DEPARTMENT OF ENERGY & CLIMATE CHANGE

Appendices to the Habitats Regulations Assessment Site Report for Heysham

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

Planning for new energy infrastructure October 2010

Habitats Regulations Assessment of the revised draft Nuclear National Policy Statement

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

The Habitats Regulations Assessment is provided in the following documents:

HRA Non-Technical Summary

Main HRA of the revised draft Nuclear NPS

Introduction
Methods
Findings
Summary of Sites
Technical Appendices

Annexes to the Main HRA Report: Reports on Sites

Site HRA Reports
Technical Appendices

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

This document is the Appendices to the Habitats Regulations Assessment Site Report for Heysham.

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.

Contents

Appendix 1: European Site Characterisations

Natura 2000 Site Identification				
Natura 2000 Designation	**Radius (measured from central grid reference point, MAGIC)**			
	5km	**10km**	**15km**	**20km**
SAC	• Morecambe Bay SAC	• None	• Calf Hill and Cragg Woods SAC	• Morecambe Bay Pavements SAC • Shell Flat cSAC & Lune Deep pSAC
SPA	• Morecambe Bay	• None	• Bowland Fells	• Leighton Moss • Liverpool Bay SPA
Ramsar	• Morecambe Bay	• None	• None	• Leighton Moss

All core site-specific information, unless otherwise stated, has been referenced from Natural England Sources (Natura 2000 Management Plans) (Nature on the Map) and the Joint Nature Conservation Committee website (Protected Sites). Information on the new draft designation of the Shell Flat and Lune Deep possible SAC (pSAC) has been obtained from Natural England's consulation website.

Natura 2000 Site Characterisations

Special Areas of Conservation (SAC)[1]

1. Calf Hill and Cragg Woods
2. Morecambe Bay
3. Morecambe Bay Pavements
4. Shell Flat cSAC[2] & Lune Deep pSAC[3]

Special Protection Areas (SPA)[4]

1. Bowland Fells
2. Leighton Moss
3. Liverpool Bay SPA[2]
4. Morecambe Bay

Ramsar Sites[5]

1. Leighton Moss
2. Morecambe Bay

[1] **Special Areas of Conservation (SACs)** are classified under the Habitats Directive and provide rare and vulnerable animals, plants and habitats with increased protection and management.
[2] **Candidate SACs/SPAs** are sites which NE, JNCC and/or CCW have submitted to the European Commission (EC) for inclusion in the Natura 2000 network and are now legally protected.
[3] **Possible SACs** are sites which have been consulted upon but are awaiting formal designation. The consultation for Lune Deep runs from 20th August 2010 to 12th November 2010 (see http://www.naturalengland.org.uk/ourwork/marine/sacconsultation/default.aspx). Possible SACs are not subject to the Habitats Regulations in law or practice but ODPM Circular 06/2005 advises that planning authorities should consider the effects of development on such sites.
[4] **Special Protection Areas (SPAs)** are classified under the Birds Directive to help protect and manage areas which are important for rare and vulnerable birds because they use them for breeding, feeding, wintering or migration. Together SACs and SPAs make up the Natura 2000 series.
[5] **Ramsar sites** are designated under the Convention on Wetlands of International Importance. The broad objectives are to stem the loss and progressive encroachment on wetlands now and in the future. These are often coincident with SPA sites designated under the Birds Directive. Although RAMSAR sites are not considered part of the Natura 2000 network, they are treated the same way as Natura 2000 sites.

Special Areas of Conservation

Site Name: Calf Hill and Cragg Woods

- **Location 024153W/ 540248N**
- **JNCC Site Code UK0030106**
- **Size: 34.43 (ha)**
- **Designation: SAC**

	Calf Hill and Cragg Woods SAC
Site Description	Calf Hill and Cragg Woods support one of the most extensive stands of upland oak woodland in Lancashire, in addition to a well-developed alder/ash woodland on lower flushed slopes along the valley bottom.
Qualifying Features	***Annex I habitats that are a primary reason for selection of this site:*** **91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles** ***Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:*** **91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)** * * Priority feature
Conservation Objectives	Subject to natural change, to maintain the designated habitats in a favourable condition in relation to their structure and natural processes, regeneration potential, composition and local distinctiveness.
Component SSSIs	

<table>
<tr><th></th><th>Calf Hill and Cragg Woods SAC</th></tr>
<tr><td></td><td>Component SSSI condition status.
<table>
<tr><th>SAC component site</th><th>Favourable</th><th>Unfavorable recovering</th><th>Unfavorable no change</th><th>Unfavorable declining</th><th>Destroyed, part destroyed</th></tr>
<tr><td>Calf Hill and Cragg Hill Woods SSSI (3 units)</td><td>100%</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table></td></tr>
<tr><td>Key Environmental Conditions (factors that maintain site integrity)</td><td>• Moderately high or high rainfall
• Maintenance of natural hydrological regime
• Base-poor soils
• Management - selective felling or thinning required to open up dense canopy
• Control of grazing
• Air quality – bryophytes and lichens are sensitive to pollution
• Control of invasive non-native species and any disease outbreaks</td></tr>
<tr><td>SAC Condition Assessment</td><td>See SSSI condition status.</td></tr>
<tr><td>Vulnerabilities (includes existing pressures and trends)</td><td>• Limited natural regeneration
• Deterioration of stock proof fencing and walls
• Air pollution is considered to be a potentially significant pressure to the structure and function of this habitat. This factor has particularly damaging effects on the epiphytic lichen and bryophyte communities, which form an important component of the qualifying plant communities.
• Lowering of water-tables through drainage or water abstraction, which results in a transition to drier woodland types</td></tr>
</table>

	Calf Hill and Cragg Woods SAC
Landowner/ Management Responsibility	• N/A
HRA/AA Studies undertaken that address this site	• **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Calf Hill and Cragg Woods SAC • **Habitats Regulations Assessment of the North West Regional Spatial Strategy (September 2008)** • **Habitat Regulations Assessment: Screening statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** Significant effects of Bolton's core strategy on Calf Hill and Cragg Woods SAC are assessed as unlikely.

Site Name: Morecambe Bay

- **Location 025742W/ 540709N**
- **JNCC Site Code UK0013027**
- **Size: 61506.22 (ha)**
- **Designation: SAC**

	Morecambe Bay SAC
Site Description	Morecambe Bay in north-west England is the confluence of four principal estuaries, the Leven, Kent, Lune and Wyre (the latter lies just outside the site boundary), together with other smaller examples such as the Keer. Collectively these form the largest single area of continuous intertidal mudflats and sandflats in the UK and the best example of muddy sandflats on the west coast. Although cobble 'skears' and shingle beaches occur at their mouths, the estuaries consist predominantly of fine sands and muddy sands. The estuaries support dense invertebrate communities, their composition reflecting the salinity and sediment regimes within each estuary. Extensive saltmarshes and glasswort *Salicornia* spp. beds are present in the Lune estuary, contrasting with the fringing saltmarshes and more open intertidal flats of the Leven and Kent estuaries. Most of the saltmarshes are grazed, a characteristic feature of north-west England. In the upper levels of the saltmarshes there are still important transitions from saltmarsh to freshwater and grassland vegetation.
Qualifying Features	Annex I habitats that are a primary reason for selection of this site: **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide** **1160 Large shallow inlets and bays** **1220 Perennial vegetation of stony banks** **1310 *Salicornia* and other annuals colonising mud and sand** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

	Morecambe Bay SAC
	2120 **Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)** **2130** **Fixed dunes with herbaceous vegetation (`grey dunes`)** * Priority feature **2190** **Humid dune slacks** Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: **110** **Sandbanks which are slightly covered by sea water all the time** **1150** **Coastal lagoons** * Priority feature **1170** **Reefs** **2110** **Embryonic shifting dunes** **2150** **Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)** * Priority feature **2170** **Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)** Annex II species that are a primary reason for selection of this site: **1166** **Great crested newt** *Triturus cristatus*
Conservation Objectives	Subject to natural change, maintain the **large shallow inlets and bays** in favourable condition, in particular: • Intertidal boulder and cobble skear communities • Subtidal boulder and cobble skear communities • Brittlestar bed communities • Intertidal boulder clay communities • Coastal lagoon communities • Intertidal mudflat and sandflat communities • Pioneer saltmarsh communities • Saltmarsh communities Subject to natural change, maintain the **mudflats and sandflats not covered by seawater at low**

<table>
<tr><th></th><th>Morecambe Bay SAC</th></tr>
<tr><td></td><td>tide
(intertidal mudflats and sandflats) in favourable condition, in particular:
• Mud communities
• Sand communities
• Eelgrass bed communities

Subject to natural change, maintain the Glasswort Salicornia spp and other annuals colonising mud and sand (pioneer saltmarsh) in favourable condition, in particular:
• The glasswort Salicornia spp communities

Subject to natural change, maintain the Atlantic salt meadows Glauco-Puccinellietalia (saltmarsh)
in favourable condition, in particular:
• Low marsh communities
• Mid marsh communities
• High marsh communities
• Transitional high marsh communities

Subject to natural change, maintain other designated features in a favourable condition.</td></tr>
<tr><td>Component SSSIs</td><td>SSSIs including condition status:
<table>
<tr><th>SSSI Component Sites</th><th>Favourable</th><th>Unfavorable recovering</th><th>Unfavorable no change</th><th>Unfavorable declining</th><th>Destroyed, part destroyed</th></tr>
<tr><td>Duddon Estuary</td><td>93.13%</td><td>4.53%</td><td>1.61%</td><td>0.67%</td><td>0.05%</td></tr>
</table></td></tr>
</table>

<table>
<tr><th></th><th colspan="6">Morecambe Bay SAC</th></tr>
<tr><td></td><td colspan="6"><table>
<tr><td>Lune Estuary</td><td>98.29%</td><td>1.71%</td><td>0%</td><td>0%</td><td>0%</td></tr>
<tr><td>Morecambe Bay</td><td>94.35%</td><td>4.68%</td><td>0.97%</td><td>0%</td><td>0%</td></tr>
<tr><td>Skelwith Hill</td><td>100%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td></tr>
<tr><td>South Walney and Piel Channel Flats</td><td>93.57%</td><td>6.43%</td><td>0%</td><td>0%</td><td>0%</td></tr>
<tr><td>Wyre Estuary</td><td>100%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td></tr>
</table></td></tr>
<tr><td>Key Environmental Conditions (factors that maintain site integrity)</td><td colspan="6">• Maintain morphological equilibrium of the estuary, including sedimentation patterns
• Maintain temperature and salinity levels within natural range
• Avoidance of pollution
• Avoidance of nutrient enrichment
• Appropriate grazing of saltmarsh communities
• No physical constraints to natural migration of mobile habitats such as dunes
• Maintain minimal impact of fishing, bait digging and dredging
• High enough water table for dune slacks
• Avoidance of damaging levels of erosion from human activities
• No increase in organic matter in sediments
• No physical constraints to managed realignment if required (coastal squeeze)
• Control of bracken/scrub
• Control of invasive and/or non-native species
• Great Crested Newt population requires suitable foraging and refuge habitat; ponds with relatively unpolluted water of roughly neutral pH; some ponds with water throughout the breeding/tadpole development season</td></tr>
</table>

	Morecambe Bay SAC
SAC Condition Assessment	See SSSI condition status for specific information on condition.
Vulnerabilities (includes existing pressures and trends)	**Physical loss** • Removal for example harvesting, coastal development • Smothering for example by artificial structures, disposal of dredge spoil • Through “coastal squeeze” **Physical damage** • Siltation for example run-off, channel dredging, outfalls • Abrasion for example boating, anchoring, trampling • Selective extraction for example aggregate dredging, entanglement **Toxic contamination** • Introduction of synthetic compounds for example pesticides, TBT, PCBs • Introduction of non-synthetic compounds for example heavy metals, hydrocarbons • Introduction of radionuclides **Non-toxic contamination** • Nutrient enrichment for example agricultural run-off, outfalls • Organic enrichment for example agriculture, outfalls • Changes in thermal regime for example power stations • Changes in turbidity for example run-off, dredging • Changes in salinity for example water abstraction, outfalls

	Morecambe Bay SAC
	Biological disturbance • Introduction of microbial pathogens • Introduction of non-native species and translocation • Selective extraction of species for example bait digging, wildfowling, shell-fishing and other commercial and recreational fishing
Landowner/ Management Responsibility	Non-governmental organisation (NGO) / National/Crown Estate / Private NGO reserve management plans, EN's site Management Statements and Coastal WES, the European Marine Site Management Schemes for the Duddon Estuary and Morecambe Bay, and Duddon Estuary and Morecambe Bay Partnerships.
HRA/AA Studies undertaken that address this site	• **HRA Screening of Fleetwood – Thornton Area Action Plan (AAP)** Source: http://www.wyrebc.gov.uk/Page.aspx?DocID=8710&PgeID=48016 There will be no direct habitat loss within the European designated sites or Ramsar site and there are unlikely to be any direct effects upon habitats within the SAC or upon the great crested newt population within the SAC. The potentially significant effects which require more consideration (and therefore will be subject to Appropriate Assessment) relate to the disturbance of wintering and migratory birds using the SPA, Ramsar site and high tide roost sites outside of the designated site boundaries (noise and visual disturbance from human activity) and to potential decreases in habitat quality within the designated sites through pollution from construction and operation of the proposed developments • **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes

	Morecambe Bay SAC
	any development which might have an adverse effect on Morecambe Bay SAC • **Appropriate Assessment of Mussel Fishery in Morecambe Bay** Source: http://www.seafish.org/upload/file/inshore/Case7_Morecambe_Mussels.doc As the competent authority for the European Marine Site in Morecambe Bay, NWNWSFC concluded that the proposal to hand gather seed mussels from a specific area of Heysham Flats with restrictions on access to the fishing ground would not adversely effect the integrity of Morecambe Bay SAC, SPA and Ramsar site, and permitted the fishery. • **Appropriate Assessment Screening of South Lakeland District Council's Core Strategy** Source:http://www.southlakeland.gov.uk/downloads/page2033/S_Lakeland_CS_HRA_report_070308.pdf Increase in visitor pressure both from an increase in local residents and an increase in tourism poses risks in terms of damage to sites and disturbance to protected species at Morecambe Bay SAC/ SPA/ Ramsar and Morecambe Bay Pavements SAC. A number of policies contribute by cumulatively increase the potential for a likely significant effect. • **Habitat Regulations Assessment: Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Source: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/39435142953.pdf Significant effects on Morecambe Bay SAC are possible according to this document although little explanation is given. • **Appropriate Assessment for Lancaster City Council: Coastal Defence Works on Morecambe Town Frontage** Very little info available, brief summary available at: http://www.yaec.co.uk/Project%20Details/A2104%20Morecambe%20AA/MorecambeAA_Page.htm • **Habitat Regulations Assessment: Screening statement to accompany Bolton's Core**

	Morecambe Bay SAC
	Strategy Preferred Option Report (May 2008) Source:http://www.bolton.gov.uk/pls/portal92/docs/PAGE/LGNL/DOCUMENTS/BUSINESS/P%20L%20A%20N%20N%20I%20N%20G/G%20R%20A%20P%20E%20S/HRA%20SCREENING%20OPINION%20BOLTON%20PREFERRED%20OPTIONS.PDF Significant effects of Bolton's core strategy on Morecambe Bay SAC are assessed as possible. • **Habitat Regulations Assessment: Cumbria Minerals and Waste Development Framework: Submission Draft Core Strategy and Generic Development Control Policies:** Details: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/39518145940.pdf Significant effects of the Cumbria MWD Framework on Morecambe Bay SAC are assessed as possible. • **HRA of the North West Regional Spatial strategy**

