during site preparation, and as a result of loss and fragmentation of their aquatic and terrestrial habitat. In addition, indirect effects could also arise as a result of improvements and extensions to sea defences

17 <http://www.jncc.gov.uk/default.aspx?page=1981>

18 Cumbria Biological Network Data (2008) www.lakelandwildlife.co.uk

along the coastline in front of the nominated site interrupting tidal inundation of dune slack ponds and upper saltmarsh pools. The effects of ponds becoming permanently fresh is that vegetation becomes increasingly tall and rank surrounding the pond leading to colonisation by intolerably high numbers of tadpole competitors and / or predators. Equally where new inland barriers to surface water run-off are built, for example, roads, roadside ditches or embankments, ponds can become permanently saline, making them toxic to Natterjack Toad spawn and larvae¹⁹.

- 2.29 **The potential for adverse effects on the integrity of these European Sites should be considered further through Appropriate Assessment.**

Coastal Squeeze

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

- Drigg Coast SAC
- Duddon Mosses SAC
- Roundsea Wood and Mosses SAC
- Subberthwaite Blawith and Torver Low Commons SAC

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

- Duddon Estuary SPA / Ramsar
- Morecambe Bay SAC / SPA / Ramsar

- 2.30 Coastal squeeze impacts are closely related to habitat loss and fragmentation, and relate specifically to situations where the coastal margin is squeezed by the fixed landward boundary. Coastal squeeze typically arises through the development of flood defences/ reinforcement of coastal margins, preventing natural movement of coastal species and habitats.
- 2.31 The south-western boundary of the nominated site is separated by a distance of 130 and 250m from the mean high water level of the Irish Sea. Between the Irish Sea and the nominated site lies a ridge of sand dunes²⁰. These are the dunes systems at Haverigg Haws which form part of Duddon Estuary SPA, Ramsar and Morecambe Bay SAC and as such, significant effects on these European Sites as a result of coastal squeeze are considered likely should hard engineering prevent their inland migration. Other habitats further along the coastline from Haverigg Point and within these European Sites, such as intertidal

19 Beebee T (1996) Natterjack Toad Natterjack Toad conservation handbook, English Nature, Peterborough.

20 RWE Siting Study: Kirksanton Nomination Form: Supporting Statement (March 2009)

mudflat and sand flat areas could also be subjected to indirect habitat loss as a result of coastal squeeze should new or additional sea defences / infrastructure be required here also.

2.32 Assuming the aforementioned interchange of bird populations between Morecambe Bay SPA, Ramsar and Duddon Estuary SPA, Ramsar, effects on the former also cannot be ruled out at this stage through loss of supporting habitat for the qualifying interests.

2.33 **The impacts of coastal squeeze should be considered alongside habitat loss and fragmentation through further Appropriate Assessment.**

Disturbance (Noise, Light and Visual)

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

- Drigg Coast SAC
- Duddon Mosses SAC
- Morecambe Bay SAC
- Roundsea Wood and Mosses SAC
- Subberthwaite Blawith and Torver Low Commons SAC

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

- Duddon Estuary SPA / Ramsar
- Morecambe Bat SPA / Ramsar

2.34 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.²¹

2.35 Waterfowl including the qualifying interests for Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar are highly sensitive to noise and visual disturbance by human activities when they are feeding or roosting and such impacts could arise as a result of construction activity as well as an influx of people into the area for the construction workforce. The qualifying waterfowl interest is particularly sensitive to

²¹ Scott Wilson (Nov 2008) EcoTowns: Sustainability Appraisal and Habitats Regulations Assessment.

disturbance in the winter months when cold temperatures and increased energy requirements are combined with short daylight hours available for feeding²². In addition, high spring tides in the winter months, force birds to utilise an increasingly reduced area left uncovered by the tide for feeding and roosting and it is within this zone that they are more likely to be disturbed by human activities. Continued disturbance may force birds to change feeding and roosting sites which often results in increased energy use and reduced intake rates. If birds are continually disturbed from feeding or roosting sites, the resulting effect may be the long term loss of available habitat with a resulting direct negative impact on species survival.

- 2.36 Breeding terns are also highly sensitive to non-physical disturbance and populations of breeding Little Tern are a qualifying interest of the adjacent Duddon Estuary SPA, Ramsar. Noise and visual disturbance may cause nesting terns to abandon eggs or chicks²³.
- 2.37 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 as well as potentially breeding areas for certain species. These disturbance sources and effects may be equally relevant offsite through the construction of marine landing sites and improved road/ rail access. **Given the extended construction phase of the development and identified sensitivities of the designated species within Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar to disturbance events, the potential for adverse effects on site integrity should be considered further through Appropriate Assessment.**

Air Quality Impacts

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

- Drigg Coast SAC
- Duddon Mosses SAC
- Roundsea Wood and Mosses SAC
- Subberthwaite Blawith and Torver Low Commons SAC

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

- Duddon Estuary SPA / Ramsar
- Morecambe Bat SPA / Ramsar

22 English Nature (2001) Duddon Estuary European Marine Site: English Nature's advice under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

23 Gill, Sutherland & Norris (1998) The consequences of human disturbance for estuarine birds. RSPB Conservation Review 12. 67-72.

