
Habitat Regulations Assessment Report

**The Yorkshire and Humber (CCS Cross Country
Pipeline) Development Consent Order**

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1 Introduction

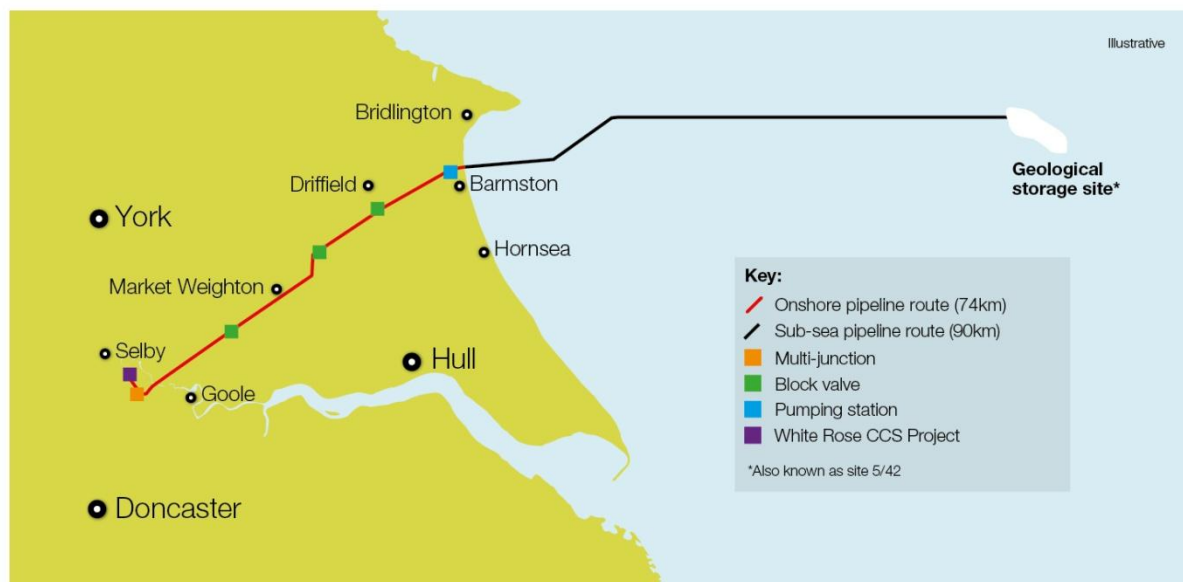
1.1 INTRODUCTION

- 1.1.1 National Grid plc owns and operates the national high-pressure gas transmission pipeline network in the UK and operates the national electricity grid in the UK. National Grid Carbon (referred to in this report as “National Grid”) is a non-regulated, independent subsidiary of National Grid plc, created to develop Carbon Dioxide transportation and storage infrastructure in the UK.
- 1.1.2 For the purposes of consenting, the project is split into two schemes, named the Onshore Scheme and the Offshore Scheme. The Offshore Scheme application is being submitted after that for the Onshore Scheme; however for the purposes of assessment under the Habitats Regulations National Grid has been advised that both the Onshore and Offshore Schemes should be considered together as one project. Therefore, although the Planning Inspectorate (PINS) is not the Competent Authority for the Offshore Scheme, information is being provided for both the Onshore Scheme (in the form of the No Significant Effects Report – Document 5.4) and the Offshore Scheme (in the form of a ‘Shadow’ Appropriate Assessment Report (SAAR)). The SAAR is being submitted to Natural England, so that Natural England can confirm to the Examining Authority that there is sufficient information before them to enable the Examining Authority to report on Habitat Regulations Assessment issues and, accordingly, for the Secretary of State to carry out the Appropriate Assessment, as the Competent Authority. This is because, when taking both reports into consideration it is possible to understand the implications of the project as a whole for Natura 2000 sites, during the consenting period for the Onshore Scheme.
- 1.1.3 This Habitat Regulations Assessment Report for the Project has been prepared under The Conservation of Habitats and Species Regulations 2010 (the ‘Habitats Regulations’) which transposes the requirements of Article 6(3) of the Habitats Directive 92/43/EEC. The Offshore Scheme will be subject to the Marine Conservation (Natural Habitats + c) (amendment) Regulations 2007 which transpose the Directives for the offshore marine areas beyond 12 nm.

1.2 THE PROJECT

- 1.2.1 The Project proposed is a Carbon Dioxide transportation and storage system to support the provision of carbon capture and storage (CCS) technology in the Yorkshire and Humber Region. The Project, in its entirety known as *The Yorkshire and Humber CCS Transportation and Storage Project* (“the Project”), would comprise the construction of a Cross Country Pipeline and sub-sea pipeline for transporting Carbon Dioxide captured from power projects in the region to a permanent geological storage site beneath the North Sea. The Project includes both onshore and offshore elements which are subject to separate consenting regimes (the “Onshore Scheme” and the “Offshore Scheme”).
- 1.2.2 The onshore elements of the Project are collectively termed the Yorkshire and Humber CCS Cross Country Pipeline (shortened to the “Onshore Scheme”) and are proposed to comprise the construction of a Cross Country Pipeline and associated infrastructure including Pipeline Internal Gauge (PIG) Traps, a Multi-junction, three Block Valves, a Pumping Station (collectively termed “Above Ground Installations” or “AGIs”) and any necessary interconnecting local pipelines and associated works. A more detailed description of the Onshore Scheme is presented in the NSER for the Onshore Scheme (Document 5.4).
- 1.2.3 The offshore elements of the Project are collectively termed the Yorkshire and Humber CCS Sub-Sea Pipeline and Geological Storage Site (shortened to the “Offshore Scheme”) and are proposed to comprise the construction of a 90 km sub-sea pipeline to a geological storage site. This is subject to a separate consenting regime requiring authorisation by the Secretary of State for Energy and Climate Change in accordance with the Petroleum Act 1998 (for the pipeline) and the Energy Act 2008 (for the geological storage site). A more detailed description of the Offshore Scheme is presented in the Shadow Appropriate Assessment Report (SAAR) for the Offshore Scheme (Document 11.9).
- 1.2.4 The Onshore and Offshore Schemes would be joined at the Mean Low Water Spring (MLWS) using appropriate landfall techniques; this is also the juncture of the Onshore and Offshore consenting regimes.
- 1.2.5 Figure 1.1 provides an illustrative overview of the Project.

Figure 1.1: Project Overview Map.



 Co-financed by the European Union's European Energy Programme for Recovery.

1.3 NEED FOR THE PROJECT

- 1.3.1 The full need case is presented in Document 7.4 a summary is provided below.
- 1.3.2 The burning of fossil fuels, such as coal and gas, to generate electricity is a major source of carbon dioxide emissions into the atmosphere, accounting for 40 per cent of global energy related carbon dioxide emissions – a greenhouse gas and major contributor to global climate change.
- 1.3.3 Significant steps are now being taken to reduce global carbon dioxide emissions and a number of countries and international bodies have policies and initiatives in place to address this issue.
- 1.3.4 Carbon Capture and Storage (CCS) has been identified as one initiative with potential to create large reductions in carbon dioxide emissions. The International Energy Agency (IEA) has described CCS as “a *critical greenhouse gas reduction solution.*”
- 1.3.5 The UK Government has a policy to increase the use of low carbon technologies including CCS. The Government has stated that:

“CCS is the only way we can reduce carbon dioxide emissions and keep fossil fuels (coal and gas) in the UK’s electricity supply mix. Fossil fuels are an

important part of the electricity mix (and will remain so for some time to come) because they let us balance the intermittency of wind and the inflexibility of nuclear.”

- 1.3.6 Whilst much is known about the respective methods of capturing, transporting and storing carbon dioxide, CCS has yet to be demonstrated in the UK on a commercial scale. In the Government’s over arching energy policy statement, known as EN-1, it states:

”The Government is leading the international efforts to develop CCS. This includes supporting the cost of four commercial scale demonstration projects at UK power stations. The intention is that each of the projects will demonstrate the full chain of CCS involving the capture, transportation and storage of carbon dioxide in the UK. These demonstration projects are therefore a priority for UK energy policy. The demonstration programme will also require the construction of essential infrastructure (such as pipelines and storage sites) that are sized and located both for the purpose of the demonstration programme and to take account of future demand beyond the demonstration phase.”

- 1.3.7 Yorkshire and Humber is the most energy-intensive region in the UK. Its concentration of fossil fuel power stations provides around 18 per cent of the nation’s electricity generation and the region is also the location for a significant amount of heavy industry.

- 1.3.8 This concentration of power stations and industrial plants produces about 60 million tonnes of carbon dioxide every year, equivalent to about half of the total emissions from domestic homes in the UK. Most of these facilities are located relatively close together and are also located within approximately 100 kilometres of the East Yorkshire coast, providing good access to offshore storage locations beneath the North Sea seabed.