Site Name: Morecambe Bay Pavements

- **Location 025136W/ 541628N**
- **JNCC Site Code UK0014777**
- **Size: 2609.69 (ha)**
- **Designation: SAC**

	Morecambe Bay Pavements SAC
Site Description	This is one of four sites in northern England representing Limestone pavements on Carboniferous limestone and supports the following habitats *Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates, *Tilio-Acerion* forests of slopes, screes and ravines, and *Taxus baccata* woods. It also contains Hawes Water, a lowland lake which is considered to be the best example of a lowland hard oligo-mesotrophic lake with *Chara* spp. in England, owing to the clarity, low nutrient status and high calcium content of its water. It provides an important habitat for the Narrow-mouthed whorl snail.
Qualifying Features	Annex I habitats that are a primary reason for selection of this site: **3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.** **5130 *Juniperus communis* formations on heaths or calcareous grasslands** **6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)** **8240 Limestone pavements** * Priority feature **9180 *Tilio-Acerion* forests of slopes, screes and ravines** * Priority feature **91J0 *Taxus baccata* woods of the British Isles** * Priority feature Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: **4030 European dry heaths** **7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*** * Priority feature **91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**

<table>
<tr><th></th><th>Morecambe Bay Pavements SAC</th></tr>
<tr><td></td><td>Annex II species that are a primary reason for selection of this site
1014 Narrow-mouthed whorl snail Vertigo angustior</td></tr>
<tr><td>Conservation Objectives</td><td>None recorded but likely to be, subject to natural change, to maintain the qualifying habitats and species in a favourable condition.</td></tr>
<tr><td>Component SSSIs</td><td>SSSI component condition status:
<table>
<tr><th>SSSI Component Sites</th><th>Favourable</th><th>Unfavorable recovering</th><th>Unfavorable no change</th><th>Unfavorable declining</th><th>Destroyed, part destroyed</th></tr>
<tr><td>Cringlebarrow and Deepdale</td><td>94.48%</td><td>0%</td><td>5.52%</td><td>0%</td><td>0%</td></tr>
<tr><td>Farleton Knott</td><td>42.98%</td><td>0%</td><td>6.94%</td><td>50.09%</td><td>0%</td></tr>
<tr><td>Gait Barrows</td><td>81.52%</td><td>16.95%</td><td>1.53%</td><td>0%</td><td>0%</td></tr>
<tr><td>Hawes Water</td><td>29.43%</td><td>13.88%</td><td>40.96%</td><td>15.73%</td><td>0%</td></tr>
<tr><td>Hutton Roof Crags</td><td>70.91%</td><td>25.26%</td><td>3.84%</td><td>0%</td><td>0%</td></tr>
<tr><td>Marble Quarry and Hale Fell</td><td>0%</td><td>0%</td><td>100.00%</td><td>0%</td><td>0%</td></tr>
<tr><td>Middlebarrow</td><td>0%</td><td>0%</td><td>59.44%</td><td>40.56%</td><td>0%</td></tr>
<tr><td>Roudsea Woods and Mosses</td><td>2.35%</td><td>61.99%</td><td>4.65%</td><td>31.01%</td><td>0%</td></tr>
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<table>
<tr><th></th><th colspan="2">Morecambe Bay Pavements SAC</th></tr>
<tr><td></td><td>
<table>
<tr><td>Thrang End and Yealand Hall Allotment</td><td>27.45%</td><td>0%</td><td>0%</td><td>72.55%</td><td>0%</td></tr>
<tr><td>Thrang Wood</td><td>100.00%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td></tr>
<tr><td>Underlaid Wood</td><td>0%</td><td>7.57%</td><td>80.80%</td><td>11.62%</td><td>0%</td></tr>
<tr><td>Whitbarrow</td><td>49.60%</td><td>41.27%</td><td>9.13%</td><td>0%</td><td>0%</td></tr>
</table>
</td></tr>
<tr><td>Key Environmental Conditions (factors that maintain site integrity)</td><td>

Avoidance of nutrient enrichment
Appropriate grazing
Control of bracken and/or scrub
Control of invasive and non-native species and disease outbreaks
Base-rich water (for fens)
Maintenance of water levels and hydrological conditions
Prevent unauthorised damage to limestone pavements for decorative rockery stone
Coppicing in some woodlands
Avoidance of erosion from trampling, vehicles etc.
Avoidance of atmospheric pollution

</td></tr>
<tr><td>SAC Condition Assessment</td><td>See SSSI condition status for specific information on condition.</td></tr>
<tr><td>Vulnerabilities (includes existing pressures and trends)</td><td>

The under-grazing of grasslands and decline of traditional cattle grazing is leading to the loss of sward diversity and scrub encroachment problems.
Calcareous fens, grasslands and heaths vulnerable to acidification through air pollution.
Localised overgrazing (sheep-dominated) has impoverished the pavement flora on one of the

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	Morecambe Bay Pavements SAC
	component sites. • A decline of traditional coppice management has reduced the interest of some of the woodland sites. • The planting of non-native conifer crops on some of the sites has led to localised declines in condition. • Oligo-mesotrophic vulnerable to the effects of eutrophication – even slight changes to trophic state through artificially elevated levels of phosphorous and nitrogen can result in degradation in habitat quality. • Fish introductions to lakes can result in increased turbidity as well as algal blooms through alterations to the food web (fish prey upon invertebrates which graze algae) • Recreation pressures
Landowner/ Management Responsibility	Large parts of the site are sensitively managed within nature reserves. EN Wildlife Enhancement Schemes, ESA Agreements, and Woodland Grant Schemes.
HRA/AA Studies undertaken that address this site	• **HRA Screening of Fleetwood – Thornton Area Action Plan (AAP)** Source: http://www.wyrebc.gov.uk/Page.aspx?DocID=8710&PgeID=48016 There will be no direct habitat loss within the European designated sites or Ramsar site and there are unlikely to be any direct effects upon habitats within the SAC or upon the great crested newt population within the SAC. The potentially significant effects which require more consideration (and therefore will be subject to Appropriate Assessment) relate to the disturbance of wintering and migratory birds using the SPA, Ramsar site and high tide roost sites outside of the designated site boundaries (noise and visual disturbance from human activity) and to potential decreases in habitat quality within the designated sites through pollution from construction and operation of the proposed developments

	Morecambe Bay Pavements SAC
	• **Report to inform Habitat Regulations Assessment of Barrow Port Area Action Plan** Source: http://www.barrowbc.gov.uk/pdf/Appropriate%20Assessment%20Aug%2007.pdf Due to the overlap between the proposals in the Barrow Port Action Plan area and land designated as Morecambe Bay SPA and SAC it was determined that a significant impact was likely due to: o Direct loss of habitat, particularly in relation to the proposed Cruise Facility o Disturbance of breeding, wintering and passage birds o Indirect effects on sensitive habitats caused by changes in sediment regime/coastal processes • **Appropriate Assessment of Core Strategy for Lancaster City Council** Impacts on Morecambe Bay Pavements not discussed • **Appropriate Assessment of Mussel Fishery in Morecambe Bay** Source: http://www.seafish.org/upload/file/inshore/Case7_Morecambe_Mussels.doc As the competent authority for the European Marine Site in Morecambe Bay, NWNWSFC concluded that the proposal to hand gather seed mussels from a specific area of Heysham Flats with restrictions on access to the fishing ground would not adversely effect the integrity of Morecambe Bay SAC, SPA and Ramsar site, and permitted the fishery. • **Appropriate Assessment Screening of South Lakeland District Council's Core Strategy:** Source:http://www.southlakeland.gov.uk/downloads/page2033/S_Lakeland_CS_HRA_report_070308.pdf Increase in visitor pressure both from an increase in local residents and an increase in tourism poses risks in terms of damage to sites and disturbance to protected species at Morecambe Bay SAC/ SPA/ Ramsar and Morecambe Bay Pavements SAC. A number of policies contribute by cumulatively increase the potential for a likely significant effect.

	Morecambe Bay Pavements SAC
	• **Habitat Regulations Assessment: Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Source: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/39435142953.pdf Significant effects on Morecambe Bay Pavements SAC are possible according to this document although little explanation is given. • **Appropriate Assessment for Lancaster City Council: Coastal Defence Works on Morecambe Town Frontage** Very little info available, brief summary available at: http://www.yaec.co.uk/Project%20Details/A2104%20Morecambe%20AA/MorecambeAA_Page.htm • **Habitat Regulations Assessment: Screening statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** Source:http://www.bolton.gov.uk/pls/portal92/docs/PAGE/LGNL/DOCUMENTS/BUSINESS/P%20L%20A%20N%20N%20I%20N%20G/G%20R%20A%20P%20E%20S/HRA%20SCREENING%20OPINION%20BOLTON%20PREFERRED%20OPTIONS.PDF Significant effects of Bolton's core strategy on Morecambe Bay Pavements SAC are assessed as unlikely. • **Habitat Regulations Assessment: Cumbria Minerals and Waste Development Framework: Submission Draft Core Strategy and Generic Development Control Policies:** Details: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/39518145940.pdf Significant effects of the Cumbria MWD Framework on Morecambe Bay Pavements SAC are assessed as possible. • **HRA of the North West Regional Spatial strategy** ▪

Site Name: Shell Flat cSAC and Lune Deep pSAC

- **Location: Site centre: Degrees and minutes: 3° 14' 35.43"W 53° 53' 17.37"N. Decimal degrees: -3.24°W 53.88°N**
- **JNCC Site Code: N/A**
- **Size: 14,019 ha**
- **Designation: cSAC and pSAC**

Note: These two sites are considered together as following the consultation for Lune Deep it is likely that a single selection assessment document will be drafted for Shell Flat and Lune Deep site, and Lune Deep submitted to Government as an extension to the existing Shell Flat cSAC (Natural England 11/08/2010 Lune Deep Selection Assessment Document for Reconsultation Version 1.2 available at http://www.naturalengland.org.uk/Images/Lune-sad_tcm6-21710.pdf)

	Shell Flat cSAC and Lune Deep pSAC
Site Description	These sites lie off the north west coast of England in the Irish sea within 12 nautical miles offshore. The sites have two components: a reef enclosed in a deep water channel (Lune Deep) and a large sandbank feature (Shell Flat) at the mouth of Morecambe Bay surrounded by shallower areas to the north and south. The reef covers about 7 percent of the site (1,077 ha-although please note that the boundary is one of the areas under consultation) and the sandbank about 63 percent of the site (8,894 ha, based on both the 20m contour and 50m contour). The site is estimated to contribute 0.8 percent of the UK's total sandbank resource and 0.2% of the UK's total reef resource to the SAC site series. Lune Deep is an enclosed deep hole at the entrance of Morecambe Bay. The reef habitat present represents a good example of boulder and rock reef which qualify as Annex 1 'reef' habitat, with the largest proportions of rock found along the unique kettle hole feature. The northern edges of Lune Deep are characterised by heavily silted cobble and boulder slope, subject to strong tidal currents with a dense turf of sea mats and sea firs with some anemones and sponges. Smooth seabed runs along the southern edge where sediment is deposited. This unique enclosed deep hole provides a contrasting habitat to the surrounding muddy communities of the Eastern Irish Mudbelt.

	Shell Flat cSAC and Lune Deep pSAC
	To the south of Lune Deep, the Shell Flat sandbank is an example of a banner sandbank, which runs northeast from the southern corner of the site in a blunt crescent shape, located in water depths less than 20m below Chart Datum. The communities found within the sediments comprised burrowing worms, shrimps and crabs, bivalve molluscs and starfish and are considered as low biodiversity, high biomass sediment communities associated with this sand and muddy sand habitat. The greatest numbers of animals have been found in the southern and eastern areas of the sandbank. The top of the sand bank is softer and smoother and the sediment is rougher and harder on the northern and southern slopes. Outer Morecambe Bay is an important spawning ground for sprat and a spawning and nursery ground for sole, whiting, plaice and herring. Shell Flat is an important feeding ground for many over wintering bird species, including a large population (over 50,000) of the Common Scoter (*Melanitta nigra).* Some 87% of the pSAC overlaps with the Liverpool Bay cSPA, which has been identified as the most important site in the UK for the Common Scoter.
Qualifying Features	Annex I habitats that are a primary reason for selection of this site: **1170 Reefs** **1110 Sandbanks which are slightly covered by seawater all the time**
Conservation Objectives	Subject to natural change, to maintain the *Reefs* in a favourable condition, in particular: Bedrock Reefs, and Stony Reefs. Subject to natural change, to maintain the *Sandbanks which are slightly covered by seawater all the time* in a favourable condition, in particular: Sand and muddy sand communities.
Component SSSIs	N/A
Key Environmental Conditions (factors that maintain site integrity)	Not available.
SAC Condition Assessment	Given the site's status as a pSAC, no condition assessment has yet been undertaken. However the following is a site summary taken from the pSAC Selection Assessment:

	Shell Flat cSAC and Lune Deep pSAC
	Reefs: - Representativity: good (graded B) - Area of habitats: contains less than 1% of the national Annex 1 reef resource (graded C) - Conservation of structure and functions: Structure well conserved (graded II); Degree of conservation of functions: good prospects (graded II); Overall: good conservation value (graded B) - Global assessment: good conservation value (graded B) Sandbanks: - Representativity: excellent (graded A) - Area of habitats: contains approx. between 0-2% of the national Annex 1 sandbank resource (graded C) - Conservation of structure and functions: Excellent structure (graded I); Degree of conservation of functions: excellent prospects (graded I); Overall: excellent conservation value (graded A) - Global assessment: excellent conservation value (graded A)
Vulnerabilities (includes existing pressures and trends)	<u>Reefs:</u> • Physical loss: direct removal: moderate sensitivity to loss of habitats; • Physical loss: smothering (e.g. by aggregate dredging, disposal of dredge spoil): reef habitats have low degree of sensitivity due to the existing high degree of natural sediment influence experienced by the reef communities and their relatively high level of recoverability; a licensed dredge disposal site operates within Lune Deep (despositing spoil from maintenance dredging in Morecambe Bay) but this is some distance from the pSAC; therefore there is a low exposure to physical loss from smothering. • Physical damage: siltation (e.g. runoff, channel dredging, outfalls): reef subfeatures have low

	Shell Flat cSAC and Lune Deep pSAC
	degree of sensitivity to siltation commensurate with their sensitivity to smothering; • Physical damage: abrasion (e.g. by boating, anchoring, demersal fishing): reef subfeatures have moderate degree of sensitivity to abrasion which can cause damage to a significant proportion of the species found in relatively stable cobble, boulder and bedrock communities; reef is not identified as having significant degree of exposure to activities such as towed demersal fisheries or aggregate extraction, thus the overall exposure of reef habitats to abrasion is low; • Toxic contamination: introduction of synthetic compounds (e.g. pesticides, TBT, PCBs) and non-synthetic compounds (e.g. heavy metals, hydrocarbons): dominant reef biotypes have intermediate intolerance to contamination and recover moderately quickly once contamination is removed, thus sensitivity is moderate; exposed to moderate levels of toxic contamination from the existing land based wastewater discharges from the Fylde coast into Lune Deep; overall vulnerability of reef sub-features is moderate; • Changes in nutrient loading (e.g. agricultural runoff, outfalls) and in organic loading (e.g. mariculture, outfalls): low sensitivity to nutrient enrichment; exposed to moderate levels of non-toxic contamination from land based discharges; overall low vulnerability; • Changes in thermal regime (e.g. power stations) – not identified; • Changes in turbidity (e.g. runoff, dredging) • Biological disturbance: Selective extraction of species (e.g. bait dredging, wildflowing, commercial andf recreational fishing): reef features moderately sensitive; relatively low exposure to fishing; overall low vulnerability. <u>Sandbanks:</u> • Physical loss: direct removal: moderate sensitivity to removal of sediment; overall negligible exposure to physical loss by removal; • Physical loss: smothering (e.g. by aggregate dredging, disposal of dredge spoil): sandbanks are relatively high energy environments, often with good ability to recover from physical disturbance,