- 2.38 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 (SO₂), ammonia (NH₃) 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.
- 2.39 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 Kirksanton are typically low²⁴.
- 2.40 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 Kirksanton. 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 200m have the potential to increase nitrogen and carbon emissions impacts from vehicles²⁵.
- 2.41 The assessment also noted the potential for radioactive releases to the atmosphere, but that regulatory sources indicate aerial (radioactive) emissions to be low and cause little (human) and biodiversity radiation exposure²⁶.
- 2.42 The HRA Screening Assessment identified that Morecambe Bay SAC could be impacted by potential changes to local air quality with vulnerabilities noted for several of the qualifying interests including: Perennial vegetation of stony banks, Atlantic salt meadows, humid dune slacks and dunes with *Salix repens ssp. argentea (Salicion arenariae)*. For example, it is suspected that nutrient deposition on many sand dunes within the UK is already above their critical threshold for impacts on vegetation^{27,28}. The consequence of this for dune slacks is the tendency to a speeded up succession away from dune slack vegetation. In addition, shingle communities are vulnerable to

24 AEA Energy (2007) Air Pollution in the UK.

25 Department for Transport (2003) Transport Analysis Guidance, the Local Air Quality Sub-Objective TAG Unit 3.3.3.

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

27 Jones, M.L.M. *et al.* 2002. Changing nutrient budget of sand dunes: consequences for the nature conservation interest and dune management CEH, Bangor.

28 Jones, M.L.M. *et al.* 2004. Changes in vegetation and soil characteristics in coastal sand dunes along a gradient of atmospheric nitrogen deposition *Plant Biology* 6, 598-605.

smothering from airborne particulates and suffer reduced rates of growth.

- 2.43 The potential for resulting changes to the vegetation structure and composition could also cause a change in food sources and prey items upon which designated bird species of Duddon Estuary SPA and Ramsar depend. In addition, assuming the interchange of bird populations between the Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar mentioned above, there is the potential for significant effects on the latter European Site also. **The potential for adverse effects on site integrity on these European Sites should be considered further through Appropriate Assessment.**

Conclusions and Recommendations

- 2.44 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 Kirksanton on the nine European Sites that lie within 20km of the nominated site. The Screening Assessment (Appendix 3) 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 Kirksanton;
 - Consideration, where necessary, of other plans and projects that have spatial/ contextual relevance – **Appendix 2**
 - Government guidance²⁹ 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.
- 2.45 The HRA Screening Assessment identified a number of key impacts arising from the development of the nominated site, and the potential for significant effects at five of the European Sites scoped into the HRA screening process. These findings are summarised in Table 3 below.

²⁹ 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>

Table 3: Summary of Likely Significant Effect Screening

European Sites within 20km of nominated site at Kirksanton	Water Resources and Quality	Habitat Loss and Fragmentation	Coastal Squeeze	Disturbance (Noise, Light, Visual)	Air Quality
Drigg Coast SAC	✗	✗	✗	✗	✗
Duddon Estuary SPA	✓	✓	✓	✓	✓
Duddon Estuary Ramsar	✓	✓	✓	✓	✓
Duddon Mosses SAC	✗	✗	✗	✗	✗
Morecambe Bay SAC	✓	✓	✓	✗	✓
Morecambe Bay SPA	?	?	?	?	?
Morecambe Bay Ramsar	?	?	?	?	?
Roudsea Wood and Mosses SAC	✗	✗	✗	✗	✗
Subberthwaite Blawith and Torver Low Commons SAC	✗	✗	✗	✗	✗

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

2.46 It is recommended that the HRA proceeds to the next stage of 'Appropriate Assessment' in relation to the five 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 Kirksanton

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 Screening Assessment. 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 (EA) 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 development at Kirksanton have the potential to result in a Likely Significant Effect on 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 programmes (detailed in Appendix 2).

Water Resources and Quality

- 3.3 Current Environment Agency data³⁰ indicates that for the closest watercourse to the nominated site at Kirksanton (the manmade drainage channel known as Haverigg Pool) the ecological status is assessed as being 'moderate' with copper and zinc currently achieving 'less than good' status. No assessment of the chemical status of this watercourse had been made. By 2027 the Environment Agency predicts that the ecological status will increase to 'good'. Current assessments for the coastal water quality, in front of the nominated site at Kirksanton indicate that the ecological and chemical status of the environments here are 'moderate' and 'good' respectively, with the former predicted to improve to 'good' by 2027. The elements that are currently achieving 'less than good' ecological status here are macroalgae and dissolved inorganic nitrogen. Groundwater quantitative and chemical quality status around the nominated site are assessed by the Environment Agency as being 'good' although the groundwater body (West Cumbria Permo-Triassic sandstone aquifers) has an

³⁰ Environment Agency River Basin Management Plans: Draft North West River Basin District, 2008. 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

upward trend in pollutant concentrations with risks noted for nitrate, phosphate and hazardous substances as well as artificial flow pressures including abstraction.

- 3.4 Radioactive discharges (including potential accidental discharges from waste storage) are subject to authorised limits monitored by the Environment Agency. Of the non-radioactive discharges, nitrate contributions are 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 Habitats 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) process. Any existing abstraction and discharge licences at Kirksanton 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.