- 1.3.9 Because of these factors, the Yorkshire and Humber region is considered to be the ideal location to demonstrate CCS as a technology on a commercial scale, with a view to promoting the development of a shared regional CCS transportation network. Allowing multiple emitters to connect to shared CCS infrastructure over time would enable the capture and storage of tens of millions of tonnes of carbon dioxide that ordinarily would have been emitted to the atmosphere.

1.4 THE REQUIREMENT FOR A HABITAT REGULATIONS ASSESSMENT

Legislative Context

- 1.4.1 European Directive 92/43/EEC on the 'Conservation of Natural Habitats and Wild Fauna and Flora', referred to as the 'Habitats Directive', and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the codified version of Council Directive 79/409/EEC on the conservation of wild birds), referred to as the 'Birds Directive' provide legal protection for habitats and species of European importance. Article 2 of the Habitats Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status. Articles 3 - 9 provide the legislative means to protect habitats and species of Community interest. In particular, Article 6 (3) of the Directive states:
- 1.4.2 *"Any plan or project not directly connected with, or necessary to, the management of the [European] site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives".*
- 1.4.3 The Project is not directly connected with or necessary to the management of a European Site.
- 1.4.4 These directives are transposed into domestic law by the Conservation of Habitats and Species Regulations 2010 (England and Wales) (as amended). The Regulations enable the protection of sites that host habitats and species of European Importance. These sites are listed below and are collectively referred to as Natura 2000 Sites or 'European Sites'.
- Special Areas of Conservation (SAC);
 - Special Protection Areas (SPA); and
 - Ramsar Sites

Special Areas of Conservation

- 1.4.5 Special Areas of Conservation (SAC) are high quality conservation sites that have been given protection under the European Habitats Directive (92/43/EEC). These important sites are selected to conserve rare and vulnerable animals, plants and habitats (excluding birds) that are listed in Annexes I and II of the Directive (as amended).

Special Protection Areas

- 1.4.6 Special Protection Areas (SPA) are protected sites that have been implemented to protect rare and vulnerable bird species and their habitats. They are classified in accordance with the Council Directive 2009/147/EC (Birds Directive) the Conservation of Wild Birds (the codified version of Council Directive 79/409/EEC on the conservation of wild birds) and aim to safeguard bird species and populations that are listed in Annexes I and II of the Directive.
- 1.4.7 Part II, Paragraph 10 of The Conservation of Habitat and Species Regulations 2010 (England and Wales) provides a definition of the term “European Site” which it identifies as including SAC and SPA sites, as well as candidate / proposed sites (cSAC and pSPA) which are being consulted on or are pending a European Commission decision. However, the Habitats Regulations do not provide statutory protection for pSPAs or to cSACs before they are agreed with the European Commission. For the purpose of considering development proposals and their likely impacts on such sites, as a matter of policy, the UK Government wishes those pSPAs and cSACs that have been included in a list sent to the European Commission, to be considered in the same way as if they have already been classified or designated.

Ramsar Sites

- 1.4.8 Ramsar sites are wetlands of international importance that have been designated under the Ramsar Convention (1971). Sites are selected for their international significance relating to all ecology, botany, zoology, limnology or hydrology wetland components. The designation recognises the importance of wetlands as economic, social and environmental entities and the need to conserve them.

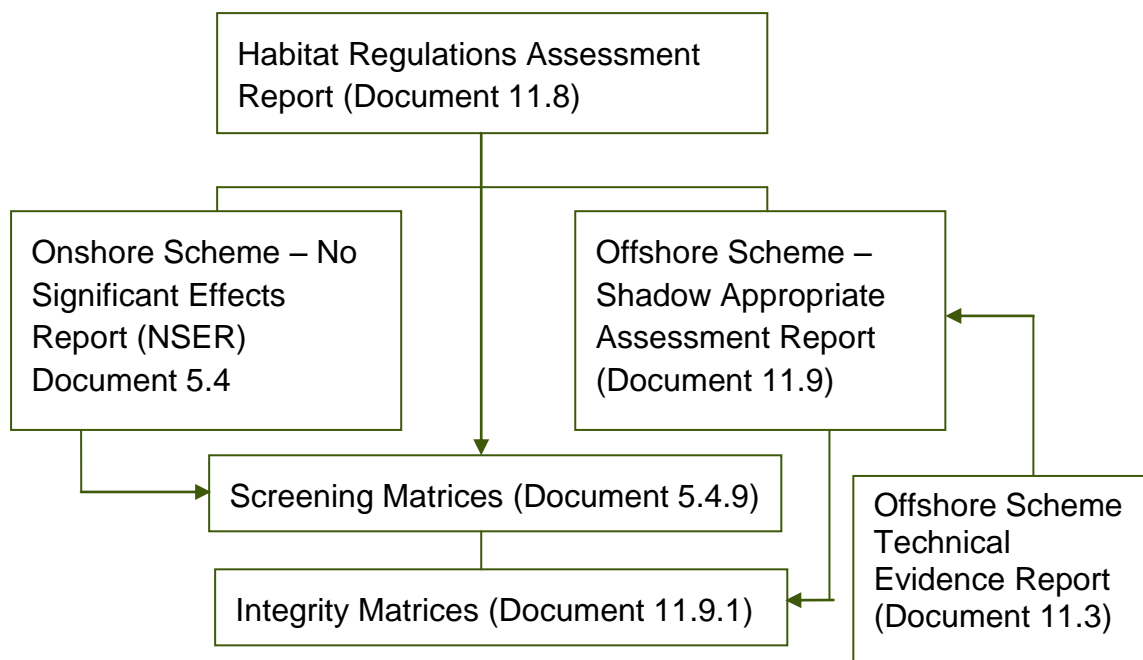
HRA Assessment of the Project

- 1.4.9 A No Significant Effects Report (NSER) (Document 5.4) has been submitted with the draft Development Consent Order (DCO) for the Yorkshire and Humber CCS Cross Country Pipeline (Onshore Scheme). The NSER concludes that the Onshore Scheme will not result in a Likely Significant Effect (LSE) on a Natura 2000 site. Natural England has confirmed that it is satisfied that the Onshore Scheme is not likely to have a significant effect on a European Site. However, having regard to the requirements of the Habitats Regulations, it is acknowledged that the Offshore Scheme is an integral part of the Project as a whole, and as such further information as to the potential impacts of the Project as a whole is provided in this document. As such this

document presents a Habitat Regulations Assessment for the Project to provide sufficient information to enable the Secretary of State to determine whether the Project as a whole will result in an Adverse Effect on Site Integrity (AEOSI).

- 1.4.10 This report is supported by two documents, the NSER for the Onshore Scheme (Document 5.4) and whilst the application for the Offshore Scheme is still to be submitted the realistic likely case shadow Appropriate Assessment for the Offshore Scheme. This Shadow Appropriate Assessment Report (Document 11.9) provides sufficient information to enable a HRA of the Project to be undertaken. The Offshore Scheme Shadow Appropriate Assessment Report is supported by an Offshore Scheme Technical Evidence Report (Document 11.3) submitted at Deadline 2.