	Shell Flat cSAC and Lune Deep pSAC
	and have a low sensitivity to smothering; overall negligible exposure to physical loss by smothering; • Physical damage: siltation (e.g. runoiff, channel dredging, outfalls) or abrasion (e.g. by boating, anchoring, demersal fishing): sandbank communities are characterized by frequent disturbance by tidal currents and contain organisms which are adapted to recurrent erosion and accretion; following significant disturbance communities can re-establish relatively quickly, e.g. within a few tidal cycles; sensitivity is considered to be low; sandbank habitats have a moderate exposure to physical damage, from commercial fishing activities within the area (mainly demersal trawling); overall low vulnerability to physical damage; • Toxic contamination: introduction of synthetic compounds (e.g. pesticides, TBT, PCBs) and non-synthetic compounds (e.g. heavy metals, hydrocarbons): sensitivity of sandbank communities is low-moderate, including lethal effects which remove individuals and species, and sub-lethal effects which could affect functioning of organisms and reduce populations in the long-term; pathways for contaminant include point source discharges of effluents and land runoff from Morecambe Bay and the Fylde coast, atmospheric deposition and accidental spillage at sea, e.g. oil spills; direct discharges to into the site include low levels of radionuclides and heavy metals, however significant dilution afforded to these low inputs, together with high energy environments associated with the sandbank mean that sandbank habitats have a low exposure to toxic contamination from these sources, and overall low vulnerability; • Changes in nutrient loading (e.g. agricultural runoff, outfalls), organic loading (e.g. maricultulture, outfalls), thermal regime (e.g. power stations) and turbidity (e.g. runoff, dredging): sensitivity of dynamic sandbank communities and gravelly muddy sand communities is considered to be low; principle pathways include point source discharges of effluents, e.g. local wastewater treatment works, land runoff (mainly from Morecambe Bay), and offshore operations (e.g. shipping); generally low exposure and low vulnerability; • Biological disturbance: Selective extraction of species (e.g. bait dredging, wildflowing, commercial andf recreational fishing): removal of fish species and larger molluscs can have significant impacts

	Shell Flat cSAC and Lune Deep pSAC
	on the structure and functioning of benthic communities, particularly as some fish species fill upper roles in trophic web; sandbank features have a moderate exposure to commercial fishing activities (mainly demersal trawling), and moderate vulnerability.
Landowner/ Management Responsibility	Crown Estate. Activities within the sites (as noted in Consultation Impact Assessment for draft SAC, November 2009) include fisheries (including a favoured mixed demersal fishery of Fleetwood-based trawlers as well as netting, dredging, potting, lining), recreational angling, and the presence of cables (one power line and one telecommunications cable).
HRA/AA Studies undertaken that address this site	• No specific HRA/AA studies have been found in relation to the effects of development plans or projects on the Shell Flat cSAC and Lune Deep pSAC designation, but various Environmental Impact Assessments and Strategic Environmental Assessments are also relevant: • **Cirrus Array Shell Flat Array Offshore Windfarm** (withdrawn 2008 by Cirrus Energy): A 90 turbine 280MW windfarm development previously proposed on Shell Flats. Proposed 2002 (subject to an Environmental Statement), the proposal moved location in 2005 in response to English Nature and RSPB concerns in relation to its location on a submerged sandbank which an environmental assessment revealed is habitat for a large population of wintering Common Scoter. The windfarm proposal was withdrawn in 2008 in response to objections from BAE Systems and the MOD on aviation and radar interference issues. The Environmental Statement for this proposal is not available. DECC's Offshore Energy SEA report (2009) described this windfarm having a predicted significant adverse effect on Common Scoter at Shell Flat. HRA/AA would not have been carried out as the pSAC had not been identified at that time of the project being proposed. • **Existing and consented windfarms:** The operational Barrow offshore windfarm lies to the north west of the pSAC, was subject to an ES in 2003 and commenced operation in 2006. The Ormonde offshore windfarm lies further to the north east of the Barrow windfarm, was consented under Round 1 in 2007 and is now under construction. West of Duddon Sands windfarm (due to commence construction in 2011), and Walney windfarm, are consented in Round 2 and also lie to the north west of the Shell Flat and Lune Deep (p)SAC. Walney phase 1 is under construction in

	Shell Flat cSAC and Lune Deep pSAC
	2010. The proposed cable route from Walney to the Hillhouse substation (to serve phase 2 of the windfarm, work due 2011) passes through the north-eastern corner of the Shell Flat and Lune Deep (p)SAC through both the sandbank and reef habitats for approx. 4.8km. The dSAC draft Consultation Impact Assessment states that it is likely that the laying of cables would be laid using ploughs to pull them along the seabed, resulting in temporary damage and disturbance to the sandbanks, but that this would be short-lived and the habitat has high recoverability. However it notes that some fragile seabed habitat can be impacted on and more than one cable may be required over a period of time for large windfarms, causing repeat disturbance in a narrow corridor. Power cables also produce electromagnetic fields that may impact on sensitive organisms such as skates and rays. (see Shell Flat and Lune Deep dSAC draft Consultation Impact Assessment, November 2009; Dong Energy, 2006, Walney Offshore Windfarm ES Non-Technical Summary and project brochure). HRA/AA would not have been carried out as the pSAC had not been identified at that time of the above projects being proposed. • **Walney Extension:** The Crown Estate announced in May 2010 that an extension will be granted to the consented Walney Offshore Windfarm for 750MW, as part of its Round 1 and 2 project extensions. The dSAC draft Consultation Impact Assessment (2009) identifies that there is a small chance that routes for power export cabes will be sought through the Shell Flat and Lune Deep (p)SAC for extensions to offshore windfarms. The Crown Estate have confirmed (June 2010) that the Extensions did not constitute a component of a plan which was subject to HRA. The Walney Offshore Windfarm project will require a full planning application and will be subject to the EIA and Habitats Regulations. It is therefore expected that the project proponent will provide information to enable the IPC (or its successor), as competent authority for the NSIP application, to undertake HRA of the project-level application. • **Offshore Energy SEA (DECC, 2009):** Assessment of environmental effects of future rounds of leasing for offshore windfarms and licensing of offshore oil and gas and gas storage. No specific reference is made to Shell Flat and Lune Deep, but various references to relevant impacts on offshore habitats from oil, gas and windfarm development.

Special Protection Areas

Site Name: Bowland Fells

- **Location 023345W/ 535913N**
- **JNCC Site Code: UK9005151**
- **Size: 16002.31 ha**
- **Designation: SPA**

	Bowland Fells SPA
Site Description	The Bowland Fells are an extensive upland area in Lancashire, in north-west England. It forms a western outlier of the Pennines, with summits mostly in the range 450-550 m. The geology is millstone grit-capped fells overlying softer Bowland shales, resulting in predominantly acidic vegetation types. The major habitats are **heather-dominated moorland** and **blanket mire**. It is important for its upland breeding birds, especially breeding **Merlin** *Falco columbarius* and **Hen Harrier** *Circus cyaneus*.
Qualifying Features	Article 4.1 Qualification During the breeding season: • Hen Harrier *Circus cyaneus*, 13 pairs representing up to 2.6% of the breeding population in Great Britain (Three year mean 1995-1997) • Merlin *Falco columbarius*, 20 pairs representing up to 1.5% of the breeding population in Great Britain (Three year mean, 1994-1996) Article 4.2 Qualification During the breeding season:

<table>
<tr><th></th><th>Bowland Fells SPA</th></tr>
<tr><td></td><td>• Lesser Black-backed Gull Larus fuscus, 13,900 pairs representing up to 11.2% of the breeding Western Europe/Mediterranean/Western Africa population (Minimum 1998; 13,900-16,300 pairs)</td></tr>
<tr><td>Conservation Objectives</td><td>Conservation objectives are in process of being completed by Natural England, but likely to be, subject to natural change, to maintain the qualifying species and supporting habitats in a favourable condition.</td></tr>
<tr><td>Component SSSIs</td><td>Component SSSIs including condition status:
<table>
<tr><th>SSSI Component Sites</th><th>Favourable</th><th>Unfavorable recovering</th><th>Unfavorable no change</th><th>Unfavorable declining</th><th>Destroyed, part destroyed</th></tr>
<tr><td>Bowland Fells</td><td>24.60%</td><td>73.72%</td><td>1.68%</td><td>0%</td><td>0%</td></tr>
</table></td></tr>
<tr><td>Key Environmental Conditions (factors that maintain site integrity)</td><td>• Appropriate levels of sheep grazing
• Management of appropriate vegetation structure
• Off-site feeding areas
• Sympathetic burning
• Maintenance of site hydrology
• Avoidance of disturbance during breeding season</td></tr>
<tr><td>SPA Condition Assessment</td><td>See SSSI condition status for specific information on condition.</td></tr>
<tr><td>Vulnerabilities (includes existing pressures and trends)</td><td>• Overgrazing
• Unsympathetic burning
• Heather beetle attack
• Bracken encroachment
• Recreational disturbance</td></tr>
</table>

	Bowland Fells SPA
	• Persecution of Hen Harrier
Landowner/ Management Responsibility	• N/A
HRA/AA Studies undertaken that address this site	• **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Bowland Fells SPA • **Habitat Regulations Assessment: Screenning statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** **http://www.bolton.gov.uk/sites/documentcentre/Documents/Habitats%20regulation%20assessment%20screening%20statement%20Bolton%20Preferred%20Options.pdf** Significant effects of Bolton's core strategy on Bowland Fells are assessed as possible. • **HRA of the North West Regional Spatial strategy**

Site Name: Leighton Moss

- **Location 024731W/ 541003N**
- **JNCC Site Code: UK9005151**
- **Size: 128.61 ha**
- **Designation: SPA**

	Leighton Moss SPA
Site Description	Leighton Moss is situated on the eastern edge of Morecambe Bay in Lancashire in north-west England and is the largest reedbed in this region. As well as the large reedbeds, there are extensive areas of open water, large areas of Tussock-sedge *Carex* spp. and transitional communities through fen to willow *Salix* spp. scrub and woodland. A typical and varied fen flora has developed in part, whilst the reedbed shows all stages of serial transition from open water through to woodland. The base-rich water, which flows into the marsh from the surrounding limestone hills, contributes to an overall richness in the vegetation and associated fauna. The site is of importance for a number of wetland birds, especially Bittern *Botaurus stellaris* and Marsh Harrier *Circus aeruginosus.*
Qualifying Features	Article 4.1 Qualification During the breeding season: • Bittern *Botaurus stellaris*, 4 individuals representing at least 20.0% of the breeding population in Great Britain • Marsh Harrier *Circus aeruginosus*, 2 pairs representing at least 1.3% of the breeding population in Great Britain Over winter: • Bittern *Botaurus stellaris*, 8 individuals representing at least 8.0% of the wintering population in Great Britain

<table>
<tr><th></th><th>Leighton Moss SPA</th></tr>
<tr><td>Conservation Objectives</td><td>Maintain the populations of designated bird species within acceptable limits and retain the extent of the habitats that support them (standing open water, Fen, marsh and swamp, wet woodland) in a favourable condition.</td></tr>
<tr><td>Component SSSIs</td><td>
<table>
<tr><th>SSSI Component Sites</th><th>Favourable</th><th>Unfavorable recovering</th><th>Unfavorable no change</th><th>Unfavorable declining</th><th>Destroyed, part destroyed</th></tr>
<tr><td>Leighton Moss</td><td>0%</td><td>0%</td><td>100.00%</td><td>0%</td><td>0%</td></tr>
</table>
</td></tr>
<tr><td>Key Environmental Conditions (factors that maintain site integrity)</td><td>

Avoidance of water pollution
Maintenance of water levels; stability during breeding season is important
Control of scrub
Appropriate reedbed management (rotational cutting) to avoid habitat drying out through accumulation of dead leaf litter.
Salinity of less than 5% during breeding season
Limited disturbance particularly during breeding season

</td></tr>
<tr><td>SPA Condition Assessment</td><td>See SSSI condition status for specific information on condition.</td></tr>
<tr><td>Vulnerabilities (includes existing pressures and trends)</td><td>

Changes in water quality (particularly from agricultural run-off from land immediately adjacent to the reserve)
Changes in water levels (including through ground water abstraction)

</td></tr>
</table>

	Leighton Moss SPA
	• Deterioration in quality of supporting habitats through lack of management for example scrub invasion, drying out of reedbeds • Susceptible to saline intrusion upstream of its tidal sluice from Morecambe Bay
Landowner/ Management Responsibility	RSPB
HRA/AA Studies undertaken that address this site	• **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Leighton Moss SPA • **Appropriate Assessment Screening of South Lakeland District Council's Core Strategy:** Source:http://www.southlakeland.gov.uk/downloads/page2033/S_Lakeland_CS_HRA_report_070308.pdf No Likely Significant Effects (LSEs) were identified for Leighton Moss SPA • **Habitat Regulations Assessment: Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Source:http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/39435142953.pdf Significant effects on Leighton Moss SPA are possible according to this document although little explanation is given. • **Habitat Regulations Assessment: Screenning statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** Source:http://www.bolton.gov.uk/sites/documentcentre/Documents/Habitats%20regulation%20assessment%20screening%20statement%20Bolton%20Preferred%20Options.pdf Significant effects of Bolton's core strategy on Leighton Moss SPA are assessed as unlikely.

	Leighton Moss SPA
	• **HRA of the North West Regional Spatial strategy** • **Habitat Regulations Assessment: Cumbria Minerals and Waste Development Framework: Submission Draft Core Strategy and Generic Development Control Policies:** Details: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/39518145940.pdf Significant effects of the Cumbria MWD Framework on Leighton Moss SPA are assessed as unlikely.