Morecambe Bay SAC

Duddon Estuary SPA, Ramsar

Morecambe Bay SPA, Ramsar

- 3.6 Water quality measurements taken at the mouth of the River Duddon, close to the nominated site and within Morecambe Bay SAC and Duddon Estuary SPA, Ramsar indicate that the ecological status here is also assessed as 'moderate', again with no information on chemical status available. Elements that are currently achieving 'less than good' status are: ammonia and dissolved oxygen. By 2027 the Environment Agency predicts that the ecological status will increase to 'good'.
- 3.7 At present in the Duddon Estuary, the main source of contamination enters habitats through diffuse agricultural sources and point source discharges from sewage treatment works most notably at the towns of Millom and Askham-in-Furness. Crude sewage also enters the estuary through discharges at Broughton-in-Furness and Barrow-in-Furness. As a result, it is therefore considered that habitats within or supporting the SAC, SPA, Ramsar designations are subject to a current medium level of exposure to nutrient and organic loading³¹.

31 English Nature (2001) Duddon Estuary European Marine Site: English Nature's advice under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

- 3.8 Exposure levels to synthetic and non-synthetic compounds within Duddon Estuary are also considered to be high. There are a number of industrial effluent disposal sites, namely a paper mill and ship building works at Barrow-in-Furness as well as other industry at Askham-in-Furness and Millom. Discharges from these sites are covered by Environment Agency consents. The past industrial history of the Duddon Estuary has left a legacy of industrial waste including slag heaps at Barrow, Askham and Millom. The extent, location, contents and stability of other past industrial waste sites is less well known, for example, waste disposal on North Walney³¹.
- 3.9 Morecambe Bay SAC designated habitats and supporting habitats for Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar are vulnerable to toxic and non-toxic contamination (Appendix 1, Site Characterisations) and whilst current water quality indicators show that, generally, ecological and chemical levels within coastal and freshwaters around Kirksanton to be generally 'moderate' or higher, there are some areas for concern, namely regarding nutrient loading from sewage treatment works and past industrial sources of synthetic and non-synthetic compounds. Without further information on discharge levels and quality arising from the development that planned radioactive and non-radioactive discharges will have, it is not possible at this stage to determine they will not adversely impact upon any of these European Sites.

Effects in Combination with Other Plans and Projects

- 3.10 Aspects of the following plans and projects could lead to 'in combination' effects on European Sites with regards to water resources and quality (see Appendix 2):
- Possible in-combination effects in terms of water quality and quantity could arise as a result of the three other nominations for nuclear power stations along the local coastline; these are Sellafield and Braystones (approximately 30km to the north-west) and Heysham (approximately 30km to the south-east). Of these, the nominated site at Heysham is the most relevant in terms of in-combination effects under consideration within this report, being immediately adjacent to Morecambe Bay SAC, SPA and Ramsar. Potential effects on water quality as described for the nominated site within this report are also directly relevant to Heysham, including risk of toxic and non-toxic contamination, nutrient and sediment loading and changes to thermal regimes (see Heysham: HRA Screening and Appropriate Assessment Report, for further details). Equally, decommissioning of the existing nuclear power stations at Heysham (estimated decommissioning dates for Heysham 1 and Heysham 2 are 2014 and 2023 respectively)³² could lead to adverse effects on water quality through mobilisation of existing contamination by

32 www.british-energy.com

direct rainwater infiltration due to the creation of temporary open excavations and; inadvertent contamination of soils and/or groundwater arising from temporary storage of contaminated soils, wastes or materials as well as changes in water quality within Morecambe Bay due to the potential release of turbid and/or contaminated water from decommissioning activities on the nominated site.

- The existing water quality impacts associated with operational power stations, both nuclear (for example Heysham 1 and 2) and conventional are also important in the consideration of in-combination effects. For example, the Centrica operated dual fuel Roosecote Power Station in Barrow is water-cooled, abstracting water from Cavendish dock (part of Morecambe Bay SAC, SPA and Ramsar) and returning it to the dock at up to ten degrees Celsius higher than ambient temperatures³³. The combined effect of changes to water temperature within and around Morecambe Bay as a result of both existing and future power stations could be significant.
- The Shoreline Management Plan (SMP) relevant to the coastline which falls within Morecambe Bay SAC, SPA and Ramsar boundaries³⁴ describes the preferred management strategies for the constituent coastal management cells with regards coastal flood risk management for the next 50 years. In general, the preferred policy within Morecambe Bay is 'hold the line', interspersed with shorter sections where the intent is to 'do nothing'. For Duddon Estuary, the policy as described within the SMP³⁵ is largely to 'do nothing', with the exception of Haverigg frontage, Millom Ironworks to Dunnerholme Point and the Inner Duddon Estuary where the preferred policy is 'hold the line'. Maintaining existing sea defences in their current situation could lead to short-term construction impacts from the construction and / or maintenance of structures such as sedimentation and localised risk of contamination from pollution events.
- The HRA Screening Assessment for the Barrow Port Area Action Plan³⁶ determined that, due to the overlap between the proposals in the Barrow Port Action Plan area and land designated as Morecambe Bay SPA and SAC, and the close proximity of the Duddon Estuary SPA, a significant impact was likely, and that an Appropriate Assessment will be required. Impacts on water quality are raised as having the potential to result in likely significant effects for a number of policies, including those promoting development of the Barrow Marina Village and link, development of a watersports (including power boating) facility, development of the waterfront business park as well as a cruise facility. In relation to Duddon Estuary SPA,

33 <http://www.centricaenergy.com/index.asp?pageid=19&area=roosecote>

34 Morecambe Bay Shoreline Management Plan: River Wyre to Walney Island: Sub-cell 11c (1998)

35 Shoreline Management Plan Sub-cell 11d: Management Unit No. 8: Skeller Point to Haverigg

36 Barrow Borough Council: Habitats Regulations Assessment of Barrow Port Area Action Plan (White Young Green, 2007)

Ramsar and Morecambe Bay SAC specifically, potential future development associated with Millom Pier, as described in the Copeland Borough Council Adopted Local Plan (2001 – 2016) could also lead to water quality impacts during construction.