Figure 1.2: Document Suite

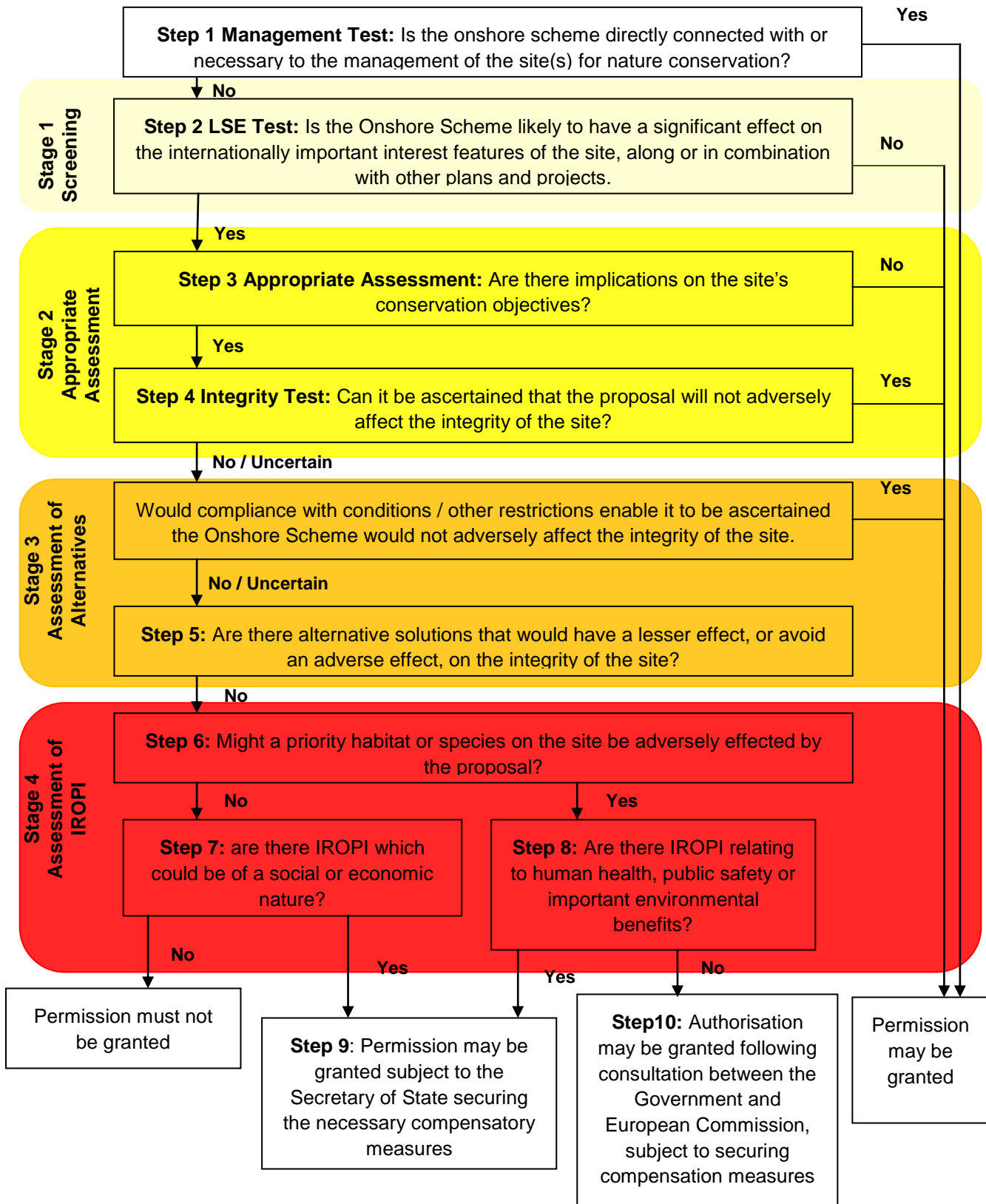


1.5 HRA PROCESS

- 1.5.1 The methodology for HRA takes cognisance of the EU guidance document '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'.

- 1.5.2 It has become generally accepted that a staged approach should be followed for a HRA as proposed by the latest European Commission guidance and as set out in the Planning Inspectorate's Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects. These stages are:
- 1.5.3 **Stage 1 Screening** — the process which identifies whether there are likely to be any effects upon a Natura 2000 site as a result of the Onshore Scheme, either alone or in combination with other projects, and considers whether these effects are likely to be significant.
- 1.5.4 **Stage 2 Appropriate Assessment** — the consideration of the effect on the integrity of the Natura 2000 site, with respect to the site's structure and function and its conservation objectives. Additionally, where significant adverse effects on site integrity exist, an assessment of potential mitigation will be made.
- 1.5.5 **Stage 3 Assessment of Alternative Solutions** — the process which examines alternative ways of achieving the objectives of the Onshore Scheme that avoids significant adverse effects on the integrity of the Natura 2000 site identified at Stage 2.
- 1.5.6 **Stage 4 Assessment of IROPI** – where no alternative solutions exist and where significant adverse effects remain an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the Onshore Scheme should proceed.
- 1.5.7 Each stage determines whether a further stage in the process is required. If, for example, the conclusions at the end of Stage 1 are that there are no likely significant effects on a European Site, there is no requirement to proceed to Stage 2 or any subsequent stages. This process is illustrated in Figure 1.3 below, with each stage being broken down into a number of steps.

Figure 1.3: HRA Process



2 Screening (Stage 1)

2.1 INTRODUCTION

- 2.1.1 The NSER (Document 5.4) concludes that the Onshore Scheme will not result in a Likely Significant Effect (LSE) on a Natura 2000 site, therefore all elements of the Onshore Scheme have been screened out at Stage 1.
- 2.1.2 The application for the Offshore Scheme is expected to be made in 2015. Whilst impacts are not certain to occur, the precautionary principle has been applied as the design for the Offshore Scheme has not yet been finalised. Therefore likely significant effects of the Offshore Scheme cannot be ruled out and the next stage (stage 2) of the HRA process - testing for Adverse Effect on Site Integrity (AEOSI) - has been progressed for all elements of the Project associated with the Offshore Scheme.

2.2 SCREENING

- 2.2.1 Table 2.1 sets out a summary of screening for the project as a whole. Documents 5.4 (NSER for the Onshore Scheme) and 11.9 (Shadow Appropriate Assessment Report for the Offshore Scheme) should be referred to for details as to why sites and interest features of those sites have been screened in / out.

Table 2.1: Potential for the Project to result in LSE			
Site	The Project		Potential for the Project to result in LSE
	Onshore Scheme	Offshore Scheme	
Humber Estuary SPA	No potential for LSE, please refer to the NSER (Document 5.4)	LSE cannot be ruled out whilst there remains some uncertainty as to the detail of the offshore scheme information	Yes
Humber Estuary SAC	No potential for LSE, please refer to the NSER	LSE cannot be ruled out whilst there remains some	Yes

Table 2.1: Potential for the Project to result in LSE			
Site	The Project		Potential for the Project to result in LSE
	Onshore Scheme	Offshore Scheme	
	(Document 5.4)	uncertainty as to the detail of the offshore scheme information	
Humber Estuary Ramsar	No potential for LSE, please refer to the NSER (Document 5.4)	LSE cannot be ruled out whilst there remains some uncertainty as to the detail of the offshore scheme information	Yes
River Derwent SAC	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No
Lower Derwent Valley SAC	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No
Lower Derwent Valley SPA	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No
Lower Derwent Valley Ramsar	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No
Skipwith Common SAC	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No

Table 2.1: Potential for the Project to result in LSE			
Site	The Project		Potential for the Project to result in LSE
	Onshore Scheme	Offshore Scheme	
Thorne and Hatfield Moors SPA	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No
Thorne Moor SAC	No potential for LSE, please refer to the NSER (Document 5.4)	No pathway between the Offshore Scheme and this site, therefore no potential for LSE.	No
Flamborough Head SAC	No potential for LSE, please refer to the NSER (Document 5.4)	LSE cannot be ruled out whilst there remains some uncertainty as to the detail of the offshore scheme information	Yes
Flamborough Head and Bempton Cliffs SPA	No potential for LSE, please refer to the NSER (Document 5.4)	LSE cannot be ruled out whilst there remains some uncertainty as to the detail of the offshore scheme information	Yes
Flamborough Head and Filey Coast pSPA	No potential for LSE, please refer to the NSER (Document 5.4)	LSE cannot be ruled out whilst there remains some uncertainty as to the detail of the offshore scheme information	Yes
Hornsea Mere SPA	No potential for LSE, please refer to the NSER	No pathway between the Offshore Scheme and this site, therefore	No

Table 2.1: Potential for the Project to result in LSE			
Site	The Project		Potential for the Project to result in LSE
	Onshore Scheme	Offshore Scheme	
	(Document 5.4)	no potential for LSE.	
The Wash and North Norfolk Coast SAC	No pathway between the Onshore Scheme and this site, therefore no potential for LSE.	LSE cannot be ruled out whilst there remains some uncertainty as to the detail of the offshore scheme information	Yes

2.2.2 Screening matrices are provided in Document 5.4.9.

2.2.3 LSE for the project as whole cannot be ruled out for the following sites therefore these have been taken through to Stage 2 which is the test for adverse effect on site integrity (AEOSI).

- Humber Estuary SAC
- Humber Estuary SPA
- Humber Estuary Ramsar
- Flamborough Head and Bempton Cliffs SPA
- Flamborough Head and Filey Coast pSPA
- Flamborough Head SAC
- The Wash and North Norfolk Coast SAC

3 Site Descriptions

3.1 INTRODUCTION

3.1.1 The following sets out a description of the sites taken through to Stage 2 of the HRA process. Full site descriptions for all sites screened out at Stage 1 can be found in the NSER (Document 5.4).

3.2 HUMBER ESTUARY PROTECTED SITES

3.2.1 The Humber Estuary is located in the east of England and comprises extensive wetland and coastal habitats. The estuary drains a catchment of some 24,240 square kilometres and provides the largest single input of freshwater from Britain into the North Sea. It has the second-highest tidal range in Britain (7.2 m) and approximately one-third of the estuary is exposed as mud- or sand-flats at low tide. The inner estuary supports extensive areas of reedbed with areas of mature and developing saltmarsh backed by grazing marsh in the middle and outer estuary. On the north Lincolnshire coast, the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. The estuary supports important numbers of waterbirds (especially geese, ducks and waders) during the migration periods and in winter. It also supports important breeding populations of terns and raptors in summer¹.