Site Name: Liverpool Bay SPA

- **Location: 53 36 10 N / 03 12 34 W**
- **SPA EU Code UK9020294**
- **Size: 170,292.94 ha**
- **Designation: SPA**

	Liverpool Bay SPA
Site Description	Liverpool Bay SPA extends from Moelfre in North-East Anglesey to Rossall Point near Fleetwood. The entire site lies within the 12-mile limit and landward extends to the Mean Low Water Mark, except where it abuts existing SPA (Mersey Narrows, North Wirral Foreshore and Dee Estuary). At the mouth of the River Mersey, the SPA boundary follows a straight line from Fort Perch Rock lighthouse to the sea wall at Seaforth Nature Reserve. The Bay supports 5.4% of GB's total estimated overwintering population of of Red-throated Diver (*Gavia stellata*) and 3.4% of GB's total estimated overwintering population of Common Scoter (*Melanitta nigra*). In addition, the site regularly supports more than 20,000 wildfowl during the non-breeding season. Because water levels within the SPA are generally within the 20m-depth contour and tidal currents are generally weak, there is deposition of sediments, encouraging mud and sand belts to accumulate. This provides both good feeding grounds for the qualifying species and also commercial fisheries.
Qualifying Features	5.4% of the GB population of Red-throated Diver (*Gavia stellata*) Annex I species 3.4% of the migratory population of Common Scoter (*Melanitta nigra*) Annex 2.2 Species

	Liverpool Bay SPA
Conservation Objectives	Maintain the Red-throated Diver population and its supporting habitats in favourable condition. This objective will be met when: (i) The 5 year peak mean population size for the Red-throated Diver population is no less than 922 individuals (ie the five-year peak mean between 2001/02 – 2006/07); (ii) The overall presence and abundance of prey species within the site is maintained; (iii) Red-throated Divers are not exposed to significant human-induced mortality, and areas where they congregate in higher densities are not subject to significant disturbance. Maintain the common scoter population and its supporting habitats in favourable condition. This objective will be met when: (i) The 5 year peak mean population size for the Common Scoter population is no less than 54,675 individuals (ie the five-year peak mean between 2001/02 – 2006/07); (ii) The overall presence and abundance of benthic prey species within the site is maintained, along with its associated features; (iii) Common Scoters are not exposed to significant human-induced mortality, and their aggregations are not subject to significant disturbance; (iv) The movement of common scoters between feeding and resting areas is not significantly impeded. Maintain the waterfowl assemblage and its supporting habitat in favourable condition. This objective will be met when:

	Liverpool Bay SPA
	(i) The peak mean population size for the waterfowl assemblage is no less than 55,597 (ie the five-year peak mean between 2001/02 – 2006/07); (ii) Aggregations of waterfowl and seabirds at feeding and resting sites are not subject to significant disturbance
Component SSSIs	None given
Key Environmental Conditions (factors that maintain site integrity)	Maintenace of the area of sandbanks in the site within acceptable limits Maintenace of presence and abundance of prey species within the site; along with its associated features Red-throated Divers & Common Scoters not to be exposed to significant human-induced mortality and areas where they congregate in higher densities are not subject to significant disturbance. The movement of Common Scoters between feeding and resting areas not to be significantly impeded.
SPA Condition Assessment	None given
Vulnerabilities (includes existing pressures and trends)	Extraction of the red-throated diver's main fish prey, as either target and/or bycatch species through commercial and recreational fishing Entanglement of Red-throated Divers in static fishing nets. Commercial and recreational fishing could directly affect both the food source and feeding grounds used by Common Scoters.

	Liverpool Bay SPA
	Navigational dredging and disposal both in and and dredging for bivalves has been shown to have significant negative effects on their benthic habitat. Red throated Divers and Common Scoters are sensitive to non physical, (noise and visual) disturbance by both commercial and recreational activities, for example disturbance by moving vessels (the larger the vessel, the greater disturbance distance expected).
Landowner/ Management Responsibility	Unknown
HRA/AA Studies undertaken that address this site	**Oil and Gas Exploration in Welsh Waters** During 2006 the DTI carried out an appropriate assessment (AA) to see if there is likely to be a significant effect on the integrity of European sites associated with licensing for oil and gas exploration in Welsh waters (Cardigan Bay and off the north coast of Wales). The DTI began consultation on a draft AA of the 24th Licensing Round in November 2006. In commenting on a draft version of the AA, CCW agreed with the DTI that many of the effects of oil and gas activities that may arise subsequent to the licensing of oil and gas blocks would be mitigated by the existence of a robust regime for assessing the project-specific impacts. However, CCW did not agree with the DTI's overall conclusion that the draft AA had established with sufficient robustness or certainty that the plan would not have an adverse effect on the integrity of any European Site or potential European Sites because of concerns about: 1. An apparent presumption created by the plan in favour of subsequent oil and gas project activities, and the influence of the plan on consenting of subsequent projects. 2. The absence of any specific consenting mechanism for seismic survey works in territorial and internal waters. 3. Important omissions from the AA in relation to potential European Sites, and certain weaknesses in the assessment of potential impacts.

	Liverpool Bay SPA
	The DTI has now revised and finalised the AA making it clear that subsequent oil and gas activity will be subject to the necessary environmental assessment procedures. In addition, legislation has been amended to ensure that seismic survey work is subject to a consenting process within the 12 nautical mile territorial waters limit. The Dee Estuary pSAC and **Liverpool Bay SPA**, absent from the earlier draft, have also now been included in the assessment. **FOOD AND ENVIRONMENT PROTECTION ACT 1985 (AS AMENDED)** **LICENCE TO UNDERTAKE CONSTRUCTION WORKS (REF 32987/07/0)** **CONSTRUCTION OF THE ORMONDE OFFSHORE WIND FARM OFF BARROW-IN-FURNESS.** Liverpool Bay Special Protection Areas – Appropriate Assessment Natural England advised Competent Authorities that an Appropriate Assessment was required to determine the potential impacts that the proposed wind farm would have on the potential Liverpool Bay Special Protection Areas (SPA) under the Wild Birds Directive along with the Duddon Estuary, Morecambe Bay Ribble and Alt Estuaries and Martin Mere SPAs. It is also noted that these sites are RAMSAR designated sites. Natural England advised that the development could have a significant adverse impact on the mortality of pink-footed goose, whooper swan and lesser black-backed gull through collisions with the turbines or increased energetic costs due to barrier effect. Potential impacts on a cobble skear feature at the landfall site, which is a designated site within Morecambe Bay SAC, were also assessed. Other Special Areas of Conservation (SAC) and SPAs also exist in the area, but Natural England have considered that an Appropriate Assessment for these sites was not required. Based on the information available and agreed mitigation measures, it was concluded that the proposed development of the Ormonde offshore wind farm will not have an adverse effect on the

	Liverpool Bay SPA
	integrity of the designated European Sites: Duddon Estuary, Morecambe Bay, Ribble and Alt Estuaries and Martin Mere, either alone or in combination with other plans or projects. **Seaforth river terminal harbour Appropriate Assessment** The Environmental Statement provided with the application identifies a number of proposed and existing nature conservation sites of European and international importance which would or would be likely to be affected by the project which the Order would authorise. These are the Sefton Coast Special Area of Conservation, the Mersey Estuary Special Protection Area and the Mersey Estuary Ramsar site, the Mersey Narrows and North Wirral Foreshore proposed Special Protection Area (SPA) and proposed Ramsar site, the Ribble and Alt Estuaries pSPA and proposed Ramsar site, and the **Liverpool Bay Marine SPA**. The project would also affect or be likely to affect a number of sites of national conservation importance coterminous with the afore-mentioned European and international sites. The Secretary of State notes that, with the exception of the Liverpool Bay Marine SPA, none of the existing and proposed sites of European and international nature conservation significance would be directly affected by the scheme which the Order would authorise. However, it is likely there would be indirect adverse impacts on the sites concerning, in particular, sediment accretion and erosion. With regard to Liverpool Bay Marine SPA the impacts relate to the dredging of a relatively small area for the berths and the approach channel for the river terminal which does not alter the reasons (importance to wild birds) for which the SPA has been proposed for classification. The Secretary of State concludes that the project will not adversely affect the integrity of the relevant nature conservation sites.

Site Name: Morecambe Bay

- **Location 025721W/ 540719N**
- **JNCC Site Code: UK9005081**
- **Size: 37404.6 ha**
- **Designation: SPA**

	Morecambe Bay SPA
Site Description	Morecambe Bay is located on the Irish Sea coast of north-west England. It is one of the largest estuarine systems in the UK and is fed by five main river channels (the Leven, Kent, Keer, Lune and Wyre) which drain through the intertidal flats of sand and mud. Mussel *Mytilus edulis* beds and banks of shingle are present, and locally there are stony outcrops. The whole system is dynamic, with shifting channels and phases of erosion and accretion affecting the estuarine deposits and surrounding saltmarshes. The flats contain an abundant invertebrate fauna that supports many of the waterbirds using the bay. The capacity of the bay to support large numbers of birds derives from these rich intertidal food sources together with adjacent freshwater wetlands, fringing saltmarshes and saline lagoons, as well as dock structures and shingle banks that provide secure roosts at high tide. The site is of European importance throughout the year for a wide range of bird species. In summer, areas of shingle and sand hold breeding populations of terns, whilst very large numbers of geese, ducks and waders not only overwinter, but (especially for waders) also use the site in spring and autumn migration periods. The bay is of particular importance during migration periods for waders moving up the west coast of Britain.
Qualifying Features	Article 4.1 Qualification **During the breeding season:** Little Tern *Sterna albifrons*, 26 pairs representing at least 1.1% of the breeding population in Great Britain (Count, as at 1994)

	Morecambe Bay SPA
	Sandwich Tern *Sterna sandvicensis*, 290 pairs representing at least 2.1% of the breeding population in Great Britain (5 year peak mean for 1992 to 1996) **Over winter:** Bar-tailed Godwit *Limosa lapponica*, 2,611 individuals representing at least 4.9% of the wintering population in Great Britain (5 year peak mean for 1991/92 to 1995/96) Golden Plover *Pluvialis apricaria*, 4,097 individuals representing at least 1.6% of the wintering population in Great Britain (5 year mean for 1991/92 to 1995/96) Article 4.2 Qualification by supporting populations of European importance of the following migratory species: **During the breeding season;** Herring Gull *Larus argentatus*, 11,000 pairs representing at least 1.2% of the breeding Northwestern Europe (breeding) and Iceland/Western Europe - breeding population (5 year mean 1992 to 1996) Lesser Black-backed Gull *Larus fuscus*, 22,000 pairs representing at least 17.7% of the breeding Western Europe/Mediterranean/Western Africa population (5 year mean 1992 to 1996) **On passage;** Ringed Plover *Charadrius hiaticula*, 693 individuals representing at least 1.4% of the Europe/Northern Africa - wintering population (5 year peak mean for 1991/92 to 1995/96)

	Morecambe Bay SPA
	Sanderling *Calidris alba*, 2,466 individuals representing at least 2.5% of the Eastern Atlantic/Western and Southern Africa - wintering population (Count as at May 1995) **Over winter;** Curlew *Numenius arquata*, 13,620 individuals representing at least 3.9% of the wintering Europe - breeding population (5 year peak mean for 1991/92 to 1995/96) Dunlin *Calidris alpina alpina*, 52,671 individuals representing at least 3.8% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean for 1991/92 to 1995/96) Grey Plover *Pluvialis squatarola*, 1,813 individuals representing at least 1.2% of the wintering Eastern Atlantic - wintering population (5 year peak mean for 1991/92 to 1995/96) Knot *Calidris canutus*, 29,426 individuals representing at least 8.4% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96) Oystercatcher *Haematopus ostralegus*, 47,572 individuals representing at least 5.3% of the wintering Europe and Northern/Western Africa population (5 year peak mean for 1991/92 to 1995/96) Pink-footed Goose *Anser brachyrhynchus*, 2,475 individuals representing at least 1.1% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean for 1991/92 to 1995/96) Pintail *Anas acuta*, 2,804 individuals representing at least 4.7% of the wintering Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96) Redshank *Tringa totanus*, 6,336 individuals representing at least 4.2% of the wintering Eastern Atlantic - wintering population (5 year peak mean for 1989/90 to 1993/94)

	Morecambe Bay SPA
	Shelduck *Tadorna tadorna*, 6,372 individuals representing at least 2.1% of the wintering Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96) Turnstone *Arenaria interpres*, 1,583 individuals representing at least 2.3% of the wintering Western Palearctic - wintering population (5 year peak mean for 1991/92 to 1995/96) **Assemblage qualification: A seabird assemblage of international importance** The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds During the breeding season, the area regularly supports 61,858 individual seabirds (5 year peak mean for 1991/92 to 1995/96) including: Herring Gull *Larus argentatus*, Lesser Black-backed Gull *Larus fuscus*, Little Tern *Sterna albifrons*, Sandwich Tern *Sterna sandvicensis*. **Assemblage qualification: A wetland of international importance.** The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl Over winter, the area regularly supports 210,668 individual waterfowl (5 year peak mean for 1991/92 to 1995/96) including: Great Crested Grebe *Podiceps cristatus*, Bar-tailed Godwit *Limosa lapponica*, Pink-footed Goose *Anser brachyrhynchus*, Shelduck *Tadorna tadorna*, Pintail *Anas acuta*, Oystercatcher *Haematopus ostralegus*, Grey Plover *Pluvialis squatarola*, Knot *Calidris canutus*, Dunlin *Calidris alpina alpina*, Curlew *Numenius arquata*, Golden Plover *Pluvialis apricaria*, Turnstone *Arenaria interpres*, Black-tailed Godwit *Limosa limosa islandica*, Cormorant *Phalacrocorax carbo*, Wigeon *Anas penelope*, Teal *Anas crecca*, Mallard *Anas platyrhynchos*, Eider *Somateria mollissima*,

<table>
<tr><th></th><th>Morecambe Bay SPA</th></tr>
<tr><td></td><td>Goldeneye Bucephala clangula, Red-breasted Merganser Mergus serrator, Ringed Plover Charadrius hiaticula, Lapwing Vanellus vanellus, Sanderling Calidris alba, Redshank Tringa totanus, Whimbrel Numenius phaeopus.</td></tr>
<tr><td>Conservation Objectives</td><td>Subject to natural change, to maintain in favourable condition the habitats of the internationally important populations of regularly occurring bird species listed on Annex 1 of the Birds Directive, in particular:
Shingle areas
Subject to natural change, to maintain in favourable condition the habitats of the internationally important assemblage of waterfowl and seabirds and the internationally important populations of regularly occurring migratory species, in particular:
Intertidal mudflat and sandflat communities
Intertidal and subtidal boulder and cobble skear communities
Saltmarsh communities
Coastal lagoon communities</td></tr>
<tr><td>Component SSSIs</td><td>
<table>
<tr><th>SSSI Component Sites</th><th>Favourable</th><th>Unfavorable recovering</th><th>Unfavorable no change</th><th>Unfavorable declining</th><th>Destroyed, part destroyed</th></tr>
<tr><td>Cringlebarrow and Deepdale</td><td>94.48%</td><td>0%</td><td>5.52%</td><td>0%</td><td>0%</td></tr>
<tr><td>Farleton Knott</td><td>42.98%</td><td>0%</td><td>6.94%</td><td>50.09%</td><td>0%</td></tr>
<tr><td>Duddon Estuary</td><td>93.13%</td><td>4.53%</td><td>1.61%</td><td>0.67%</td><td>0.05%</td></tr>
</table>
</td></tr>
</table>

	Morecambe Bay SPA					
	Gait Barrows	81.52%	16.95%	1.53%	0%	0%
	Hawes Water	29.43%	13.88%	40.96%	15.73%	0%
	Hutton Roof Crags	70.91%	25.26%	3.84%	0%	0%
	Lune Estuary	98.29%	1.71%	0%	0%	0%
	Marble Quarry and Hale Fell	0%	0%	100.00%	0%	0%
	Middlebarrow	0%	0%	59.44%	40.56%	0%
	Roudsea Woods and Mosses	2.35%	61.99%	4.65%	31.01%	0%
	Thrang End and Yealand Hall Allotment	27.45%	0%	0%	72.55%	0%
	Thrang Wood	100.00%	0%	0%	0%	0%
	Underlaid Wood	0%	7.57%	80.80%	11.62%	0%
	Whitbarrow	49.60%	41.27%	9.13%	0%	0%
	Wyre Estuary	100.00%	0%	0%	0%	0%
Key Environmental Conditions (factors that maintain site integrity)	• Avoidance of pollution • Management of saltmarsh grazing • Control of bait digging and dredging					

	Morecambe Bay SPA
	• Maintenance of prey availability for example control of shell-fishing • Maintenance of uninterrupted views • Open ground with short vegetation cover for feeding and roosting birds • Maintain hydrology of wet grassland (for waders) • Limited disturbance to birds (land and waterbased) • No physical constraints to natural migration of mobile habitats • Maintenance of natural sedimentation patterns • Control of non-native species
SPA Condition Assessment	See SSSI condition status for specific information on condition.
Vulnerabilities (includes existing pressures and trends)	The site is subject to a wide range of pressures such as land-claim for agriculture, overgrazing, dredging, overfishing, industrial uses and unspecified pollution. However, overall the site is relatively robust and many of those pressures have only slight to local effects and are being addressed thorough Management Plans. The European data states that the breeding tern interest is very vulnerable and the colony has recently moved to the adjacent Duddon Estuary.
Landowner/ Management Responsibility	Non-governmental organisation (NGO) / National/Crown Estate / Private NGO reserve management plans, EN's site Management Statememts and Coastal WES, the European Marine Site Management Schemes for the Duddon Estuary and Morecambe Bay, and Duddon Estuary and Morecambe Bay Partnerships.
HRA/AA Studies undertaken that address this site	• **HRA Screening of Fleetwood – Thornton Area Action Plan (AAP)** Source: http://www.wyrebc.gov.uk/Page.aspx?DocID=8710&PgeID=48016 o There will be no direct habitat loss within the European designated sites or Ramsar site and there are unlikely to be any direct effects upon habitats within the SAC or upon the great crested newt population within the SAC.