- Under the Duddon Estuary and Morecambe Bay Regional Park proposals, several of the plans and policies included could result in impacts on water quality within Duddon Estuary SPA and Ramsar and Morecambe Bay SAC, SPA and Ramsar. Of particular relevance are suggestions for a series of sports venues for power boating and promotion of the new marina development at Barrow with new watersports centre at Cavendish dock.
- Offshore developments such as the Gas Storage Facility being developed by Gateway Storage Company Ltd as well as two major off-shore wind farm projects at West of Duddon Sands and Walney could all result in water quality impacts for Duddon Estuary SPA, Ramsar and Morecambe Bay SAC, SPA and Ramsar for example through the construction of turbine bases on the seabed in the case of the latter as well as through the construction of on-shore connections. The Gas Storage Facility is likely to lead to increased shipping traffic within port facilities which fall within the European Sites.

3.11 As a result of all of the above projects and future developments in and around Morecambe Bay and Duddon Estuary, cumulative effects in terms of water quantity could be significant.

3.12 **Given that water abstraction requirements and discharge qualities and locations for Kirksanton are currently unknown, a precautionary approach requires that at the strategic level, potential adverse effects be assumed for Morecambe Bay SAC, Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, 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 site integrity identified is considered further in the avoidance and mitigation section of this report.**

Habitat (and species) Loss and Fragmentation / Coastal Squeeze

Morecambe Bay SAC

Duddon Estuary SPA, Ramsar

Morecambe Bay SPA, Ramsar

- 3.13 The Shoreline Management Plan³⁷ describes the coastal geomorphology and main pressures affecting the coastal habitats found immediately in front of the nominated site and which form part of the qualifying interest for Morecambe Bay SAC as well as supporting habitat for qualifying interests within Duddon Estuary SPA, Ramsar and potentially Morecambe Bay SPA, Ramsar.
- 3.14 The direction of material drift along this stretch of coastline is considered to be variable being determined disproportionately by severe storms at high sea levels. Residual tidal currents indicate a net south-easterly drift whilst an annual average wave condition is directed to the north-east. The presence of Selker Rocks is believed to have a sheltering affect from northerly storms encouraging the northerly drive of sediment although its influence is not fully understood at present. Without further information on sediment movement along the coastline, it is not possible to draw meaningful conclusions regarding impacts to habitats that could arise as a result of impediment to material flows through development of infrastructure within the coastal zone.
- 3.15 The blown sand which makes up the coast from Kirksanton Haws through to Haverigg originates from the Duddon estuary sand bars. It is anticipated that, without intervention, the coastline close to the nominated site would continue to erode at a similar rate to that observed at present, estimated to be between 0.2 - 0.5/m year with a small area of accretion at Haverigg Point of around 0.3m/year. However in the longer term (100 years or more), the erosion and consequent behaviour of the coast will change when the sand and gravel deposits are estimated to be exhausted and the more extensive boulder clay deposits that back them become exposed. The continued erosion of the outer Duddon sand bars would maintain the supply of material in the short term to the south length of the Unit between Haverigg and Kirkstanton Haws, but would eventually cause the coast to become more exposed and the coastline to start to recede.
- 3.16 The Natterjack Toad is a nationally rare species in Britain and over 95% of the population is associated with 5 estuaries, the Alt, Ribble, Duddon, Esk and Solway. The UK range conclusion is reported as being 'unfavourable – inadequate', but improving to reflect post-2001

37 Shoreline Management Plan Sub-cell 11d: Management Unit No. 8: Skeller Point to Haverigg

trends (attributed to conservation action). However, if intensive conservation efforts were to be withdrawn, species specialists are not confident that the range would be sufficiently comprehensive to support viable populations in the long-term.³⁸ The Duddon Estuary itself is therefore one of the most important areas in Britain for this species and contains between 18-25% of the U.K. population, which in turn is equivalent to 50% of the Cumbrian Natterjack Toad population. Particular concentrations occur at Millom Ironworks, Sandscale Haws and the stretch of coast between Sandside and Dunnerholme, but the species is evenly distributed over the whole estuary³⁹. It is assumed that the Duddon Estuary population is stable, based on the last reporting round for Cumbria Biodiversity Action Plan, which identified the monitored population of Natterjack Toads within the county as being stable⁴⁰.