Qualifying features and conservation objectives

3.2.2 Table 3.1 below sets out the Qualifying Species and Conservation Objectives of the Humber Estuary SAC.

Table 3.1 Qualifying Species and Conservation Objectives of the Humber Estuary SAC	
Qualifying Features	Conservation Objectives
<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> ▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide 	<p>Avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to</p>

¹ <http://jncc.defra.gov.uk/default.aspx?page=1996>

Table 3.1 Qualifying Species and Conservation Objectives of the Humber Estuary SAC	
Qualifying Features	Conservation Objectives
<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> ▪ Sandbanks which are slightly covered by sea water all the time ▪ Coastal lagoons * Priority feature ▪ Salicornia and other annuals colonising mud and sand ▪ Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (‘white dunes’) ▪ Fixed dunes with herbaceous vegetation (‘grey dunes’) * Priority feature ▪ Dunes with <i>Hippophae rhamnoides</i> <p>Annex II species present as a qualifying feature, but not a primary reason for site selection</p> <ul style="list-style-type: none"> ▪ Sea lamprey <i>Petromyzon marinus</i> ▪ River lamprey <i>Lampetra fluviatilis</i> ▪ Grey seal <i>Halichoerus grypus</i> 	<p>achieving Favourable Conservation Status of each of the qualifying features.</p> <p>Subject to natural change, to maintain or restore:</p> <ul style="list-style-type: none"> ▪ The extent and distribution of qualifying natural habitats and habitats of qualifying species; ▪ The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species; ▪ The supporting processes on which qualifying natural habitats and habitats of qualifying species rely; ▪ The populations of qualifying species; ▪ The distribution of qualifying species within the site.

3.2.3 Table 3.2 below sets out the Qualifying Species and Conservation Objectives of the Humber Estuary SPA.

Table 3.2 Qualifying Species and Conservation Objectives of the Humber Estuary SPA	
Qualifying Features	Conservation Objectives
<p>Article 4.1 Qualification (79/409/EEC) during the breeding season the area regularly supports:</p>	<p>Avoid the deterioration of the habitats of the qualifying features, and the significant</p>

Table 3.2 Qualifying Species and Conservation Objectives of the Humber Estuary SPA	
Qualifying Features	Conservation Objectives
<ul style="list-style-type: none"> ▪ Great bittern <i>Botaurus stellaris</i> ▪ Eurasian marsh harrier <i>Circus aeruginosus</i> ▪ Pied avocet <i>Recurvirostra avosetta</i> ▪ Little tern <i>Sterna albifrons</i> <p>Over winter the area regularly supports:</p> <ul style="list-style-type: none"> ▪ Great bittern <i>Botaurus stellaris</i> ▪ Hen harrier <i>Circus cyaneus</i> ▪ Bar-tailed godwit <i>Limosa lapponica</i> ▪ European golden plover <i>Pluvialis apricaria</i> ▪ Pied avocet <i>Recurvirostra avosetta</i> <p>On passage the area regularly supports:</p> <ul style="list-style-type: none"> ▪ Ruff <i>Philomachus pugnax</i> <p>Article 4.2 Qualification (79/409/EEC)</p> <p>Over winter the area regularly supports:</p> <ul style="list-style-type: none"> ▪ Dunlin <i>Calidris alpina alpina</i> ▪ Red knot <i>Calidris canutus</i> ▪ Black-tailed godwit <i>Limosa limosa islandica</i> ▪ Common shelduck <i>Tadorna tadorna</i> ▪ Common redshank <i>Tringa totanus</i> <p>On passage the area regularly supports:</p> <ul style="list-style-type: none"> ▪ Dunlin <i>Calidris alpina alpina</i> ▪ Red knot <i>Calidris canutus</i> ▪ Black-tailed godwit <i>Limosa limosa islandica</i> ▪ Common redshank <i>Tringa totanus</i> <p>Article 4.2 Qualification (79/409/EEC) An Internationally Important Assemblage of Birds</p>	<p>disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.</p> <p>Subject to natural change, to maintain or restore:</p> <ul style="list-style-type: none"> ▪ The extent and distribution of the habitats of the qualifying features; ▪ The structure and function of the habitats of the qualifying features; ▪ The supporting processes on which the habitats of the qualifying features rely; ▪ The populations of the qualifying features; ▪ The distribution of the qualifying features within the site.

Table 3.2 Qualifying Species and Conservation Objectives of the Humber Estuary SPA	
Qualifying Features	Conservation Objectives
<p>In the non-breeding season the area regularly supports 153,934 waterfowl (5 year peak mean 1996/7 to 2000/1) Including: <i>Anas crecca</i>, <i>Anas penelope</i>, <i>Anas platyrhynchos</i>, <i>Arenaria interpres</i>, <i>Aythya ferina</i>, <i>Aythya marila</i>, <i>Botaurus stellaris</i>, <i>Branta bernicla bernicla</i>, <i>Bucephala clangula</i>, <i>Calidris alba</i>, <i>Calidris alpina alpina</i>, <i>Calidris canutus</i>, <i>Charadrius hiaticula</i>, <i>Haematopus ostralegus</i>, <i>Limosa lapponica</i>, <i>Limosa limosa islandica</i>, <i>Numenius arquata</i>, <i>Numenius phaeopus</i>, <i>Philomachus pugnax</i>, <i>Pluvialis apricaria</i>, <i>Pluvialis squatarola</i>, <i>Recurvirostra avosetta</i>, <i>Tadorna tadorna</i>, <i>Tringa nebularia</i>, <i>Tringa totanus</i>, <i>Vanellus vanellus</i></p>	

3.2.4 Table 3.3 below sets out the Criterion for the Humber Estuary Ramsar.

Table 3.3: Humber Estuary Ramsar	
Site Name	Humber Estuary
Area (ha)	37,987.8
Criterion 1	<p>The site contains a representative, rare, or unique example of natural or near-natural wetland types found within the appropriate biogeographic region:</p> <p>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.</p>
Criterion 2	The site supports populations of animal species important for maintaining the biological diversity of a particular

Table 3.3: Humber Estuary Ramsar	
Site Name	Humber Estuary
	<p>biogeographic region:</p> <p>The Humber Estuary Ramsar site supports a breeding colony of grey seals <i>Halichoerus grypus</i> at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad <i>Bufo calamita</i>.</p>
Criterion 5	<p>The site regularly supports 20,000 or more waterbirds:</p> <p>In the non-breeding season, the area regularly supports 153,934 individual waterbirds (5 year peak mean 1996/97 – 2000/01).</p>
Criterion 6	<p>The site regularly supports 1% of the individuals in a population of one species or subspecies of waterbird in any season:</p> <p>Shelduck <i>Tadorna tadorna</i> – wintering</p> <p>Golden plover <i>Pluvialis apricaria</i> - wintering</p> <p>Knot <i>Calidris canutus</i> – wintering</p> <p>Dunlin <i>Calidris alpina</i> – wintering</p> <p>Black-tailed godwit <i>Limosa limosa</i> – wintering</p> <p>Bar-tailed godwit <i>Limosa lapponica</i> – wintering</p> <p>Redshank <i>Tringa totanus</i> – wintering</p> <p>Golden plover <i>Pluvialis apricaria</i> - passage</p> <p>Knot <i>Calidris canutus</i> – passage</p> <p>Dunlin <i>Calidris alpina</i> – passage</p>

Table 3.3: Humber Estuary Ramsar	
Site Name	Humber Estuary
	Black-tailed godwit <i>Limosa limosa</i> – passage Redshank <i>Tringa totanus</i> - passage

3.3 FLAMBOROUGH HEAD AND BEMPTON CLIFFS SPA

3.3.1 Flamborough Head is located on the central Yorkshire coast of eastern England. The cliffs project into the North Sea, rising to 135 m at Bempton Cliffs, and exposing a wide section of chalk strata. The cliff-top vegetation comprises maritime grassland vegetation growing alongside species more typical of chalk grassland. The site supports large numbers of breeding seabirds including Kittiwake *Rissa tridactyla*, as well as the only mainland-breeding colony of Gannet *Morus bassanus* in the UK. The seabirds feed and raft in the waters around the cliffs, outside the SPA, as well as feeding more distantly in the North Sea. The intertidal chalk platforms are also used as roosting sites, particularly at low water and notably by juvenile Kittiwakes².

Qualifying Features and Conservation Objectives

3.3.2 Table 3.4 below sets out the Qualifying Species and Conservation Objectives of Flamborough Head and Bempton Cliffs SPA.