	Morecambe Bay SPA
	o The potentially significant effects which require more consideration (and therefore will be subject to Appropriate Assessment) relate to the disturbance of wintering and migratory birds using the SPA, Ramsar site and high tide roost sites outside of the designated site boundaries (noise and visual disturbance from human activity) and to potential decreases in habitat quality within the designated sites through pollution from construction and operation of the proposed developments • **Report to inform Habitat Regulations Assessment of Barrow Port Area Action Plan** Source: http://www.barrowbc.gov.uk/pdf/Appropriate%20Assessment%20Aug%2007.pdf Due to the overlap between the proposals in the Barrow Port Action Plan area and land designated as Morecambe Bay SPA and SAC it was determined that a significant impact was likely due to: o Direct loss of habitat, particularly in relation to the proposed Cruise Facility o Disturbance of breeding, wintering and passage birds o Indirect effects on sensitive habitats caused by changes in sediment regime/coastal processes • **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Morecambe Bay SPA. • **Appropriate Assessment of Mussel Fishery in Morecambe Bay** Source: http://www.seafish.org/upload/file/inshore/Case7_Morecambe_Mussels.doc As the competent authority for the European Marine Site in Morecambe Bay, NWNWSFC concluded that the proposal to hand gather seed mussels from a specific area of Heysham Flats with restrictions on access to the fishing ground would not adversely effect the integrity of Morecambe Bay SAC, SPA and Ramsar site, and permitted the fishery.

	Morecambe Bay SPA
	• **Appropriate Assessment Screening of South Lakeland District Council's Core Strategy:** Source:http://www.southlakeland.gov.uk/downloads/page2033/S_Lakeland_CS_HRA_report_070308.pdf Increase in visitor pressure both from an increase in local residents and an increase in tourism poses risks in terms of damage to sites and disturbance to protected species at Morecambe Bay SAC/ SPA/ Ramsar and Morecambe Bay Pavements SAC. A number of policies contribute by cumulatively increase the potential for a likely significant effect. • **Habitat Regulations Assessment: Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Source:http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/39435142953.pdf Significant effects on Morecambe Bay SPA are possible according to this document although little explanation is given. • **Appropriate Assessment for Lancaster City Council: Coastal Defence Works on Morecambe Town Frontage** Not very much information found but summary here: http://www.yaec.co.uk/Project%20Details/A2104%20Morecambe%20AA/MorecambeAA_Page.http • **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Morecambe Bay SAC • **Habitat Regulations Assessment: Screenning statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** Details:http://www.bolton.gov.uk/sites/documentcentre/Documents/Habitats%20regulation%20assessment%20screening%20statement%20Bolton%20Preferred%20Options.pdf

	Morecambe Bay SPA
	Significant effects of Bolton's core strategy on Morecambe Bay SPA are assessed as possible. • **Habitat Regulations Assessment: Cumbria Minerals and Waste Development Framework: Submission Draft Core Strategy and Generic Development Control Policies:** Details: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/39518145940.pdf Significant effects of the Cumbria MWD Framework on Morecambe Bay SPA are assessed as possible. • **HRA of the North West Regional Spatial strategy**

Ramsar Sites

Site Name: Morecambe Bay

- **Location: 025721W/ 540719N**
- **JNCC Site Code: UK11045**
- **Size: 37404.6 ha**
- **Designation: Ramsar**

	Morecambe Bay Ramsar
Site Description	Morecambe Bay lies between the coasts of South Cumbria and Lancashire, and represents the largest continuous intertidal area in Britain. Morecambe Bay comprises the estuaries of five rivers and the accretion of mudflats behind Walney Island. The area is of intertidal mud and sandflats, with associated saltmarshes, shingle beaches and other coastal habitats. It is a component in the chain of west coast estuaries of outstanding importance for passage and overwintering waterfowl (supporting the third-largest number of wintering waterfowl in Britain), and breeding waterfowl, gulls and terns.
Qualifying Features	Ramsar criterion 4 • The site is a staging area for migratory waterfowl including internationally important numbers of passage Ringed Plover *Charadrius hiaticula*. Ramsar criterion 5 Species with peak counts in winter: • Waterfowl Ramsar criterion 6

	Morecambe Bay Ramsar
	Species regularly supported during the breeding season: • Lesser Black-backed Gull • Herring Gull • Sandwich Tern Species with peak counts in spring/autumn: • Great Cormorant • Common Shelduck • Northern Pintail • Common Eider • Eurasian Oystercatcher • Ringed Plover • Grey Plover • Sanderling • Eurasian Curlew • Common Redshank • Ruddy Turnstone • Lesser Black-backed Gull Species with peak counts in winter: • Great Crested Grebe • Pink-footed Goose • Eurasian Wigeon • Common Goldeneye

	Morecambe Bay Ramsar
	• Red-breasted Merganser • European Golden Plover • Northern Lapwing • Red Knot • Dunlin • Bar-tailed Godwit
Conservation Objectives	• See SPA characterisation
Component SSSIs	• See SPA characterisation
Key Environmental Conditions (factors that maintain site integrity	• See SPA characterisation
Ramsar Condition Assessment	• See SPA characterisation
Vulnerabilities (includes existing pressures and trends)	• See SPA characterisation
Landowner/ Management Responsibility	• Non-governmental organisation (NGO) / National/Crown Estate / Private
HRA/AA Studies undertaken that address this site	• **HRA Screening of Fleetwood – Thornton Area Action Plan (AAP)** Source:http://www.wyrebc.gov.uk/Page.aspx?DocID=8710&PgeID=48016 o There will be no direct habitat loss within the European designated sites or Ramsar site and there are unlikely to be any direct effects upon habitats within the SAC or upon the great crested newt population within the SAC. o The potentially significant effects which require more consideration (and therefore will be subject to Appropriate Assessment) relate to the disturbance of wintering and

	Morecambe Bay Ramsar
	migratory birds using the SPA, Ramsar site and high tide roost sites outside of the designated site boundaries (noise and visual disturbance from human activity) and to potential decreases in habitat quality within the designated sites through pollution from construction and operation of the proposed developments • **Report to inform Habitat Regulations Assessment of Barrow Port Area Action Plan** Source: http://www.barrowbc.gov.uk/pdf/Appropriate%20Assessment%20Aug%2007.pdf Due to the overlap between the proposals in the Barrow Port Action Plan area and land designated as Morecambe Bay SPA and SAC it was determined that a significant impact was likely due to: o Direct loss of habitat, particularly in relation to the proposed Cruise Facility o Disturbance of breeding, wintering and passage birds o Indirect effects on sensitive habitats caused by changes in sediment regime/coastal processes • **Appropriate Assessment of Core Strategy for Lancaster City Council** Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007) Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Morecambe Bay Ramsar. • **Appropriate Assessment of Mussel Fishery in Morecambe Bay Details** As the competent authority for the European Marine Site in Morecambe Bay, NWNWSFC concluded that the proposal to hand gather seed mussels from a specific area of Heysham Flats with restrictions on access to the fishing ground would not adversely effect the integrity of Morecambe Bay SAC, SPA and Ramsar site, and permitted the fishery. • **Appropriate Assessment Screening of South Lakeland District Council's Core Strategy**:

	Morecambe Bay Ramsar
	Source:http://www.southlakeland.gov.uk/downloads/page2033/S_Lakeland_CS_HRA_report_070308.pdf Increase in visitor pressure both from an increase in local residents and an increase in tourism poses risks in terms of damage to sites and disturbance to protected species at Morecambe Bay SAC/ SPA/ Ramsar and Morecambe Bay Pavements SAC. A number of policies contribute by cumulatively increase the potential for a likely significant effect. • **Habitat Regulations Assessment: Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Source: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/39435142953.pdf Significant effects on Morecambe Bay Ramsar are possible according to this document although little explanation is given. • **Appropriate Assessment for Lancaster City Council: Coastal Defence Works on Morecambe Town Frontage** Not very much information found but summary here: http://www.yaec.co.uk/Project%20Details/A2104%20Morecambe%20AA/MorecambeAA_Page.htm • **Habitat Regulations Assessment: Screening statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** Source:http://www.bolton.gov.uk/sites/documentcentre/Documents/Habitats%20regulation%20assessment%20screening%20statement%20Bolton%20Preferred%20Options.pdf Significant effects of Bolton's core strategy on Morecambe Bay Ramsar are assessed as possible. • **Habitat Regulations Assessment: Cumbria Minerals and Waste Development Framework: Submission Draft Core Strategy and Generic Development Control Policies:** Details: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/39518145940.pdf

	Morecambe Bay Ramsar
	Significant effects of the Cumbria MWD Framework on Morecambe Bay Ramsar are assessed as possible. • **HRA of the North West Regional Spatial strategy:**

Site Name: Leighton Moss

- **Location: 024731W/ 541003N**
- **JNCC Site Code: UK11035**
- **Size: 128.61 ha**
- **Designation: Ramsar**

	Leighton Moss Ramsar
Site Description	Leighton Moss is the largest reedbed in north-west England and is situated on the eastern edge of Morecambe Bay in Lancashire. Large areas of open water are surrounded by extensive reedbeds in which areas of willow scrub and mixed fen vegetation also occur. A typical and varied fen flora has developed in part, whilst the reedbed shows all stages of serial transition from open water through to woodland.
Qualifying Features	Ramsar criterion 1 An example of large reedbed habitat characteristic of the biogeogaphical region. The reedbeds are of Particular importance as a northern outpost for breeding populations of Bittern *Botaurus stellaris*, Eurasian Marsh Harrier *Circus aeruginosus* and Bearded Tit *Panurus biarmicus*. Ramsar criterion 3 The site supports a range of breeding birds including Bittern *Botaurus stellaris*, Eurasian Marsh Harrier *Circus aeruginosus* and Bearded Tit *Panurus biarmicus*. Species occurring in nationally important numbers outside the breeding season include northern Shoveler *Anas clypeata* and Water Rail *Rallus aquaticus*
Conservation Objectives	• See SPA characterisation

	Leighton Moss Ramsar
Component SSSIs	• See SPA characterisation
Key Environmental Conditions (factors that maintain site integrity	• See SPA characterisation
Ramsar Condition Assessment	• See SPA characterisation
Vulnerabilities (includes existing pressures and trends)	• See SPA characterisation
Landowner/ Management Responsibility	RSPB
HRA/AA Studies undertaken that address this site	• **Appropriate Assessment of Core Strategy for Lancaster City Council (September 2007)** Some policies could facilitate development affecting European Sites but Policy E1 precludes any development which might have an adverse effect on Bowland Fells SPA • **Appropriate Assessment Screening of South Lakeland District Council's Core Strategy:** Source:http://www.southlakeland.gov.uk/downloads/page2033/S_Lakeland_CS_HRA_report_070308.pdf Likely Significant Effects were not identified for Leighton Moss Ramsar in this report. • **Habitat Regulations Assessment: Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Source:http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/39435142953.pdf Significant effects on Leighton Moss Ramsar are possible according to this document although little explanation is given. • **Habitat Regulations Assessment: Cumbria Minerals and Waste Development Framework:**

	Leighton Moss Ramsar
	Submission Draft Core Strategy and Generic Development Control Policies: Details: http://www.cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/39518145940.pdf Significant effects of the Cumbria MWD Framework on Leighton Moss Ramsar are assessed as unlikely. • **HRA of the North West Regional Spatial strategy** • **Habitat Regulations Assessment: Screenning statement to accompany Bolton's Core Strategy Preferred Option Report (May 2008)** Source:http://www.bolton.gov.uk/sites/documentcentre/Documents/Habitats%20regulation%20assessment%20screening%20statement%20Bolton%20Preferred%20Options.pdf Significant effects of Bolton's core strategy on Calf Leighton Moss are assessed as unlikely.

Appendix 2: Plans and Programmes Review

Regional

Plan	Potential impacts that could cause 'in-combination' effects
Shoreline Management Plan	• Development/ construction/ maintenance of coastal defences; potential for land take, pollution increase, disturbance/ severance of habitats and species.
Lancashire Minerals and Waste Local Plan	• Increased handling capacity at Heysham Port and increase in waste disposal at Fleetwood leading to increase in transport impacts; air pollution; disturbance. • Generally European sites recognised for protection and existing facilities in vicinity provide for expected demand, although plan period nearing end and potential for future growth/ facilities a possibility but locations unknown. Current plan has broadly sought to focus any required expansion/ extension on existing sites/ facilities.
Cumbria Minerals and Waste Local Plan	• Current plan has broadly sought to focus any required expansion/ extension on existing sites/ facilities. Potential expansion of sites with associated (ongoing) impacts of air/ water pollution. • Potential for indirect impacts associated with transport; air pollution.
Lancashire Local Transport Plan	• Heysham to M6 Link – potential for increased transport related impacts; air pollution; disturbance, although may ease congestion reducing local air pollution. Start date for the main highway works is January 2010 with an expected completion date of late 2012.
Cumbria Local Transport Plan (LTP2)	• Morecambe Bay Barrage has potential effects; land take/ direct loss of habitat through development; increased transport movements; air pollution; disturbance/ severance of habitats and species.

Plan	Potential impacts that could cause 'in-combination' effects
Lancaster District Core Strategy (Adopted July 23 2008)	• Local housing (total 7200 no dwellings) and employment growth may lead to increased transport movements - the potential for in-combination effect is greater where housing sites are in proximity to European sites. • New communities require increased infrastructure – potential for land take, pollution increase, disturbance/ severance of habitats and species. • Growth in requirement for waste management/ transport disposal from new communities and businesses has the potential to increase pollution, and introduce land take issues. • On and off shore wind power projects; potential for land take, disturbance/ of habitats and species. • Tourism may increase recreational pressures. • Recreation pressures may result from housing developments near/ adjacent to European sites. The Strategy has also been screened and Habitat Regulations Appropriate Assessment is not required.

Local

Plan	Potential impacts that could cause 'in-combination' effects
South Lakeland District Council Adopted Local Plan 2006	• Housing and employment growth may lead to increased transport movements - the potential for in-combination effect is greater where housing sites are in proximity to European sites. • New communities require increased infrastructure – potential for land take, pollution increase, disturbance/ severance of habitats and species. • Growth in requirement for waste management/ transport disposal from new communities and businesses has the potential to increase pollution, and introduce land take issues. • On and off shore wind power projects; potential for land take, disturbance/ of habitats and species. • Tourism may increase recreational pressures. • Recreation pressures may result from housing developments near/ adjacent to European sites.
Barrow-in-Furness Borough Council Local Plan Review 1996-2006 (Adopted 24th August 2001)	Limited development activities, and direct effects anticipated. Effects are likely to be indirect associated with transport/ infrastructure. • Housing and employment growth may lead to increased transport movements - the potential for in-combination effect is greater where housing sites are in proximity to European sites. • New communities require increased infrastructure – potential for land take, pollution increase, disturbance/ severance of habitats and species. • Growth in requirement for waste management/ transport disposal from new communities and businesses has the potential to increase pollution, and introduce land take issues. • Tourism may increase recreational pressures. • Recreation pressures may result from housing developments near/ adjacent to European sites.