Effects in Combination with Other Plans and Projects

3.17 Aspects of the following plans and projects could lead to 'in combination' effects on European Sites with regards to water resources and quality (see Appendix 2):

- As described in paragraph 3.10 above, a site in Heysham is also being nominated within the Nuclear NPS. The nominated site is immediately adjacent to Morecambe Bay SAC, SPA and Ramsar designations and as such, any development within the coastal fringe (for example for cooling water culverts, enhanced coastal defences and a construction-phase marine off-loading facility) could result in direct land take within these European Sites. Further, indirect impacts of habitat loss and fragmentation could occur both as a result of interruption of sediment flows around the bay or, for the qualifying bird interest within the SPA and Ramsar, as a result of land take within regularly used feeding or roosting grounds outside of the European Sites.
- The Shoreline Management Plans covering both Duddon Estuary SPA, Ramsar and Morecambe Bay SAC, SPA and Ramsar sets out policies for coastal flood defence as described in more detail within paragraph 3.12 above. The policy within Morecambe Bay is largely 'hold the line' in order to protect development which lies at or even below sea level and hence is at high risk of tidal inundation. A side effect of this policy is the prevention of the natural inland migration of inter-tidal habitats, with coastal squeeze impacts resulting. Equally the policy of 'do nothing' which is the intent for much of Duddon Estuary could result in loss of qualifying habitats in the long term that are currently being protected by sea defences, given that no

38 Joint Nature Conservation Committee. 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC.

39 Duddon Estuary SSSI citation

40 <http://www.ukbap-reporting.org.uk/>

alternative compensation areas where new inter-tidal habitats can establish have been identified within the SMP.

- Consultation with Natural England regarding the potential impacts of policies set out within the Barrow Port Action Plan³⁶ indicated that their greatest concerns related to issues of direct habitat loss within Morecambe Bay SAC, SPA and Ramsar, (predicted in relation to the proposed Cruise Facility, Barrow Marina Village and development of Cavendish Dock as a wildlife attraction) as well as indirect effects caused by new developments resulting in changes in sediment regimes and coastal processes.
- The potential future development associated with Millom Pier, as described in the Copeland Borough Council Adopted Local Plan (2001 – 2016) could also lead to direct loss of habitat within Duddon Estuary SPA, Ramsar and Morecambe Bay SAC as well as potential indirect effects as a result of interruption of coastal processes on completion. Other small-scale development proposals are put forward within the proposals for Duddon Estuary and Morecambe Bay Regional Park and could lead to cumulative significant habitat losses both within and adjacent to Duddon Estuary SPA, Ramsar and Morecambe Bay SAC, SPA and Ramsar. Examples include proposals for an eco-holiday village development at Millom as well as a 'discovery' centre for green energy celebrating the energy coast and technologies and a new observatory and visitor centre with an energy theme close to Heysham Power Station.
- Off-shore developments such as the Gas Storage Facility being developed by Gateway Storage Company Ltd as well as two major off-shore wind farm projects at West of Duddon Sands and Walney could all result in direct habitat losses within Duddon Estuary SPA, Ramsar and Morecambe Bay SAC, SPA and Ramsar, depending on the location of on-shore connections with the national grid.

3.18 As a result of all of the above projects and future developments in and around Morecambe Bay and Duddon Estuary, cumulative effects in terms of habitat loss / fragmentation and coastal squeeze could be significant.

3.19 **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 and coastal squeeze on Morecambe Bay SAC and Duddon Estuary SPA, Ramsar as well as Morecambe Bay SPA, Ramsar until greater site specific detail (including on technology and mitigation measures) is known and site level baseline studies are undertaken. 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.**

Disturbance (Noise, Light, Visual)

Duddon Estuary SPA, Ramsar

Morecambe Bay SPA, Ramsar

- 3.20 Information on waterbird trends at Duddon Estuary SPA, Ramsar and their regional (sub-national) and national contexts contained within Wetland Bird Survey (WeBS) Reports⁴¹ were consulted. They revealed that of a total of 9 species evaluated, alerts had been triggered for six. Knot and Pintail had high alerts triggered whilst Shelduck, Red-breasted Merganser, Dunlin and Sanderling had medium alerts triggered. Reasons given for the decline in the local populations of these species were varied but in the main were thought to be attributed to large scale factors rather than site specific issues, including disturbance factors, although this should be caveated by the fact that this data does not represent a comprehensive assessment of the population status of the qualifying interests.
- 3.21 Within the Duddon Estuary, the main sites vulnerable to existing disturbance include an important Redshank feeding area around Askam Pier and high tide roosts located adjacent to the Cumbrian Coastal Way. Breeding terns, also highly sensitive to non-physical disturbance are known to utilise bare slag at Hodbarrow Lagoon within the SPA, Ramsar. Hodbarrow Lagoon which lies close to the nominated site on the western banks of the Duddon Estuary is managed as an RSPB reserve and provides unrestricted access for walkers (visited by around 20-30,000 visitors every year, being one of the best bird-watching sites in Cumbria)⁴². This level of current exposure (assessed as medium) combined with the high sensitivity to disturbance, means that the breeding and non-breeding bird assemblage within Duddon Estuary SPA, Ramsar are currently awarded a high vulnerability rating³¹.
- 3.22 No published studies on disturbance of qualifying bird interests within Morecambe Bay SPA were found. However published studies on recreational disturbance impacts more generally highlight vulnerabilities for qualifying interests of the SPA, including for species such as Little Tern⁴³ which are particularly vulnerable to disturbance from dog walkers and close proximity to humans.
- 3.23 Information retrieved from the Wetland Bird Survey (WeBS) Reports for Morecambe Bay SPA, Ramsar⁴⁴ were consulted and revealed that of a

41 The Wetland Bird Survey (WeBS) Alerts: Duddon Estuary (data evaluated inters 2004/5 inclusive)

42 Shoreline Management Plan Sub-cell 11d: Management Unit No. 9: Haverigg to Millom Iron Works

43 Footprint Ecology: Little terns at Great Yarmouth: Disturbance to birds and implications for strategic planning, Footprint Ecology