Table 3.4 Qualifying Species and Conservation Objectives of Flamborough Head and Bempton Cliffs SPA.	
Qualifying Features	Conservation Objectives
<p>This site qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: During the breeding season:</p> <ul style="list-style-type: none"> ▪ Kittiwake <i>Rissa tridactyla</i> ▪ A seabird assemblage of international importance <p>The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly</p>	<p>Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.</p> <p>Subject to natural change, to</p>

² <http://jncc.defra.gov.uk/default.aspx?page=1995>

Table 3.4 Qualifying Species and Conservation Objectives of Flamborough Head and Bempton Cliffs SPA.	
Qualifying Features	Conservation Objectives
<p>supporting at least 20,000 seabirds. During the breeding season, the area regularly supports 305,784 individual seabirds including: Puffin <i>Fratercula arctica</i>, Razorbill <i>Alca torda</i>, Guillemot <i>Uria aalge</i>, Herring Gull <i>Larus argentatus</i>, Northern gannet <i>Morus bassanus</i>, Kittiwake <i>Rissa tridactyla</i>.</p>	<p>maintain or restore:</p> <ul style="list-style-type: none"> ▪ The extent and distribution of the habitats of the qualifying features; ▪ The structure and function of the habitats of the qualifying features; ▪ The supporting processes on which the habitats of the qualifying features rely; ▪ The populations of the qualifying features; ▪ The distribution of the qualifying features within the site.

3.4 FLAMBOROUGH HEAD AND FILEY COAST PSPA

3.4.1 Flamborough Head and Filey Coast pSPA is an extension of the existing Flamborough Head and Bempton Cliffs SPA described above. Data recently collected has revealed that the area covered by the SPA extension as well as the existing SPA supports internationally important numbers of several regularly occurring migratory bird species during the breeding season. As a consequence the SPA extension is being recommended for classification as an SPA. The pSPA is one of the most important sites for breeding sea birds in England.

Qualifying Features and Conservation Objectives

3.4.2 Table 3.5 below sets out the Qualifying Species and Conservation Objectives.

Table 3.5 Qualifying Species and Conservation Objectives	
Qualifying Features	Conservation Objectives
<p>This site qualifies under Article 4.2 of the Directive (79/409/EEC) for supporting over 1% of the biogeographical population of four</p>	<p>Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying</p>

Table 3.5 Qualifying Species and Conservation Objectives	
Qualifying Features	Conservation Objectives
<p>regularly occurring migratory species:</p> <ul style="list-style-type: none"> ▪ Black-legged kittiwake <i>Rissa tridactyla</i> ▪ Northern gannet <i>Morus bassanus</i> ▪ Common guillemot <i>Uria aalge</i> ▪ Razorbill <i>Alca torda</i> <p>This site qualifies under Article 4.2 of the Directive 2009/147/EC as it is used by over 20,000 seabirds in any season: during the breeding season, the area regularly supports 215,750 individual seabirds including: black-legged kittiwake, northern gannet, common guillemot, razorbill, northern fulmar <i>Fulmarus glacialis</i></p>	<p>features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.</p> <p>Subject to natural change, to maintain or restore:</p> <ul style="list-style-type: none"> ▪ The extent and distribution of the habitats of the qualifying features; ▪ The structure and function of the habitats of the qualifying features; ▪ The supporting processes on which the habitats of the qualifying features rely; ▪ The populations of the qualifying features; ▪ The distribution of the qualifying features within the site.

3.5 FLAMBOROUGH HEAD SAC

3.5.1 The site lies close to the boundary between two North Sea waterbodies and encompasses a large area of hard and soft chalk cliffs which extend seaward as bedrock, boulder and cobble reefs further than at other site in the UK.

3.5.2 The reefs at Flamborough are important due to their substrate type, biogeographic position and the influences of hydrodynamic processes on reef topography and community structure. The reefs and cliffs on the north side of the headland are harder and more exposed than those of the south side of the headland and as a result they support different ranges of species. The site supports an unusual range of marine species, rich animal communities and some species that are at the southern limit of their North Sea distribution, e.g. the northern alga *Ptilota plumosa*. More than 110 species of seaweed and over 270 species of invertebrates have been recorded on the rocky shores. In the

shallow waters the hard nature of the chalk have enabled kelp *Laminaria hyperborea* forests to become established. These are important as they are considered to be a key structural and functional component of the reefs at Flamborough. In the deeper waters the reefs become dominated by faunal turfs which are made up of sea mats and sponges, soft corals and sea fans.

- 3.5.3 The site contains caves cut into soft rock exposures and is important for its specialised cave- algal communities, which contain abundant *Hildenbrandia rubra*, *Pseudendoclonium submarinum*, *Sphacelaria nana* and *Waerniella lucifuga*. There are more than 200 caves within the site. Some are partially submerged at all stages of the tide, others dry out at low tide, and some lie above the high water mark but are heavily influenced by wave splash and salt spray. The largest extend for more than 50 m from their entrance.
- 3.5.4 The vegetated sea cliffs are characterised by both a maritime influence, and by the chalk underlying the boulder clay. Thrift *Armeria maritima* and sea plantain *Plantago maritima* grow alongside herbaceous species more typical of chalk grassland such as kidney vetch *Anthyllis vulneraria*. Where the undercliff has slipped and is flushed by calcareous runoff, northern marsh orchid *Dactylorhiza purpurella* may be found with saltmarsh species, including sea arrowgrass *Triglochin palustris* and sea-milkwort *Glaux maritima*. Towards the northern and southern end of the site the chalk is masked by drift deposits, which support mesotrophic and acidic grassland communities.

Qualifying Features and Conservation Objectives

- 3.5.5 Table 3.6 below sets out the Qualifying Species and Conservation Objectives.

Table 3.6 Qualifying Species and Conservation Objectives of Flamborough Head SAC	
Qualifying Features	Conservation Objectives
<p>Annex I habitats that are a primary reason for selection of this site:</p> <p>Reefs</p> <p>Vegetated sea cliffs of the Atlantic and Baltic coasts</p> <p>Submerged or partially submerged sea caves</p>	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</p> <ul style="list-style-type: none"> ▪ The extent and distribution of qualifying natural habitats ▪ The structure and function

Table 3.6 Qualifying Species and Conservation Objectives of Flamborough Head SAC	
Qualifying Features	Conservation Objectives
	<p>(including typical species) of qualifying natural habitats, and</p> <ul style="list-style-type: none"> ▪ The supporting processes on which qualifying natural habitats rely

3.6 THE WASH AND NORTH NORFOLK COAST SAC

- 3.6.1 The Wash is the largest embayment in the UK. It is connected via sediment transfer systems to the north Norfolk coast. Together, the Wash and North Norfolk Coast form one of the most important marine areas in the UK and European North Sea coast, and include extensive areas of varying, but predominantly sandy, sediments subject to a range of conditions. Communities in the intertidal include those characterised by large numbers of polychaetes, bivalve and crustaceans. Subtidal communities cover a diverse range from the shallow to the deeper parts of the embayments and include dense brittlestar beds and areas of an abundant reef-building worm ('ross worm') *Sabellaria spinulosa*. The embayment supports a variety of mobile species, including a range of fish, otter *Lutra lutra* and common seal *Phoca vitulina*. The extensive intertidal flats provide ideal conditions for common seal breeding and hauling-out.
- 3.6.2 Sandy sediments occupy most of the subtidal area, resulting in one of the largest expanses of subtidal sandbanks in the UK. The subtidal sandbanks vary in composition and include coarse sand through to mixed sediment at the mouth of the embayment. Communities present include large dense beds of brittlestars *Ophiothrix fragilis*. Species include the sand-mason worm *Lanice conchilega* and the tellin *Angulus tenuis*. Benthic communities on sandflats in the deeper, central part of the Wash are particularly diverse. The subtidal sandbanks provide important nursery grounds for young commercial fish species, including plaice *Pleuronectes platessa*, cod *Gadus morhua* and sole *Solea solea*.
- 3.6.3 The site contains the largest single area of saltmarsh in the UK and is one of the few areas in the UK where saltmarshes are generally accreting. The proportion of the total saltmarsh vegetation represented by glasswort *Salicornia* and other colonising annuals is high because of the extensive enclosure of marsh in this site and is also unusual in that it forms a pioneer community with common cord-

grass *Spartina anglica*. There are large ungrazed saltmarshes on the North Norfolk Coast and traditionally grazed saltmarshes around the Wash. Saltmarsh swards dominated by sea-lavenders *Limonium spp.* are particularly well-represented. In North Norfolk, in addition to typical lower and middle saltmarsh communities, there are transitions from upper marsh to tidal reedswamp, sand dunes (which are largely within the adjacent North Norfolk Coast SAC), shingle beaches and mud/sandflats. Mediterranean saltmarsh scrub vegetation is dominated by a shrubby cover up to 1 metre high of bushes of shrubby sea-blite *Suaeda vera* and sea-purslane *Atriplex portulacoides*, with a patchy cover of herbaceous plants and bryophytes. This scrub vegetation often forms an important feature of the upper saltmarshes, and extensive examples occur where the drift-line slopes gradually and provides a transition to dune, shingle or reclaimed sections of the coast. At a number of locations on this coast perennial glasswort *Sarcocornia perennis* forms an open mosaic with other species at the lower limit of the sea-purslane community.