	A screening report for a Habitat Regulation Assessment has been carried out of the Barrow Port AAP. Likely significant effects identified due to; the potential for inappropriate type and scale development; development of some sites; residential development; port facilities development; access improvements; development of the Barrow Marina Village and marina link; marina Village housing; development of Cavendish Dock as a wildlife attraction; development of a water sports centre including power boat facilities; Barrow Waterfront Gateway area for specific purposes including a cruise facility; development of the Waterfront Business Park.
Wyre Borough Council Local Plan Review 2001-2016 (Approved for development control purposes 31 December 2003)	• Development/ growth adjacent to European sites, potential for land take, pollution increase, disturbance/ severance of habitats and species. • Housing and employment growth may lead to increased transport movements - the potential for in-combination effect is greater where development sites are in proximity to European sites. • New communities require increased infrastructure – potential for land take, pollution increase, disturbance/ severance of habitats and species. • Growth in requirement for waste management/ transport disposal from new communities and businesses has the potential to increase pollution, and introduce land take issues. • Tourism may increase recreational pressures. • Recreation pressures may result from housing developments near/ adjacent to European sites.

Other Plans and Programmes

Plan	Potential impacts that could cause 'in-combination' effects
Gas Storage Facility, Gateway Storage Company Ltd	• Development adjacent to and within European sites, potential for land take, pollution increase, disturbance/ severance of habitats and species. • Growth in requirement for waste management/ transport disposal related to development proposal has the potential to increase pollution, and introduce land take issues.
Extension to Offshore Wind Energy Rounds 1 and 2 sites announced by The Crown Estate, May 2010	• Extension to Walney Offshore Windfarm announced by The Crown Estate, to provide 750MW wind power generation over an additional 146.2km^2. Walney Extension site is located to the north west of the windfarm sites for West Duddon windfarm (consented) and Walney (phase 1 under construction) and to the west of the operational Barrow offshore windfarm site. • The proposed power export cable route for Walney phase 2 to the Hillhouse substation passes through the north-eastern corner of the Shell Flat and Lune Deep pSAC through both the sandbank and reef habitats for approx. 4.8km. This is likely to cause disturbance and physical damage to pSAC habitats (see Appendix 1). It is possible that the routes for power cables for the Walney Extension may also be proposed through the Shell Flat and Lune Deep pSAC. The presence of power cables may also have effects on some species sensitive to electromagnetic fields. • The Crown Estate has confirmed (June 2010) that the extensions did not constitute a component of a plan which was subject to HRA (see Appendix 1).

Appendix 3: Likely Significant Effect (LSE) Screening Table

SIGNIFICANT EFFECTS SCREENING (INCORPORATING IN-COMBINATION ASSESSMENT):

European Sites within a 20km radius of the nominated site

	Designation	Distance to nominated site
Bowland Fells	**SPA**	13 km
Calf Hill and Cragg Woods	**SAC**	14 km
Leighton Moss	**SPA**	17 km
Leighton Moss	**Ramsar**	17 km
Liverpool Bay	**SPA**	19 km
Morecambe Bay	**SAC**	Partly within and adjacent
Morecambe Bay	**SPA**	Partly within and adjacent
Morecambe Bay	**Ramsar**	Partly within and adjacent
Morecambe Bay Pavements	**SAC**	18 km
Shell Flat and Lune Deep	**cSAC & pSAC**	19 km & 15km

The likely significant effects of the development of the nominated site on the above listed European sites located within a 20km radius of the nominated site have been assessed. Some of these European sites have been screened out for the reasons given below. For the remaining European sites, the assessment of the likely significant effects of the construction, operation and decommissioning phases of a new nuclear power station development are presented in tabular form.

European Sites within a 20km radius of the nominated site for which likely significant impacts are not considered not to arise:

- **Bowland Fells SPA:** The SPA covers an extensive upland area (16,000ha) in Lancashire, in north-west England. It forms a western outlier of the Pennines, with summits mostly in the range 450-550 m. The geology is millstone grit-capped fells overlying softer Bowland shales, resulting in predominantly acidic vegetation types. The major habitats are heather-dominated moorland and blanket mire. It is important for its upland breeding birds, especially breeding Merlin *Falco columbarius* and Hen Harrier *Circus cyaneus*.
- Maintenance of hydrology has been recorded as a key environmental condition that maintains site integrity. Bowland Fells fall partly within the Lune river basin district (the same district as the nominated site). However the heather moorland and blanket mire habitats that support the designated bird species are rain fed systems and only work within these habitats are likely to affect their condition, for example if drains were cut for sheep grazing. It is therefore considered that impacts on site hydrology as a result of the proposed development are extremely unlikely.

- **Liverpool Bay SPA**: Liverpool Bay SPA extends from Moelfre in North-East Anglesey to Rossall Point near Fleetwood. The Bay supports 5.4% of GB's total estimated overwintering population of Red-throated Diver (*Gavia stellata*) and 3.4% of GB's total estimated overwintering population of Common Scoter (*Melanitta nigra*). In addition, the site regularly supports more than 20,000 wildfowl during the non-breeding season.
- Given the distance to the nominated site (19 km) and 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 Environment Agency (EA) assessments show that radioactive aerial emissions fall within authorised limits[6], any impacts on the integrity of the SPA with regards to air quality are considered extremely unlikely.

[6] Environment Agency, Measuring Environmental Performance: Sector Report for the Nuclear Industry, Nov 2005

- Given the that the dominant waves and prevailing winds originate from the south west[7], the effect of dilution of any pollution over 19km, the low sensitivity of the site to non-toxic contamination, including changes in nutrient and organic loading, thermal regime, turbidity and salinity[8], the moderate sensitivity of the site to non-synthetic compounds[3] and the low sensitivity of the site to introduced compounds[3], any impacts on the integrity of the SPA with regards to water resource/quality are considered extremely unlikely.
- Given the distance to the nominated site (19 km) and that the overall vulnerability of the Annex I species in Liverpool Bay SPA for habitat smothering is low[3], and for siltation and abrasion is also low for Annex I and II species, any impacts on the integrity of the SPA with regards to habitat (and species) loss and fragmentationn are considered extremely unlikely.
- Given the location of the site coastal squeeze and disturbance have also been screened out.

- **Morecambe Bay Pavements SAC:** The SAC consists of 15 discrete areas (including 12 SSSIs) either side of the Lancashire Cumbria border, covering a total of 2,609ha. The site is designated for its Carboniferous limestone pavements, which support the following habitats *Juniperus communis* formations on heaths or calcareous grasslands, semi-natural dry grasslands and scrubland facies: on calcareous substrates, *Tilio-Acerion* forests of slopes, screes and ravines, and *Taxus baccata* woods. It also contains Hawes Water, a lowland lake which is considered to be the best example of a lowland hard oligo-mesotrophic lake with *Chara* spp. in England. It provides an important habitat for the Narrow-mouthed whorl snail.
- Water quality is an identified vulnerability for the SAC, however, given that the closest part of the SAC to the nominated site is 18km away and in a separate river basin district (Kent/Leven) to the nominated site (Lune) it is considered unlikely that there would be significant impacts on the integrity of the SAC due to water quality impacts arising from the proposals.
- There is potential for increased levels of airborne pollutants during the construction, operation and decommissioning phases of the proposed development at Site, which could include planned argon-41, krypton-85, tritium, carbon dioxide, sulphur dioxide, volatile organic compounds release and accidental radioactive and non-radioactive emissions. Avoidance of atmospheric pollution is a key environmental condition of the SAC, but given the distance to the proposals, and the fact 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 Environment Agency (EA) assessments show that

[7] North West England And North Wales SMP2-Appendix C-Section J-Knott End-on-Sea To Heysham Revision 01/10/2009
[8] Natural England 10/11/2009, Inshore Special Area of Conservation: Shell Flat and Lune Deep, Draft Conservation Objectives and Advice on Operations V2.0

radioactive aerial emissions fall within authorised limits[9], any impacts on the integrity of the SAC are considered extremely unlikely.

- **Shell Flat cSAC and Lune Deep pSAC:** These two sites are considered together, as following the consultation for Lune Deep it is likely that a single selection assessment document will be drafted for Shell Flat and Lune Deep site, and Lune Deep has been submitted to Government as an extension to the existing Shell Flat SAC[10]. The two areas consists of, a reef enclosed in a deep water channel (Lune Deep) and a large sandbank feature (Shell Flat) at the mouth of Morecambe Bay surrounded by shallower areas to the north and south. The site is designated for its Annex 1 sandbank habitats and proposed to be designated for its reef habitat. Lune Deep is a good example of a boulder and rocky reef, and Shell Flat sandbank an example of a banner sandbank in waters less than 20m deep, which supports low biodiversity high biomass communities.
- It is considered that as a result of the distances (19km & 15km) from the nominated site and the environmental conditions associated with both sites, any impacts on the integrity of them as a result of the proposed development of a new nuclear power station are extremely unlikely.
- The habitats have moderate sensitivity and exposure to toxic contamination and can recover moderately quickly once contaminant sources are removed. It is considered likely that routine and non-routine discharges from a new nuclear power station at Heysham are likely to be sufficiently diluted by seawater to avoid any effects on their habitats. The habitats have a low sensitivity to smothering by sediment and to nutrient enrichment. It is assumed that the thermal plume would not have an affect at this distance. Therefore it is concluded there are unlikely to be any significant effects in relation to water quality and resources.
- The sites are unlikely to be affected by any effects on air quality from the development due to the distance and depth of covering water.
- The sites are unlikely to be affected by any effects in relation to habitat loss, species loss, or fragmentation, as no effects of works associated with the construction and operation of the power station have been identified. A possible small increase in shipping in the area, e.g. for the offloading during construction, is not likely to cause a significant increase in shipping movements in the area of the cSAC & pSAC, an area well used by large fishing vessels. Impacts of coastal squeeze and

[9] Environment Agency, Measuring Environmental Performance: Sector Report for the Nuclear Industry, Nov 2005
[10] Natural England 11/08/2010 Lune Deep Selection Assessment Document for Reconsultation Version 1.2 available at http://www.naturalengland.org.uk/Images/Lune-sad_tcm6-21710.pdf

disturbance (noise, visual) are not relevant to this marine cSAC & pSAC designation. Smothering (possible light disturbance) is unlikely to be caused due to distance and the low vulnerability of habitats.

Calf Hill and Cragg Woods SAC

Unitary Authority: Lancashire

Air quality impacts have been screened out the assessment below for Calf Hill and Cragg Woods SAC, due to the distance to the nominated site (14 km) and 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 Environment Agency (EA) assessments show that radioactive aerial emissions fall within authorised limits[11], any impacts on the integrity of the SAC with regards to air quality are considered extremely unlikely. Given the location of the site Habitat fragmentation, coastal squeeze and disturbance have also been screened out.

No potential impact pathways were identified at the construction and decommissioning phases.

Source: Operation (duration approx 60 years)

Calf Hill and Cragg Woods SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water availability from planned abstraction (Approximately 15 million cubic meters of fresh water per year may be needed).
Potential effects on the SAC: Receptor	Lowering of water-tables through water abstraction may result in a transition of the designated Alder/Ash woodland to a drier (unfavorable) woodland type.
Risk of Likely Significant Effect (LSE)?	Maintenance of natural hydrological regime is a key environmental condition that maintains site integrity and a main pressure on the Alder/Ash woodland habitats is the lowering of water tables through water abstraction. Calf Hill and Cragg Woodland is over 14km away from the nominated development site but within the same river basin district (Lune) and as such likely significant impacts cannot be ruled out at this stage.

[11] Environment Agency, Measuring Environmental Performance: Sector Report for the Nuclear Industry, Nov 2005

Calf Hill and Cragg Woods SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts - other Plans and Programmes	**Core Strategy for Lancaster City Council (September 2007)** Policy E1 precludes any development which might have an adverse effect on Calf Hill and Cragg Woods SAC **Lancaster District Core Strategy (Adopted July 23 2008)** 7,200 dwellings planned
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Uncertain

Leighton Moss, SPA/Ramsar

Unitary Authority: Lancashire

Air quality impacts have been screened out the assessment below for Leighton Moss SPA and Ramsar, due to the distance to the nominated site (17 km) and 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 Environment Agency (EA) assessments show that radioactive aerial emissions fall within authorised limits[12], any impacts on the integrity of the SPA with regards to air quality are considered extremely unlikely. Given the location of the site Habitat fragmentation, coastal squeeze and disturbance have also been screened out. It should be noted that although impacts on water quality at Morecambe Bay could have implications for habitat and species loss related to Leighton Moss, these impacts are considered indirect and are dealt with under the potential direct water quality impact.

Source: Construction (duration approx 5 years)

Leighton Moss, SPA/Ramsar: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/ excavations, infrastructure provision (pollution incidents).
Potential effects on the SAC: Receptor	Any released toxins could accumulate within the food chain within Morecambe Bay, for example, salt marsh plants are known to bio-accumulate toxic compounds and act as sinks for them, and this could then accumulate within prey items which the Marsh Harrier populations of Leighton Moss SPA / Ramsar may be reliant upon.
Risk of Likely Significant Effect (LSE)?	Maintenance of feeding areas outside of Leighton Moss SPA/Ramsar has not been recorded as key environmental condition of the site, but given that Leighton Moss is less than 1km from Morecambe Bay, and supports suitable prey items (birds, insects and fish) that could support Marsh Harrier populations of Leighton Moss, a likely

[12] Environment Agency, Measuring Environmental Performance: Sector Report for the Nuclear Industry, Nov 2005

Leighton Moss, SPA/Ramsar: Construction (duration approx 5 years)	
Water Resources/Quality	
	significant impact cannot be ruled out at this stage.
Potential Impacts - other Plans and Programmes	**South Lakeland District Council's Core Strategy** Appropriate Assessment Screening of strategy identified no likely significant effect on Leighton Moss SPA/Ramsar **Cumbria Wind Energy – Supplementary Planning Document (SPD), revised June 2007** Significant effects on Leighton Moss SPA are possible according to the HRA of this document **Cumbria Local Transport Plan (LTP2)** Morecambe Bay Barrage has potential effects; land take/ direct loss of habitat through development; increased transport movements; air pollution; disturbance/ severance of habitats and species
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Operation (duration approx 60 years)

Leighton Moss, SPA/Ramsar: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water quality and drainage from planned and accidental discharges (radioactive and non-radioactive).
Potential effects on the SAC: Receptor	Any released toxins could accumulate within the food chain within Morecambe Bay, for example, salt marsh plants are known to bio-accumulate toxic compounds and act as sinks for them, and this could then accumulate within prey items which the Marsh Harrier populations of Leighton Moss SPA/Ramsar may be reliant upon.
Risk of Likely Significant Effect (LSE)?	Maintenance of feeding areas outside of Leighton Moss SPA/Ramsar has not been recorded as key environmental condition of the site, but given that Leighton Moss is less than 1km from Morecambe Bay, and supports suitable prey items (birds, insects and fish) that could support Marsh Harrier populations of Leighton Moss, a likely significant impact can not be ruled out at this stage.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Decommissioning (duration approx 30 years)

Leighton Moss, SPA/Ramsar: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	Any released toxins could accumulate within the food chain within Morecambe Bay, for example, salt marsh plants are known to bio-accumulate toxic compounds and act as sinks for them, and this could then accumulate within prey items which the Marsh Harrier populations of Leighton Moss SPA/Ramsar may be reliant upon.
Risk of Likely Significant Effect (LSE)?	Maintenance of feeding areas outside of Leighton Moss SPA/Ramsar has not been recorded as key environmental condition of the site, but given that Leighton Moss is less than 1km from Morecambe Bay, and supports suitable prey items (birds, insects and fish) that could support Marsh Harrier populations of Leighton Moss, a likely significant impact can not be ruled out at this stage. As stated within the Leighton Moss SPA Natura 2000 data form, saline intrusion into Leighton Moss is a rare occurrence (three inundations since 1964). Given the rarity of this event and the distance from the nominated site (greater than 15 km) significant water quality impacts within Leighton Moss SPA are considered extremely unlikely.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC

Unitary Authority: Cumbria and Lancashire

Source: Construction (duration approx 5 years)

Morecambe Bay SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/ excavations and infrastructure provision (sedimentation, pollution incidents through water courses and cycles).
Potential effects on the SAC: Receptor	Potential for: • change in sediment flows within the bay, • toxic contamination through the introduction of synthetic and non-synthetic compounds, • non-toxic contamination through organic and nutrient enrichment, • changes in turbidity and salinity, These could affect the status of the designated habitats, for example toxins can bind to sediments and bio-accumulate in saltmarsh plants.
Risk of Likely Significant Effect (LSE)?	The maintenance of morphological equilibrium of the estuary (including sediment flows, salinity, and trophic status) are key environmental conditions of the SAC. As the nominated site is partly within the SAC, significant effects on the SACs integrity cannot be ruled out at this stage.