44 The Wetland Bird Survey WeBS Alerts: Morecambe Bay (data evaluated – winters 2004/5 inclusive)

total of 23 species evaluated, alerts have been triggered for 12 species. The following six species were listed as being on 'high alert' for the nominated site: Pintail, Eider, Ringed Plover, Grey Plover, Bar-tailed Godwit and Turnstone. The remaining species were all considered to be on 'medium alert': Shelduck, Mallard, Eider, Goldeneye, Red-breasted Merganser, Ringed Plover, Grey Plover, Dunlin, Bar-tailed Godwit, Curlew, Turnstone. Reasons given for the decline in these species were varied but in the main could be attributed to large scale factors rather than site specific issues. However, for certain species, site-level effects were cited as possibly contributing factors including cockling and bait-digging both of which relate to disturbance impacts.

- 3.24 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 indeed to conclude that there will be no adverse effect on the integrity of these European Sites as a result of disturbance effects.

Effects in Combination with Other Plans and Projects

- 3.25 Aspects of the following plans and projects could lead to 'in combination' effects on European Sites with regards to water resources and quality (see Appendix 2):
- The proposed Duddon Estuary and Morecambe Bay Regional Park states as some of its objectives, 'the development and promotion of a wide range of high quality leisure and tourism facilities and events'; 'the development of the North West Coastal Trail' and 'provision of good access to regional park resources'. Specific proposals for a number of new visitor attractions around Duddon Estuary and Morecambe Bay, including a series of new sports venues for power boating, a new watersports centre at Cavendish dock, a new national wind surfing and kite surfing centre at Earnse Point, the renewal of estuary bridges to provide improved walking and cycle trails and promotion of ferry access to serve Piel Island and South Walney could all lead to significant increases in disturbance to qualifying interests of the SPA and Ramsar sites.
 - Within the HRA Screening Assessment, a total of 13 policies set out within the Barrow Port Action Plan were considered likely to result in a significant effect as a result of direct disturbance to passage, breeding and over-wintering birds that are qualifying interests of Morecambe Bay SPA, Ramsar and Duddon Estuary SPA and Ramsar³⁶. In addition, indirect effects associated with increased recreational pressure arising as a result of policies encouraging strategic growth in the area were also noted for several other policies. Policy BP6 in particular promotes enhanced public access to Natura 2000 sites whilst policy BP7 promotes renewable energy proposals with the potential for disruption of bird flight paths should wind turbines be erected in

inappropriate locations. Also of particular concern in relation to disturbance impacts are policies BP19 and BP20 which promote the development of Cavendish dock as a wildlife attraction and a watersports centre including a new power boating facility respectively. Until detailed assessment of these potential impacts has been undertaken and reviewed, the possibility of adverse effects on the integrity of Duddon Estuary SPA and Ramsar and Morecambe Bay SPA and Ramsar must be assumed.

- The potential future development associated with Millom Pier, as described in the Copeland Borough Council Adopted Local Plan (2001 – 2016) could also lead to disturbance of qualifying interests within Duddon Estuary SPA, Ramsar (with indirect effects on Morecambe Bay SPA and Ramsar) as result of both the construction activities within the foreshore and increased human presence on completion.
- The two major off-shore wind farm projects at West of Duddon Sands and Walney could both represent significant barriers to migratory bird species present within Duddon Estuary SPA, Ramsar and Morecambe Bay SAC, SPA and Ramsar as well as for those with off-shore feeding grounds. There is also the potential for direct mortality of birds as a result of collisions with turbines.

3.26 As a result of all of the above projects and future developments in and around Morecambe Bay and Duddon Estuary, cumulative effects in terms of disturbance could be significant.

3.27 **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 Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar until greater site specific detail (including on technology and mitigation measures) is known and site level baseline studies are undertaken. 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

3.28 Information provided by the UK Air Pollution Information System⁴⁵ indicates that air quality measured around Kirksanton (up to a resolution of 5km) is generally good with pollution levels for all key

⁴⁵ <http://www.apis.ac.uk/>

pollutants (sulphur dioxide, particulates, nitrogen dioxide etc.) typically low.

- 3.29 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 Agency's most recent available assessment of radioactive aerial emissions indicates that all fall within authorised limits⁴⁶.

Morecambe Bay SAC

Duddon Estuary SPA, Ramsar

Morecambe Bay SPA, Ramsar

- 3.30 Changes in air quality could impact upon sensitive designated communities within Morecambe Bay SAC and therefore, through effects on supporting habitats, this could lead to indirect effects on qualifying interests for Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar. Air quality issues around the nominated site are considered to potentially be most significant during construction and decommissioning phases.
- 3.31 Sensitivities and critical loads have been identified for the interest features within Morecambe Bay SAC and key supporting habitats for Duddon Estuary SPA, Ramsar and Morecambe Bay SPA, Ramsar. Information gathered using UK Air Pollution Information System⁴⁷ has revealed that for some pollutants, current deposition levels are close to or within exceedance level ranges. For saltmarsh, sand dunes and shingle habitats, current acid deposition levels when compared to critical loads for these habitats are in exceedance by 0.62keq/ha/yr. In addition, air quality data for other parts of Morecambe Bay SAC (close to Heysham and within Morecambe Bay SPA, Ramsar) reveal that here, nitrogen deposition for dune systems and Perennial vegetation of stony banks are at, or are in exceedance of, critical loads.