Qualifying Features and Conservation Objectives

3.6.4 Table 3.7 below sets out the Qualifying Species and Conservation Objectives.

Table 3.7 Qualifying Species and Conservation Objectives of the Wash and North Norfolk Coast SAC	
Qualifying Features	Conservation Objectives
<p>Annex I habitats that are a primary reason for selection of this site:</p> <p>Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks</p> <p>Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats</p> <p>Coastal lagoons</p> <p>Large shallow inlets and bays</p> <p>Reefs</p> <p>Salicornia and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand</p> <p>Atlantic salt meadows (<i>Glauco-</i></p>	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</p> <ul style="list-style-type: none"> ▪ The extent and distribution of qualifying natural habitats and habitats of qualifying species ▪ The structure and function (including typical species) of qualifying natural habitats ▪ The structure and function of the habitats of qualifying species

Table 3.7 Qualifying Species and Conservation Objectives of the Wash and North Norfolk Coast SAC	
Qualifying Features	Conservation Objectives
<p><i>Puccinellietalia maritimae</i></p> <p>Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>); Mediterranean saltmarsh scrub</p> <p>Annex II species present as a qualifying feature, but not a primary reason for site selection</p> <p>Otter <i>Lutra lutra</i></p> <p>Common seal <i>Phoca vitulina</i></p>	<ul style="list-style-type: none"> ▪ The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely ▪ The populations of qualifying species, and, ▪ The distribution of qualifying species within the site.

4 Potential for Adverse Effect on Site Integrity (Stage 2)

4.1 INTRODUCTION

4.1.1 The following sections present an assessment as to the potential for the Project to result in an adverse effect on site integrity.

4.2 SUMMARY OF SCREENING

4.2.1 Five sites have been taken through to stage 2, Table 4.1 provides details as to why these sites and interest features have been screened into the assessment of adverse effect on site integrity.

Table 4.1: Sites / interest features screened in			
Sources of effect	Mechanism for effect	Natura 2000 sites	Interest features screened in
Installation of the Offshore Scheme pipeline (including excavation, trenching, backfilling and pre-sweeping) potentially altering coastal processes.	Installation of the pipeline potentially resulting in an increase or decrease of the down drift sediment supply.	Humber Estuary SAC	<ul style="list-style-type: none"> ▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Sandbanks which are slightly covered by sea water all of the time ▪ Coastal lagoons ▪ Salicornia and other annuals colonising mud and sand ▪ Atlantic salt meadows (Glauco-Puccinellietalia maritima) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with Ammophila arenaria ('white dunes') ▪ Fixed dunes with

Table 4.1: Sites / interest features screened in			
Sources of effect	Mechanism for effect	Natura 2000 sites	Interest features screened in
			herbaceous vegetation ('grey dunes') <ul style="list-style-type: none"> ▪ Dunes with Hippophae rhamnoides
		Associated effects on the Humber Estuary SPA / Ramsar resulting from changes in coastal processes.	
		Flamborough Head SAC	<ul style="list-style-type: none"> ▪ Reefs ▪ Vegetated sea cliffs of the Atlantic and Baltic Coasts ▪ Submerged or partially submerged sea caves
Use of rock armouring and stabilisation materials for the Offshore Scheme, including at crossings.	Use of rock armouring potentially interfering with coastal process resulting in an increase or decrease of the down drift sediment supply.	Humber Estuary SAC	<ul style="list-style-type: none"> ▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Sandbanks which are slightly covered by sea water all of the time ▪ Coastal lagoons ▪ Salicornia and other annuals colonising mud and sand ▪ Atlantic salt meadows (Glauco-Puccinellietalia maritima) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with Ammophila arenaria ('white dunes') ▪ Fixed dunes with herbaceous vegetation

Table 4.1: Sites / interest features screened in			
Sources of effect	Mechanism for effect	Natura 2000 sites	Interest features screened in
			('grey dunes') <ul style="list-style-type: none"> Dunes with <i>Hippophae rhamnoides</i>
		Associated effects on the Humber Estuary SPA / Ramsar resulting from changes in coastal processes.	
		Flamborough Head SAC	<ul style="list-style-type: none"> Reefs Vegetated sea cliffs of the Atlantic and Baltic Coasts Submerged or partially submerged sea caves
Installation vessels for the installation of the Offshore Scheme	Disturbance from the physical presence of pipeline and NUI installation vessels.	Humber Estuary SAC & Ramsar	<ul style="list-style-type: none"> Grey seal <i>halichoerus grypus</i> Criterion2
		The Wash and North Norfolk Coast SAC	<ul style="list-style-type: none"> Harbour seal <i>phoca vitulina</i>
		Flamborough Head and Bempton Cliffs SPA	<ul style="list-style-type: none"> Kittiwake <i>rissa tridactyla</i> Assemblage features (puffin <i>fratercula arctica</i>, razorbill <i>alca torda</i>, guillemot <i>uria aalge</i>, herring gull <i>larus argentatus</i>, northern gannet <i>morus bassanus</i>, kittiwake <i>rissa tridactyla</i>)
		Flamborough Head and Filey Coast	<ul style="list-style-type: none"> Black-legged kittiwake <i>rissa tridactyla</i> Northern gannet <i>morus bassanus</i>

Table 4.1: Sites / interest features screened in			
Sources of effect	Mechanism for effect	Natura 2000 sites	Interest features screened in
		pSPA	<ul style="list-style-type: none"> ▪ Common guillemot <i>uria aalge</i> ▪ Razorbill <i>alca torda</i> ▪ Assemblage features (black-legged kittiwake, northern gannet, common guillemot, razorbill, northern fulmar <i>fulmarus glacialis</i>)
Underwater noise from the Offshore Scheme pipeline and NUI installation activities including drilling	Disturbance to marine mammals	Humber Estuary SAC & Ramsar	<ul style="list-style-type: none"> ▪ Grey seal <i>halichoerus grypus</i> ▪ Criterion2
		The Wash and North Norfolk Coast SAC	<ul style="list-style-type: none"> ▪ Harbour seal <i>phoca vitulina</i>
Operational vessels and activities associated within the Offshore Scheme including noise from long-term storage site monitoring.	Disturbance from vessels and activities associated with the operation of the Offshore Scheme.	Humber Estuary SAC & Ramsar	<ul style="list-style-type: none"> ▪ Grey seal <i>halichoerus grypus</i> ▪ Criterion2
		The Wash and North Norfolk Coast SAC	<ul style="list-style-type: none"> ▪ Harbour seal <i>phoca vitulina</i>
		Flamborough Head and Bempton Cliffs SPA	<ul style="list-style-type: none"> ▪ Kittiwake <i>rissa tridactyla</i> ▪ Assemblage features (puffin <i>fratercula arctica</i>, razorbill <i>alca torda</i>, guillemot <i>uria aalge</i>, herring gull <i>larcus</i>)

Table 4.1: Sites / interest features screened in			
Sources of effect	Mechanism for effect	Natura 2000 sites	Interest features screened in
			<i>argentatus</i> , northern gannet <i>morus bassanus</i> , kittiwake <i>rissa tridactyla</i>)
		Flamborough Head and Filey Coast pSPA	<ul style="list-style-type: none"> ▪ Black-legged kittiwake <i>rissa tridactyla</i> ▪ Northern gannet <i>morus bassanus</i> ▪ Common guillemot <i>uria aalge</i> ▪ Razorbill <i>alca torda</i> ▪ Assemblage features (black-legged kittiwake, northern gannet, common guillemot, razorbill, northern fulmar <i>fulmarus glacialis</i>)

4.3 POTENTIAL FOR ADVERSE EFFECT ON SITE INTEGRITY

4.3.1 An analysis of each mechanism set out in Table 4.1 has been undertaken with regards to assessing whether there is potential to result in implications on the sites and interest features conservation objectives and potential to result in adverse effect on site integrity. This analysis is presented in Document 11.9 and Table 4.2 provides direction to the relevant section.