Morecambe Bay SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts - other Plans and Programmes	**Offshore Mineral and Waste Sites** • Indirect impacts as a result of new or intensification of minerals and waste development/ activities; disturbance; pollution **Shoreline Management Plan** • Development/ construction/ maintenance of coastal defences; potential for land take, pollution increase, disturbance/ severance of habitats and species **Lancashire Minerals and Waste Local Plan** • Increased handling capacity at Heysham Port and increase in waste disposal at Fleetwood leading to increase in transport impacts; air pollution; disturbance • Generally European sites recognised for protection and existing facilities in vicinity provide for expected demand, although plan period nearing end and potential for future growth/ facilities a possibility but locations unknown. Current plan has broadly sought to focus any required expansion/ extension on existing sites/ facilities **Cumbria Local Transport Plan (LTP2)** • Morecambe Bay Barrage has potential effects; land take/ direct loss of habitat through development; increased transport movements; air pollution; disturbance/ severance of habitats and species **Gas Storage Facility, Gateway Storage Company Ltd** • Development adjacent to and within European sites, potential for land take, pollution increase, disturbance/ severance of habitats and species • Growth in requirement for waste management/ transport disposal related to development proposal has the potential to increase pollution, and introduce land take issues **Cumbria Minerals and Waste Development Framework**

Morecambe Bay SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
	• HRA of framework assess significant effects of the Cumbria MWD Framework on Morecambe Bay SAC are assessed as possible
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Construction (duration approx 5 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased traffic growth, and the emissions arising from construction activity. Likely to be restricted to a local level, for example dust/ particulates.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading and changes to water quality from aerial deposition. Changes in air quality can impact upon sensitive designated communities within the SAC, for example it is suspected that nutrient deposition on many sand dunes is already above their critical threshold for impacts on vegetation (Jones *et al* 2002[13] and 2004[14]). The consequence of this for dune slacks is the tendency to a speeded up succession away from dune slack vegetation. Shingle communities are vulnerable to smothering from airborne particulates and suffer reduced rates of growth.
Risk of Likely Significant Effect (LSE)?	Air quality has been identified as a vulnerability for the following designated habitats: • Perennial vegetation of stony banks • Atlantic salt meadows • Humid dune slacks • Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) As such, likely significant effects as a result of air quality impacts cannot be ruled out at this stage.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)

[13] JONES, M.L.M. *et al.* 2002. Changing nutrient budget of sand dunes: consequences for the nature conservation interest and dune management CEH, Bangor.
[14] 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

Morecambe Bay SAC: Construction (duration approx 5 years)	
Air Quality	
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Construction (duration approx 5 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Construction of infrastructure, extension of site into 'buffer' habitats, possible development at the coastal fringes.
Potential effects on the SAC: Receptor	Construction activities have the potential to result in direct loss and fragmentation of key SAC habitats, for example inter-tidal habitats.
Risk of Likely Significant Effect (LSE)?	Any loss of designated habitats could be considered significant.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Construction (duration approx 5 years)	
Coastal Squeeze	
Potential Impacts: Pathway	Construction of infrastructure and facilities relating to the operation of the nuclear power station may result in an encroachment upon land at the coastal fringes.
Potential effects on the SAC: Receptor	Any development encroaching on the coastal fringe may lead to habitats being 'squeezed' between an eroding seaward edge and fixed flood defence walls and lead to indirect loss of designated inter-tidal habitats.
Risk of Likely Significant Effect (LSE)?	Erosion of the seaward edge of saltmarshes occurs widely in the high energy locations of the larger estuaries as a result of coastal processes. Any loss of habitat could be considered significant.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Operation (duration approx 60 years)

Morecambe Bay SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water quality and drainage from planned and accidental discharges (radioactive and non-radioactive), and from the abstraction and discharge of water for cooling (heated water up to 10^{o}c warmer than the receiving environment).
Potential effects on the SAC: Receptor	Changes to water quality and of water temperature can impact species composition/ encourage excessive algal growth. Biocides used to clean cooling infrastructure could potentially affect the status of habitats. Localised abrasion of habitats can occur around discharge/abstraction points, which can also result in altered sediment regimes locally.
Risk of Likely Significant Effect (LSE)?	Pollution, nutrient enrichment, and an increase in organic matter in sediments are key vulnerabilities of the SAC. Potential for operational effects to change water quality and temperature to result in adverse effects on water quality need further investigation to determine whether changes are likely to be significant.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Operation (duration approx 60 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth (nitrogen oxides, sulphur dioxide). Potential impacts from planned aerial release of argon-41, krypton-85 and tritium, carbon dioxide, sulphur dioxide, nitrogen oxide, volatile organic compounds and accidental radioactive emissions.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading and changes to water quality from aerial deposition, thus leading to changes in structure and composition of the qualifying habitats. Changes in air quality can impact upon sensitive designated communities within the SAC through bio-accumulation. For example saltmarsh plants are known to bio-accumulate toxic compounds and act as sinks for them.
Risk of Likely Significant Effect (LSE)?	An increase in airborne pollutants could significantly affect favourable condition of: • Perennial vegetation of stony banks • Atlantic salt meadows • Humid dune slacks • Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) Habitats which are identified within the conservation objectives to be maintained in favourable condition.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Operation (duration approx 60 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through operation, for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities arising from changes to the footprint of the site could increase loss of terrestrial, marine and sub-tidal habitats given the location of the proposed development site on the coast.
Risk of Likely Significant Effect (LSE)?	Any loss of designated habitats could be considered significant.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Decommissioning (duration approx 30 years)

Morecambe Bay SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	Potential for: • change in sedimentation patterns, • toxic contamination through the introduction of synthetic and non-synthetic compounds, • non-toxic contamination through organic and nutrient enrichment, • changes in turbidity and salinity, These potential impacts could affect the favourable status of the designated habitats for example, toxins can bind to sediments and bio-accumulate in saltmarsh plants.
Risk of Likely Significant Effect (LSE)?	The maintenance of morphological equilibrium of the estuary (including sedimentation patterns) and salinity, avoidance of pollution or nutrient enrichment, and no increase in organic matter in sediments are key environmental conditions of the site.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Decommissioning (duration approx 30 years)	
Air Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading and changes to water quality from aerial deposition. Changes in air quality can impact upon sensitive designated communities within the SAC, for example it is suspected that nutrient deposition on many sand dunes is already above their critical threshold for impacts on vegetation (Jones *et al* 2002[2] and 2004[3]). The consequence of this for dune slacks is the tendency to a speeded up succession away from dune slack vegetation.
Risk of Likely Significant Effect (LSE)?	Air quality has been identified as a vulnerability for the following designated habitats: • Perennial vegetation of stony banks • Atlantic salt meadows • Humid dune slacks • Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SAC: Decommissioning (duration approx 30 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through decommissioning activities, for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities required during decommissioning can result in a direct loss of terrestrial, marine and sub-tidal habitats.
Risk of Likely Significant Effect (LSE)?	As the nominated site is partly within the SAC, loss of designated habitats (which could be considered significant) can not be ruled out at this stage.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality)
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar

Unitary Authority: Cumbria and Lancashire

Source: Construction (duration approx 5 years)

Morecambe Bay SPA/ Ramsar: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/excavations, infrastructure provision (sedimentation, pollution incidents).
Potential effects on the SAC: Receptor	Increased nutrient input may affect species composition and structure of habitats within the SPA/Ramsar. This could cause a change in food sources which designated bird species of the SPA/Ramsar require. 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). Similarly intertidal habitats may be affected through smothering, for example eelgrass beds. This may cause reductions in prey items and food sources for waterfowl and waders: Eel grass beds are an important feeding area for Wigeon. Any release of toxins could impact on important bird assemblages of the SPA/Ramsar through accumulation within the food chain. This could damage the integrity of habitats, for example saltmarsh plants are known to bio-accumulate toxic compounds and act as sinks for them which will in turn be passed onto birds which graze upon them.
Risk of Likely Significant Effect (LSE)?	The avoidance of pollution and the maintenance of site hydrology and sedimentation patterns are key environmental conditions that maintain site integrity. As the SPA/Ramsar is adjacent to the nominated site, impacts on water quality as a result of construction activities

Morecambe Bay SPA/ Ramsar: Construction (duration approx 5 years)	
Water Resources/Quality	
	cannot be ruled out at this stage.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Construction (duration approx 5 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth, and the emissions arising from construction activity. Likely to be restricted to a local level, for example dust/particulates.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading, possibly affecting species composition and structure of habitats within the SPA/Ramsar. This could cause a change in food sources and prey items which designated bird species of the SPA/Ramsar require. Airborne pollutants can affect the condition of supporting habitats, for example Shingle which supports breeding Sandwich Terns is vulnerable to smothering by airborne particulates.
Risk of Likely Significant Effect (LSE)?	Air quality is an identified vulnerability for each of the key supporting habitats for the SPA/Ramsar qualifying species.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Construction (duration approx 5 years)	
Habitats (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Construction of cooling water infrastructure, extension of site into 'buffer' habitats, possible development at the coastal fringes could lead to habitat (and species) loss and fragmentation.
Potential effects on the SAC: Receptor	Loss or fragmentation (direct or indirect) of any habitat within the SPA/Ramsar site could reduce the availability of feeding and roosting habitat and thus could be detrimental to the condition of the important bird assemblages of the SPA and Ramsar.
Risk of Likely Significant Effect (LSE)?	As the nominated site is partly within the SPA/Ramsar it is possible that the development could lead to direct loss of habitat within or adjacent to the SPA/Ramsar. Any loss of supporting habitat within the SPA/Ramsar could be considered significant.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Construction (duration approx 5 years)	
Coastal Squeeze	
Potential Impacts: Pathway	Construction areas, infrastructure and facilities requiring development of land at the coastal fringe.
Potential effects on the SAC: Receptor	Any development encroaching on the coastal fringe may lead to habitats being 'squeezed' between an eroding seaward edge and fixed flood defence walls and lead to indirect loss of designated habitats.
Risk of Likely Significant Effect (LSE)?	SPA and Ramsar designated species are vulnerable to the physical loss of supporting habitats.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Construction (duration approx 5 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	The construction phase extends over 5-6 years with potential for significant increases in noise/light and visual changes during the construction period.
Potential effects on the SAC: Receptor	Birds are disturbed by sudden movements and noise which can displace them from their feeding and roosting grounds. For example, Bar-tailed Godwits are under threat from the degradation of foraging sites with human disturbance being a contributing factor.
Risk of Likely Significant Effect (LSE)?	As the nominated site is partly within the SPA/Ramsar, it is likely disturbance could lead to significant effects on bird species for which the SPA and Ramsar are designated.
Potential Impacts - other Plans and Programmes	**Thornton Area Action Plan (AAP)** Potentially increased noise and visual disturbance from human activity **South Lakeland District Council's Core Strategy** Potentially increased noise and visual disturbance from human activity
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Operation (duration approx 60 years)

Morecambe Bay SPA/ Ramsar: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water quality and drainage from planned and accidental discharges (radioactive and non-radioactive), and from the abstraction and discharge of water for cooling (heated water up to 10^{o}c warmer than the receiving environment).
Potential effects on the SAC: Receptor	Changes to water quality and water temperature can impact species composition, for example by encouraging excessive algal growth. This in turn can affect the composition of habitats and associated invertebrate assemblages and could result in an impact upon bird food sources. Thermal plumes associated with discharge of heated water could impact on invertebrates and fish populations both of which are prey items for birds within the SPA / Ramsar. Localised abrasion of habitats can occur around discharge/abstraction points, which can also result in altered sediment regimes locally. Accidental release of pollutants entering the estuarine system may impact on key SPA/Ramsar interests for example toxins may bio-accumulate within plants/invertebrates which may have an impact on birds further along the food chain. Biocides used to clean cooling infrastructure may have similar impacts.
Risk of Likely Significant Effect (LSE)?	A key requirement for the important bird populations present on site is that water quality, quantity and salinity as necessary for maintaining the favourable condition of key supporting habitats for feeding, nesting and roosting birds is maintained.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC

Morecambe Bay SPA/ Ramsar: Operation (duration approx 60 years)	
Water Resources/Quality	
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Operation (duration approx 60 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth (nitrogen oxides, sulphur dioxide). Potential impacts from planned aerial release of argon-41, krypton-85 and tritium, carbon dioxide, sulphur dioxide, nitrogen oxide, volatile organic compounds.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading, possibly affecting species composition and structure of habitats within the SPA/Ramsar. This could cause a change in food sources and prey items which designated bird species of the SPA/Ramsar require. Airborne pollutants can affect the favourable condition of supporting habitats, for example, shingle which supports Sandwich Terns is vulnerable to smothering by airborne particulates.
Risk of Likely Significant Effect (LSE)?	Air quality is an identified vulnerability for each of the key supporting habits listed within the conservation objectives for the SPA/Ramsar and therefore at this stage the possibility of significant effects on the integrity of the SPA/Ramsar interest features cannot be ruled out.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Operation (duration approx 60 years)	
Habitat Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through operation, for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities arising from changes to the footprint of the site could increase loss of terrestrial, inter- and sub-tidal habitats that support the designated bird species of the SPA and Ramsar.
Risk of Likely Significant Effect (LSE)?	SPA designated species are vulnerable to the physical loss of supporting habitats, especially in the intertidal area.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Operation (duration approx 60 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	Potential for increased disturbance through site operations.
Potential effects on the SAC: Receptor	Birds are disturbed by sudden movements and noise which can displace them from their feeding and roosting grounds, for example Bar-tailed Godwits are under threat from the degradation of foraging sites with human disturbance being a contributing factor.
Risk of Likely Significant Effect (LSE)?	As the nominated site is partly within the SPA/Ramsar, it is likely disturbance could lead to significant effects on bird species for which the SPA/Ramsar are designated.
Potential Impacts - other Plans and Programmes	**Thornton Area Action Plan (AAP)** Potentially increased noise and visual disturbance from human activity **South Lakeland District Council's Core Strategy** Potentially increased noise and visual disturbance from human activity
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Decommissioning (duration approx 30 years)