Effects in Combination with Other Plans and Projects

- 3.32 Aspects of the following plans and projects could lead to 'in combination' effects on European Sites with regards to water resources and quality (see Appendix 2):

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

<http://maps.environment-agency.gov.uk/wiyby/>

47 <http://www.apis.ac.uk/>

- Possible in-combination effects in terms of air quality and the release of non-radioactive and radioactive aerial emissions could arise as a result of the development of a new nuclear power station immediately adjacent to Morecambe Bay SAC, SPA and Ramsar at Heysham (see paragraph 3.10 above). Decommissioning of Heysham 1 and Heysham 2 in the future will also lead to potential impacts on air quality, including the release of particulate matter during demolition operations as well as a result of emissions from increased traffic (potentially shipping, road and rail) that is required for the transport of material off-site.
 - Development of a cruise facility as proposed within Barrow Port Area Action Plan has the potential to lead to potentially significant air quality impacts with associated direct and indirect effects on the qualifying interests of Morecambe Bay SAC, SPA and Ramsar. In addition, expansion and redevelopment of Barrow as detailed within the Barrow Area Action Plan could lead to increased atmospheric pollution generated as a result of housing, employment and transport regeneration/ renewal.
 - The Gas Storage Facility being developed by Gateway Storage Company Ltd could also result in air quality impacts for Duddon Estuary SPA, Ramsar and Morecambe Bay SAC, SPA and Ramsar, as a result of the potential for increased shipping traffic within port facilities which fall within the European Sites.
- 3.33 As a result of all of the above projects and future developments in and around Morecambe Bay and Duddon Estuary, cumulative effects in terms of air quantity could be significant.
- 3.34 **In the context of known air quality conditions and interest feature vulnerabilities and the possibility of cumulative effects, a precautionary approach requires that at this strategic level, potential adverse effects be assumed for Morecambe Bay SAC, Duddon Estuary SPA, Ramsar and Morecambe Bay 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 site integrity identified is considered further below.**

Avoidance and Mitigation Measures

- 3.35 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 development at the nominated site. These uncertainties limit the capacity of the HRA to reasonably predict the effects on a European Site⁴⁸.

- 3.36 At this strategic stage, the HRA for Kirksanton can make avoidance and mitigation recommendations to inform the strategic siting assessment process and therefore the overall development of the revised draft Nuclear NPS. These recommendations may also subsequently provide guidance to the IPC, and potential future developers, to ensure that any future development at Kirksanton takes into account the findings of this strategic level assessment in more detailed, project level HRA.
- 3.37 The HRA recommendations for avoidance and mitigation measures in relation to Kirksanton are detailed below (Table 4) and summarised in the HRA Report Part II. Part II of the main HRA report also summarises the measures identified in this report alongside those proposed by other individual site HRAs.
- 3.38 This HRA 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 Kirksanton 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 site boundary and location at Kirksanton. Such changes required at the project level should be sufficiently flexible to ensure that all identified impacts are addressed.
- 3.39 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

- 3.40 Avoiding adverse effects on surface, ground and estuarine waters is primarily the responsibility of the Water Companies (resource planning)

⁴⁸ 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.

and the Environment Agency (abstraction licensing and discharge regulation).

- 3.41 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)⁴⁹ 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.
- 3.42 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.
- 3.43 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 and discharge standards.

Habitat (and species) Loss and Fragmentation/Coastal Squeeze

- 3.44 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 and species impacts that may lead to loss or fragmentation.
- 3.45 In relation to the identified issues at Kirksanton this would include the avoidance of direct habitat loss within designated habitats in the adjacent Morecambe Bay SAC and Duddon Estuary SPA and Ramsar for example, locating cooling water infrastructure and marine off-loading facility beyond the western boundary of these European Sites as well as avoiding the need for improved or extended coastal defences within the SAC, SPA and Ramsar through careful site layout and design. Direct loss of habitats which cannot be avoided within the coastal fringe but outside of these European Sites should be mitigated for through reinstatement of affected habitats, as well as habitat creation, to maintain the connectivity of wildlife corridors around the nominated site.

⁴⁹ 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.

- 3.46 With regards mitigation for indirect effects, it would also include design of sea defences (soft engineering) and marine off-loading facility in ways that do not impede sediment movements along the shore. Connectivity of important wildlife corridors around the 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. Protection measures should also be incorporated into water intake systems so as to avoid depleting important food sources for birds such as fish/invertebrates.
- 3.47 If, following detailed site surveys, Natterjack Toads are confirmed as being present within the nominated site, a detailed mitigation strategy will be required. It would be necessary to avoid, where possible, any direct impacts on this species through alterations to site design and layout. If mitigation through avoidance is not feasible (for example, due to widespread distribution across the nominated site) measures to reduce the impacts would be necessary. The latter could involve a combination of in-situ mitigation to ensure a viable on-site population is maintained with connections to other populations in and around Duddon Estuary as well as possibly translocation of individuals outside of the working area into adjacent suitable habitats as well as creation of new habitat. The effectiveness of any mitigation strategy is dependent upon the specific circumstances such as the size and nature of the population, the extent of habitat loss or damage and the nature of the threat. As mitigation for potential indirect habitat loss impacts associated with the construction of new sea defences, sluices could be provided within any sea walls to ensure that ponds within the dune slacks are irrigated, whilst careful design of Sustainable Drainage Systems within the development could reduce impacts associated with infrastructure preventing freshwater inputs to upper saltmarsh pools and dune slack ponds.