Table 4.2: Mechanism for effect		
Sources of effect	Mechanism for effect	Document 11.9 Section Ref
Installation of the Offshore Scheme pipeline (including excavation, trenching,	Installation of the pipeline potentially resulting in an increase or decrease of the down drift sediment supply.	Section 7.2 (Document 11.9)

Table 4.2: Mechanism for effect		
Sources of effect	Mechanism for effect	Document 11.9 Section Ref
backfilling and pre-sweeping) potentially altering coastal processes.		
Use of rock armouring and stabilisation materials for the Offshore Scheme, including at crossings.	Use of rock armouring potentially interfering with coastal process resulting in an increase or decrease of the down drift sediment supply.	Section 7.2.13 (Document 11.9)
Installation vessels for the installation of the Offshore Scheme	Disturbance from the physical presence of pipeline and NUI installation vessels.	Section 7.3 (Document 11.9)
Underwater noise from Offshore Scheme pipeline and NUI installation activities including drilling	Disturbance to marine mammals	Section 7.4 9 (Document 11.9)
Operational vessels and activities associated with the Offshore Scheme including noise from long-term storage site monitoring.	Disturbance from vessels and activities associated with the operation of the Offshore Scheme.	Section 7.5 (Document 11.9)

4.3.4 An assessment of the potential for the Project to result in an adverse effect on site integrity has been undertaken. A summary of the results of this assessment is presented in Table 4.3, Tables 7.2 – 7.6 in Document 11.9 should be referred to for full details.

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
Installation of the Offshore Scheme pipeline potentially resulting in an increase or decrease of the down drift sediment supply.	<p><u>Humber Estuary SAC</u></p> <p>The installation of the pipeline is temporary and will not impede the availability of sediment from the Holderness Coast reaching Spurn Head and the Humber Estuary. There is however the potential for 10% (64,923 m³) of the sediment excavated and sidecast during the pipeline installation to be lost. This volume is considered to represent a small addition to annual sediment loads and negligible in relation to that which is subsequently deposited at Spurn Head and the Humber Estuary. Therefore the installation of the pipeline will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	Please refer to Table 7.2 in Document 11.9
	<p><u>Flamborough Head SAC</u></p> <p>In the context of predictions in terms of the interactions between the coastal processes, sediment regime and the installation of the Pipeline. The installation of the pipeline will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	Please refer to Table 7.3 in Document 11.9

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
Use of rock armouring on the Offshore Scheme potentially interfering with coastal process resulting in an increase or decrease of the down drift sediment supply.	<p><u>Humber Estuary SAC</u></p> <p>The rock cover required for the nearshore pipeline stability will be buried below bed level and will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>Rock cover for pipeline and cable crossings is unlikely to have any interaction with sediment transport to regional sediment sinks including Spurn Head and the Humber Estuary and therefore will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>Rock protection for the NUI is unlikely to have any interaction with sediment transport to regional sediment sinks including Spurn Head and the Humber Estuary and therefore will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	Please refer to Table 7.2 in Document 11.9
	<p><u>Flamborough Head SAC</u></p> <p>Based on a review of coastal processes and that the natural movement of sediment is to the south away from this site under average sediment transport conditions, the use of rock</p>	

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
	cover will not result in any implication on the conservation objectives or an adverse effect on integrity.	
Disturbance from the physical presence of the Offshore Scheme pipeline and NUI installation vessels.	<p><u>Humber Estuary SAC</u></p> <p>The presence of installation vessels will not result in any implication on the conservation objectives or an adverse effect on integrity due to the temporary nature of the works and the limited potential for interaction with grey seal.</p> <p>The Offshore Scheme is at least 30nm from the Humber Estuary SAC and therefore this interest feature is considered to be at low risk of mortality due to the presence of construction vessels. Therefore the presence of installation vessels will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	Please refer to Table 7.2 in Document 11.9
	<p><u>Flamborough Head and Bempton Cliffs SPA & Flamborough Head and Filey Coast pSPA</u></p> <p>Due to the distance between installation activities</p>	

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
	<p>(approximately 4km from the nearshore pipeline) the installation of the pipeline will not result in any implication on the conservation objectives or an adverse effect on integrity in relation to preening, bathing and displaying behaviours.</p> <p>Given the temporary nature of the installation activities and the limited potential for disturbance above, the installation of the Offshore Scheme will not result in any implication on the conservation objectives or an adverse effect on integrity in relation to these interest features in relation to feeding and foraging.</p> <p>Given the temporary nature of the installation activities, the installation of the Offshore Scheme will not result in any implication on the conservation objectives or an adverse effect on integrity in relation to sediment plumes.</p>	
	<p><u>The Wash and North Norfolk Coast SAC</u></p> <p>The presence of installation vessels will not result in any implication on the conservation objectives or an adverse effect</p>	<p>Please refer to Table 7.5 in Document 11.9</p>

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
	<p>on integrity due to the temporary nature of the works and the limited potential for interaction with harbour seal.</p> <p>The Offshore Scheme is at least 107km from the SAC and therefore this interest feature is considered to be at low risk of mortality due to the presence of construction vessels. Therefore the presence of installation vessels will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	
Disturbance to marine mammals from underwater noise generated by the Offshore Scheme	<p><u>Humber Estuary SAC</u></p> <p>Noise from pipeline installation will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>Noise from drilling will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>The piling operations would be subject to soft start and Marine Mammal Observer requirements (in line with JNCC Guidelines), therefore with regards to the above underwater noise from installation of the NUI will not result in any implication on the</p>	Please refer to Table 7.2 in Document 11.9

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
	<p>conservation objectives or an adverse effect on integrity.</p> <p><u>The Wash and North Norfolk Coast SAC</u></p> <p>Noise from pipeline installation will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>Noise from drilling will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>The piling operations would be subject to soft start and Marine Mammal Observer requirements (in line with JNCC Guidelines), therefore with regards to the above underwater noise from installation of the NUI will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	<p>Please refer to Table 7.5 in Document 11.9</p>
<p>Disturbance from vessels and activities associated with the operation of the Offshore Scheme.</p>	<p><u>Humber Estuary SAC</u></p> <p>Underwater noise from operation of the NUI will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>Underwater noise from</p>	<p>Please refer to Table 7.2 in Document 11.9</p>

Table 4.3: Potential to result in adverse effect on site integrity		
Mechanism for effect	Site and potential to result in adverse effect on site integrity	Detailed assessment Reference
	monitoring of the storage site will not result in any implication on the conservation objectives or an adverse effect on integrity.	
	<p><u>Flamborough Head and Bempton Cliffs SPA & Flamborough Head and Filey Coast pSPA</u></p> <p>The activities associated with the operation of the Offshore Scheme will not result in an implication of the conservation objectives or an adverse effect on site integrity.</p>	Please refer to Tables 7.3 and 7.4 in Document 11.9
	<p><u>The Wash and North Norfolk Coast SAC</u></p> <p>Underwater noise from operation of the NUI will not result in any implication on the conservation objectives or an adverse effect on integrity.</p> <p>Underwater noise from monitoring of the storage site will not result in any implication on the conservation objectives or an adverse effect on integrity.</p>	Please refer to Table 7.5 in Document 11.9

4.4 IN-COMBINATION ASSESSMENT

4.4.1 This section looks at the potential for the Project to result in in-combination effects with other developments, which when aggregated together could result in an adverse effect on site integrity.

Relevant Developments

4.4.2 The following developments are considered relevant to the assessment of in-combination effects:

4.4.3 Dogger Bank Creyke Beck Offshore Wind Farm (please refer to Sections 8.2.2 to 8.2.3 of Document 11.9 for a description of this development).

4.4.4 Hornsea Round 3 developments (please refer to Sections 8.2.4 to 8.2.13 of Document 11.9 for a description of these developments).

Potential for in-combination effects

4.4.5 The predicted effects as outlined in the Environmental Statements and other relevant submissions made for these developments have been reviewed and considered in the context of the Offshore Scheme. The potential for in-combination effects with the Offshore Scheme that could result in an adverse effect on site integrity are discussed in Table 4.4 below.

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
Installation of the pipeline potentially resulting in an increase or decrease of down drift sediment supply.	Dogger Bank Creyke Beck project	The landfall for the Forewind Dogger Bank Creyke Beck A & B projects is located to the north of Ulrome, approximately 2.5 km to the south of the proposed landfall for the Offshore Scheme. The preferred landfall method involves directionally drilling to a location in the subtidal area and the installation of cable ducts through which the cables would then be pulled ashore (Forewind 2014a). This method negates the need for an intertidal cofferdam, although	There is no potential for the in-combination effects to result in adverse effects on the integrity of the Humber Estuary SAC.