Disturbance (Noise, Light, Visual)

- 3.48 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 should 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 Natural England prior to the commencement of development but could include for example, the use of visual screens. These measures should 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 and roosting birds.

Air Quality

3.49 As air quality impacts have been assessed as having the potential to result in adverse effects on the integrity of the European Sites around Kirksanton, 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 Environment Agency as appropriate) to track changes throughout the lifecycle of proposed operations.

Table 4: Summary of Avoidance and Mitigation Recommendations

Potential Effects	Avoidance and Mitigation Measures – Recommendations for the IPC
Water Resources and Quality	
<ul style="list-style-type: none"> Water Quality 	<ul style="list-style-type: none"> Direct requirements for the protection of water quality. Such measures could include construction environmental management techniques for example use of containment (membranes and bunding), emergency spill response planning, and management of rainwater run-off. Require suitable discharge quality standards which avoid adverse effects. Ensure that cooling water culverts apply modern tunnelling techniques and discharge to reduce the impacts of thermal plumes
<ul style="list-style-type: none"> Water Quantity 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Surface and Groundwater Flow 	<ul style="list-style-type: none"> Require suitable design, including use of Sustainable Drainage Systems.
Habitat (and Species) Loss and Fragmentation	
<ul style="list-style-type: none"> Direct and Indirect Habitat Loss 	<ul style="list-style-type: none"> Require site layout/ design to avoid direct habitat losses; in particular cooling water infrastructure should avoid passing through

Potential Effects	Avoidance and Mitigation Measures – Recommendations for the IPC
	<p>Duddon Estuary SPA / Ramsar and Morecambe Bay SAC and site layout should avoid the need for new sea defences within or adjacent to these European Sites</p> <ul style="list-style-type: none"> • Require directional drilling techniques are used to install cooling water culverts to minimise surface disturbance to habitats crossed within the coastal fringe • Require dredging for marine access (should it be required) avoids adverse effects on offshore sandbanks which supply sediment to intertidal and on-shore qualifying habitats • Require sensitive design for all coastal defence structures and marine off-loading facilities which are permeable to sediment flows along the coastline • 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
<ul style="list-style-type: none"> • Loss of Surrounding Habitat (construction of associated infrastructure) 	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Loss of Natterjack Toads and supporting habitat 	<ul style="list-style-type: none"> • Require site design / layout to avoid direct loss of Natterjack Toads and supporting habitat. • If avoidance is not possible, require translocation of individuals outside of the working area into adjacent suitable habitats as well as creation of new habitat to ensure no net loss of individuals in the long term. • Require any new coastal defences do not prevent saline flushing of upper saltmarsh pools and dune slacks for example sluices to be provided within any new sea walls • Require new infrastructure such as access roads etc. does not impede surface water movements and hence freshwater inputs to pools within saltmarsh and dune slacks.

Potential Effects	Avoidance and Mitigation Measures – Recommendations for the IPC
<ul style="list-style-type: none"> Fish impingement 	<ul style="list-style-type: none"> 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)	
<ul style="list-style-type: none"> Construction and Decommissioning (including associated infrastructure) 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Recreational Activities 	<ul style="list-style-type: none"> Require contributions towards increased wardening / visitor management at sites vulnerable to disturbance
Air Quality	
<ul style="list-style-type: none"> Non-particulate emissions arising from construction, operation and decommissioning 	<ul style="list-style-type: none"> 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 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
<ul style="list-style-type: none"> Particulate emissions arising from construction, operation and decommissioning 	<ul style="list-style-type: none"> 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

- 3.50 The HRA Screening Assessment identified the likely significant effects on five of the European Sites as a result of impacts that may arise from development of a new nuclear power station at the nominated site at Kirksanton. 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.
- 3.51 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.
- 3.52 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 five European Sites identified through the screening stage through impacts on water resources and quality, habitat and species loss and fragmentation (including coastal squeeze), disturbance (noise, light and visual) and air quality.
- 3.53 Table 5 below illustrates those 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	<ul style="list-style-type: none"> • Duddon Estuary SPA • Duddon Estuary Ramsar • Morecambe Bay SAC • Morecambe Bay SPA • Morecambe Bay Ramsar
Air quality	<ul style="list-style-type: none"> • Duddon Estuary SPA • Duddon Estuary Ramsar • Morecambe Bay SAC • Morecambe Bay SPA

	<ul style="list-style-type: none"> • Morecambe Bay Ramsar
Habitat (and species) loss and fragmentation / coastal squeeze	<ul style="list-style-type: none"> • Duddon Estuary SPA • Duddon Estuary Ramsar • Morecambe Bay SAC • Morecambe Bay SPA • Morecambe Bay Ramsar
Disturbance (noise, light, visual)	<ul style="list-style-type: none"> • Duddon Estuary SPA • Duddon Estuary Ramsar • Morecambe Bay SPA • Morecambe Bay Ramsar

- 3.54 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.
- 3.55 **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 Kirksanton.**
- 3.56 **Only at the project level HRA can a conclusion of no adverse effect on 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 Oxides
NPS	National Policy Statement
PPP	Plans, Programmes and Projects
pSPA	Potential Special Protection Area
RoC	Review of Consents
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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