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
		a cofferdam may be used if geotechnical issues arise. Should cofferdams be required, their maximum dimensions are 10 m wide, 15 m long and 3 m deep (Forewind 2013a), with a separate cofferdam being required for each cable (i.e. up to 4), which would be in place for 2 months per cable. This would result in the removal of 450 m ³ of sediment per cable installation (1,800 m ³ for all four cables) and result in some sediment trapping. No impact on natural erosion processes is predicted by Forewind (2013b) for the landfall construction and in-combination with the Offshore Scheme will not result in changes to the sediment transport which could affect the integrity of regional sinks.	
	Hornsea Round 3 developments	The assessment has concluded that an adverse effect on integrity from the installation of the offshore scheme is unlikely as there will be no reduction in sediment supply to the regional sinks and once constructed there will be no effect on coastal processes, therefore even if constructed at the same time it is unlikely in-combination effects on regional sinks would result.	There is no potential for the in-combination effects to result in adverse effects on the integrity of the Humber Estuary SAC.
Use of rock armouring	Dogger Bank	Immediately offshore, and along the route to the wind farm	There is no potential for the

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
potentially interfering with coastal processes resulting in an increase or decrease in down drift sediment supply.	Creyke Beck project	location, the offshore export cable is to be buried by one of a number of techniques (e.g. jetting, ploughing, trenching, cutting, mass flow excavation, potentially with some pre-sweeping) to be confirmed following final geotechnical investigations. Initial findings indicated that remedial cable protection in the form of mattresses or rock dump may be required where hard seabed substrates prevent sufficient cable burial (Forewind 2013b). Such conditions are particularly evident in the inshore area out to 32.5 km offshore and particularly in the first 7.5 km, and therefore protection measures may be required in this area (Forewind 2013b). It is likely that only 10% of each cable would require protection in this area with a worst case width of 15 m and a height above seabed of 1.5 m (equating to an overall seabed footprint of 48,000 m ²). Forewind (2013b) predict that there will be no interruption in bedload sediment supply either as longshore or nearshore bedload transport resulting from the imposition of cable protection measures in the shallow subtidal area. The pipeline for the Offshore	in-combination effects to result in adverse effects on the integrity of the Humber Estuary SAC.

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
		Scheme will be buried within the nearshore area and any rock cover required in this section will be below bed level, therefore there is no potential for an in-combination effect with the Dogger Bank Creyke Beck project. Rock cover above the bed surface will be required in the nearshore section at the crossings with the Dogger Bank Creyke Beck export cables but this has already been taken into account within the assessment and therefore will not result in an in-combination effect.	
Disturbance from the physical presence of pipeline and NUI installation vessels	Dogger Bank Creyke Beck project Hornsea Round 3 developments	<p><u>Marine Mammals</u></p> <p>With regards to the specific issue of corkscrew injuries to seals, Forewind (2013e) indicate that the distance between the proposed Creyke Beck development and harbour and grey seal SACs is such that the risk of injury is considered low in each case following SNCB (2012). Similar considerations for the Hornsea Project One Development (SMartWind 2013a) indicate that the risk of injury is considered low for the development area, though activities associated with cable export route represent a medium risk to both harbour and grey seals such that alternative vessel choice and/or a Seal Corkscrew</p>	<p>There is no potential for the in-combination effects to result in adverse effects on the integrity of the Humber Estuary SAC.</p> <p>There is no potential for the in-combination effects to result in adverse effects on the integrity of the Wash and North Norfolk Coast SAC.</p>

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
		<p>Injury Monitoring Scheme would need to be considered. As the risk of injury for the Offshore Scheme is regarded to be low, that the construction of these projects may not be coincident, and in the context of the transient and low incremental level of shipping that the Offshore Scheme represents, Offshore Scheme installation activities are not considered to be a source of in-combination effects that are likely to result in an adverse effect on integrity.</p> <p><u>Seabirds</u></p> <p>No effects were predicted on seabirds (including species which are qualifying features of designated sites such as razorbill, puffin and guillemot) from disturbance arising from the installation activities associated with the Dogger Bank Creyke Beck A & B projects. Due to the low potential for disturbance to seabirds during the installation of the Offshore Scheme in-combination an adverse effect on integrity is not predicted.</p>	<p>There is no potential for the in-combination effects to result in adverse effects on the integrity of Flamborough Head and Bempton Cliffs SPA and Flamborough Head and Filey Coast pSPA.</p>
Disturbance from underwater noise	Dogger Bank Creyke Beck project Hornsea	Information provided for Appropriate Assessment in relation to both the Dogger Bank Creyke Beck A & B (Forewind 2013e) and Hornsea Project One (SMartWind 2013b) indicate that	There is no potential for the in-combination effects to result in adverse effects on the integrity of

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
	Round 3 developments	<p>construction (e.g. piling, cable lay), operation or decommissioning would not result in adverse effects for the Humber Estuary SAC and The Wash and North Norfolk Coast SAC for grey and harbour seals respectively, including when considering the potential for in-combination effects with other relevant projects.</p> <p>In the context of piling activities and related noise that could be generated by the installation of wind turbine foundations at the Creyke Beck and Hornsea Project One sites (a worst case of 1,200 and 1,420 pin piles respectively, assuming jacket-type foundations are used), and the conclusion that grey and harbour seals had a low sensitivity to the installation of these developments (with no adverse effects predicted for the Humber Estuary SAC and The Wash and North Norfolk Coast.</p> <p>With regards to the construction of these projects potentially not being coincident, the temporary nature of the works and the low usage of the area by grey and harbour seals, even if the construction was to coincide it is unlikely an in-combination effect resulting in adverse effect on</p>	<p>the Humber Estuary SAC.</p> <p>There is no potential for the in-combination effects to result in adverse effects on the integrity of the Wash and North Norfolk Coast SAC.</p>

Table 4.4: Potential for In-combination effects			
Mechanism for effect	Projects	Potential In-combination effect	Sites
		integrity would result.	
Disturbance from activities associated with the operation of the Offshore Scheme.	Dogger Bank Creyke Beck project Hornsea Round 3 developments	Operational effects (e.g. bird collision and barrier effects) of the Dogger Bank Creyke Beck and the Hornsea Project One developments were not regarded to be significant at the population level for species including qualifying seabird species of the Flamborough & Filey Coast pSPA (Forewind 2013g, SMartWind 2013b). Analogous to the above consideration, in view of the scale of the NUI during its operation and the above consideration in relation to effects experienced in relation to North Sea oil and gas platforms, it is not regarded to represent a significant incremental source of effects for seabirds such that population level effects could occur.	There is no potential for the in-combination effects to result in adverse effects on the integrity of Flamborough Head and Bempton Cliffs SPA and Flamborough Head and Filey Coast pSPA.

4.4.6 The integrity matrices are provided in Document 11.9.1.

5 Conclusions

- 5.1.1 No adverse effects on the integrity of the Humber Estuary SAC (and associated effects on the Humber Estuary SPA & Ramsar), Flamborough Head SAC, Flamborough Head and Bempton Cliffs SPA, Flamborough Head and Filey Coast pSPA and the Wash and North Norfolk Coast SAC have been identified as a result of the Project or in-combination with other developments.
- 5.1.2 Table 5.1 presents a summary of the assessment results, full details are provided in Documents 5.4 and 11.9 and the screening and integrity matrices set out in Documents 5.4.9 and 11.9.1 respectively.

Table 5.1: Summary of Conclusions					
Sites	The Project				
	Onshore Scheme		Offshore Scheme		
	LSE alone or in-combination	AEOSI	LSE alone or in-combination	AEOSI	AEOSI In-combination
Humber Estuary SAC	No	-	Yes	No	No
Humber Estuary SPA	No	-	Yes	No	No
Humber Estuary	No	-	Yes	No	No
River Derwent SAC	No	-	No	-	-
Lower Derwent Valley SAC	No	-	No	-	-

Table 5.1: Summary of Conclusions					
Sites	The Project				
	Onshore Scheme		Offshore Scheme		
	LSE alone or in-combination	AEOSI	LSE alone or in-combination	AEOSI	AEOSI In-combination
Lower Derwent Valley SPA	No	-	No	-	-
Lower Derwent Valley Ramsar	No	-	No	-	-
Skipwith Common SAC	No	-	No	-	-
Thorne and Hatfield Moors SPA	No	-	No	-	-
Thorne Moor SAC	No	-	No	-	-
Flamborough Head SAC	No	-	Yes	No	No
Flamborough Head and Bempton Cliffs SPA	No	-	Yes	No	No
Flamborough Head and Filey Coast pSPA	No	-	Yes	No	No

Table 5.1: Summary of Conclusions					
Sites	The Project				
	Onshore Scheme		Offshore Scheme		
	LSE alone or in-combination	AEOSI	LSE alone or in-combination	AEOSI	AEOSI In-combination
Hornsea Mere SPA	No	-	No	-	-
The Wash and North Norfolk Coast SAC	No	-	Yes	No	No