Morecambe Bay SPA/ Ramsar: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	Increased nutrient input may affect species composition of habitats within the SPA/Ramsar causing a reduction in species richness. This could cause a reduction in food sources and prey items which designated bird species of the SPA/Ramsar require. Changes to sediment regimes and increased turbidity/siltation could affect filter feeding shellfish. Similarly important plants of coastal and intertidal habitats may be affected through smothering, for example eelgrass beds. Both may cause reductions in prey items and food sources for waterfowl and waders, for example Eel grass beds are an important food source for Wigeon and Knot are specialist feeders on molluscs such as cockles. Any release of toxins could impact on important bird species and assemblages of the SPA/Ramsar through accumulation within the food chain. This could damage the integrity of habitats, for example saltmarsh plants are known to bio-accumulate toxic compounds and act as sinks for them.
Risk of Likely Significant Effect (LSE)?	Water quality and the maintenance of existing hydrological and sediment regimes are key environmental conditions that maintain site integrity. As the SAC/Ramsar site is partly within the nominated site, significant impacts on water quality as a result of de-construction activities cannot be ruled out at this stage.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain

Morecambe Bay SPA/ Ramsar: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Decommissioning (duration approx 30 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth associated with decommissioning and the emissions arising from [de]construction activity. Likely to be restricted to a local level, for example dust/particulates.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading, possibly affecting species composition and structure of habitats within the SPA/Ramsar. This could cause a change in food sources and prey items which designated bird species of the SPA/Ramsar require. Airborne pollutants can affect the favourable condition of supporting habitats, for example shingle which supports Sandwich Terns is vulnerable to smothering by airborne particulates.
Risk of Likely Significant Effect (LSE)?	Air quality is an identified vulnerability for the SPA/ Ramsar and pollution (including air pollution) is listed as a main pressure on each of the habits listed within the conservation objectives for the site to be maintained in a favourable condition.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Decommissioning (duration approx 30 years)	
Habitats (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through decommissioning activities, for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Loss or fragmentation (direct or indirect) of any habitat within the SPA/Ramsar site could reduce the availability of feeding and roosting habitat and thus could be detrimental to the favourable condition of the important bird assemblages of the SPA and Ramsar.
Risk of Likely Significant Effect (LSE)?	As the nominated site is partly within the SPA and Ramsar it is possible the development could lead to direct loss of habitat within or adjacent to the SPA/Ramsar. Any loss of supporting habitat within the SPA/Ramsar could be considered significant.
Potential Impacts - other Plans and Programmes	See Construction (Water Resources/Quality) for Morecambe Bay SAC
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Morecambe Bay SPA/ Ramsar: Decommissioning (duration approx 30 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	Decommissioning activity and associated de-construction likely to result in significant local increases in noise events, light pollution and visual disturbance in and around the immediate vicinity of the site.
Potential effects on the SAC: Receptor	Birds are disturbed by sudden movements and noise which can displace them from their feeding and roosting grounds, for example Bar-tailed Godwits are under threat from the degradation of foraging sites with human disturbance being a contributing factor.
Risk of Likely Significant Effect (LSE)?	As the nominated site is partly within the SPA/Ramsar, it is likely disturbance could lead to significant effects on bird species for which the SPA and Ramsar are designated.
Potential Impacts - other Plans and Programmes	**Thornton Area Action Plan (AAP)** Potentially increased noise and visual disturbance from human activity **South Lakeland District Council's Core Strategy** Potentially increased noise and visual disturbance from human activity
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Appendix 4: HRA/ Appropriate Assessment Proforma

Calf Hill and Cragg Woods SAC

- **Location: 024153W/ 540248N**
- **Size (ha): 34.43**
- **Designation: SAC**

	Calf Hill and Cragg Woods SAC
Qualifying Features	Annex I Habitats primary reason for selection: • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles Annex I Habitats qualifying feature: • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)
Conservation Objectives	Subject to natural change, to maintain the designated habitats in a favourable condition in relation to their structure and natural processes, regeneration potential, composition and local distinctiveness.
Key Environmental Conditions (factors that maintain site integrity)	• Moderately high or high rainfall • Maintenance of natural hydrological regime • Base-poor soils • Limited felling or thinning planned to open up dense canopy • Control of grazing • Minimal air pollution – bryophytes and lichens are sensitive

	Calf Hill and Cragg Woods SAC
	• Control of invasive non-native species and any disease outbreaks
Vulnerabilities (includes existing pressures and trends) ***Details at Appendix 1***	• Limited natural regeneration • Deterioration of stock proof fencing and walls • Air pollution is considered to be a potentially significant pressure to the structure and function of this habitat. This factor has particularly damaging effects on the epiphytic lichen and bryophyte communities, for which this habitat is of importance • Lowering of water-tables through drainage or water abstraction, which results in a transition to drier woodland types
Predicted Impacts ***What are the issues arising from the plan and how might the site be affected?***	**Water Resources** • Alteration of water table from abstraction
Potential In-combination effects (screening) ***What other plans and programmes could lead to in-combinations effects?***	**Water Resources and Quality** • Core Strategy for Lancaster City Council • Lancaster District Core Strategy
Appropriate Assessment	**Water Resources and Quality**

	Calf Hill and Cragg Woods SAC
Likelihood of adverse effect on integrity:	• Calf Hill and Cragg Woods is within the same river basin district (Lune), but not in the same WRMU. • It is in WRMU 3 (River Conder). The EA[15] regards the Conder as being of "High" sensitivity to abstraction; however, current abstraction is minimal and resource availability status of this unit is "water available". • Given the location of Calf Hill and Cragg Woods SAC, it is considered unlikely that water abstraction requirements for Heysham would lead to adverse effects on the SAC.
Possible Avoidance and Mitigation Measures – *includes recommendations for policy/proposals*	**Water Resource and Quality** • The Nuclear NPS can direct requirements for efficiency of water use and can require that control and regulation measures relating to supply are in place prior to the implementation of the nominated site proposals to ensure water abstraction does not significantly affect the hydrological regime underlying Calf Hill and Cragg Woods SAC.
Conclude no adverse effect on integrity?	• Water abstraction requirements and discharge qualities for the nominated site are extremely unlikely to have an adverse effect on integrity of the Calf Hill and Cragg Woods SAC.

[15] Environment Agency, The Lune Catchment Abstraction Management Strategy, March 2004

Leighton Moss SAC

- **Location: 024731W/ 541003N**
- **Size (ha): 128.61**
- **Designation: SAC**

	Leighton Moss SAC
Qualifying Features	Article 4.1 Qualification During the breeding season: • Bittern *Botaurus stellaris*, 4 individuals representing at least 20.0% of the breeding population in Great Britain • Marsh Harrier *Circus aeruginosus*, 2 pairs representing at least 1.3% of the breeding population in Great Britain Over winter: • Bittern *Botaurus stellaris*, 8 individuals representing at least 8.0% of the wintering population in Great Britain
Conservation Objectives	Maintain the populations of designated bird species within acceptable limits and retain the extent of the habitats that support them (standing open water, fen, marsh and swamp, wet woodland) in a favourable condition.
Key Environmental Conditions (factors that maintain site integrity)	• Avoidance of water pollution • Maintenance of water levels; stability during breeding season is important • Control of scrub

	Leighton Moss SAC
	• Appropriate reedbed management (rotational cutting) • Salinity of less than 5% during breeding season • Limited disturbance particularly during breeding season
Vulnerabilities (includes existing pressures and trends) ***Details at Appendix 1***	• Changes in water quality (particularly from agricultural run-off from land immediately adjacent to the reserve) • Changes in water levels (including through ground water abstraction) • Deterioration in quality of supporting habitats through lack of management for exmaple scrub invasion, drying out of reedbeds • Susceptible to saline intrusion upstream of its tidal sluice from Morecambe Bay
Predicted Impacts ***What are the issues arising from the plan and how might the site be affected?***	The predicted impacts listed below all relate to Morecambe Bay which comprises intertidal and estuarine habitats that may provide prey items which could support the Marsh Harrier populations of Leighton Moss SPA/Ramsar. **Water Resources and Quality** • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) The above impacts could lead to indirect effects on Marsh Harriers present within Leighton Moss through the accumulation of toxins within the food chain.
Potential In-combination effects (screening) ***What other plans and programmes could lead to in-combinations effects?***	**Water Resources and Quality** • South Lakeland District Council's Core Strategy • Cumbria Wind Energy – Supplementary Planning Document • Cumbria Local Transport Plan

	Leighton Moss SAC
Appropriate Assessment **Likelihood of adverse effect on integrity:**	**Water Resources and Quality** • Current Environment Agency (EA) data[16] has not assessed the ecological status (including ecological potential) around Heysham or near Leighton Moss SPA/Ramsar. • Chemical status of the estuary was recorded as 'failing to meet good' around Heysham and as 'good' near Leighton Moss by the EA[1]. • Radioactive discharges are subject to targets monitored by the EA. Radiation doses to wildlife around existing nuclear facilities are below the levels that are known to have significant effects on reproductive capacity, mortality, morbidity and mutation[17]. • Releases of argon-41 are radiologically significant in the immediate vicinity of some working Magnox power stations[3]. • Non-radioactive discharges have a relatively low environmental impact. There is, though, a measurable impact on sea nutrient levels in the vicinity of the discharges[3]. • Morecambe Bay SAC/SPA/Ramsar is vulnerable to toxic contamination (Appendix 1, Site Characterisations, see also further information on this site provided below), and toxins could accumulate within the food chain which the Marsh Harrier population of Leighton Moss SPA and Ramsar may depend on.
Possible Avoidance and Mitigation Measures – *includes recommendations for policy/proposals*	**Water Resource and Quality** • Adverse impacts upon surface, ground and estuarine waters should be avoided through the implementation of appropriate safety measures and water quality monitoring. This is primarily the responsibility of the Water Companies (resource planning) and the Environment Agency (abstraction licensing and discharge regulation). However, the Nuclear NPS can require that control and regulation measures relating to supply and discharge are in place prior to the implementation of the

[16] Environment Agency River Basin Management Plans: Draft North West River Basin District, February 2009. 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.
[17] Environment Agency, Measuring Environmental Performance: Sector Report for the Nuclear Industry, 2005

	Leighton Moss SAC
	nominated site proposals. • Primary data collection and subsequent laboratory analyses of samples for a full suite of parameters (including radioactive elements) should be undertaken to determine current exposure levels within the ecosystems.
Conclude no adverse effect on integrity?	• It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Heysham will not have significant adverse effects on the Marsh Harrier populations for which Leighton Moss SPA and Ramsar are partly designated, as a result of impacts to water quality within Morecambe Bay.

Morecambe Bay SAC

- **Location: 025742W/ 540709N**
- **Size (ha): 61506.22**
- **Designation: SAC**

	Morecambe Bay SAC
Qualifying Features	Annex I habitats that are a primary reason for selection of this site: 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1160 Large shallow inlets and bays 1220 Perennial vegetation of stony banks 1310 *Salicornia* and other annuals colonising mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`) 2130 Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature 2190 Humid dune slacks Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: 110 Sandbanks which are slightly covered by sea water all the time 1150 Coastal lagoons * Priority feature 1170 Reefs 2110 Embryonic shifting dunes 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) * Priority feature 2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) Annex II species that are a primary reason for selection of this site:

	Morecambe Bay SAC
	1166 Great crested newt *Triturus cristatus*
Conservation Objectives	Subject to natural change, maintain the **large shallow inlets and bays** in favourable condition, in particular: • Intertidal boulder and cobble skear communities • Subtidal boulder and cobble skear communities • Brittlestar bed communities • Intertidal boulder clay communities • Coastal lagoon communities • Intertidal mudflat and sandflat communities • Pioneer saltmarsh communities • Saltmarsh communities Subject to natural change, maintain the **mudflats and sandflats not covered by seawater at low tide (intertidal mudflats and sandflats)** in favourable condition, in particular: • Mud communities • Sand communities • Eelgrass bed communities Subject to natural change, maintain the **Glasswort *Salicornia* spp and other annuals colonising mud and sand (pioneer saltmarsh)** in favourable condition, in particular: • The glasswort Salicornia spp communities Subject to natural change, maintain the **Atlantic salt meadows *Glauco-Puccinellietalia* (saltmarsh)** in favourable condition, in particular: • Low marsh communities • Mid marsh communities • High marsh communities

	Morecambe Bay SAC
	• Transitional high marsh communities Subject to natural change, maintain other designated features in a favourable condition.
Key Environmental Conditions (factors that maintain site integrity)	• Maintain morphological equilibrium of the estuary, including sedimentation patterns • Maintain temperature and salinity levels within natural range • Avoidance of pollution • Avoidance of nutrient enrichment • Appropriate grazing of saltmarsh communities • No physical constraints to natural migration of mobile habitats such as dunes • Maintain minimal impact of fishing, bait digging and dredging • High enough water table for dune slacks • Avoidance of damaging levels of erosion from human activities • No increase in organic matter in sediments • No physical constraints to managed realignment if required in response to coastal squeeze • Control of bracken/scrub • Control of invasive and/or non-native species • Great crested newts require suitable foraging and refuge habitat; ponds with relatively unpolluted water of roughly neutral pH; some ponds with water throughout the breeding/tadpole development season
Vulnerabilities (includes existing pressures and trends) ***Details at Appendix 1***	**Physical loss** • Removal, for example, harvesting, coastal development • Smothering for example by artificial structures, disposal of dredge spoil • Through “coastal squeeze” **Physical damage**

	Morecambe Bay SAC
	• Siltation for example. run-off, channel dredging, outfalls • Abrasion for example. boating, anchoring, trampling • Selective extraction for example. aggregate dredging, entanglement **Toxic contamination** • Introduction of synthetic compounds for example. pesticides, TBT, PCBs • Introduction of non-synthetic compounds for example heavy metals, hydrocarbons • Introduction of radionuclides **Non-toxic contamination** • Nutrient enrichment for example agricultural run-off, outfalls • Organic enrichment for example agriculture, outfalls • Changes in thermal regime for example. power stations • Changes in turbidity for example run-off, dredging • Changes in salinity for example water abstraction, outfalls **Biological disturbance** • Introduction of microbial pathogens • Introduction of non-native species and translocation • Selective extraction of species for example shell fisheries, bait digging, wildfowling, commercial and recreational fishing Potential threats include commercial fisheries, aggregate extraction, gas exploration, and recreation.
Predicted Impacts	**Water Resources and Quality** Potential

	Morecambe Bay SAC
What are the issues arising from the plan and how might the site be affected?	• Increased/ altered drainage from earthworks and excavation • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) • Alteration of flow from abstraction • Changes to water temperature from controlled discharge • Sedimentation and changes in organic and nutrient loading arising from construction during the construction and decommissioning phases **Air Quality** • Local level impacts (reduced air quality arising from increased emissions from road/ transport/ generation sources) arising from construction decommissioning activities. • Potential impacts from planned aerial release of argon-41, krypton-85 and tritium, carbon dioxide, sulphur dioxide, nitrogen oxide, sulphur dioxides, volatile organic compounds and accidental radioactive emissions. **Habitat Loss and Fragmentation** • Construction activities (during construction, operation and decommissioning) have the potential to result in direct loss and fragmentation of key SAC habitats for example inter-tidal habitats. **Coastal Squeeze** • Any development encroaching on the coastal fringe may lead to habitats being 'squeezed' between an eroding seaward edge and fixed flood defence walls and lead to indirect loss of designated habitats.
Potential In-combination effects (screening) ***What other plans and programmes could lead to in-combinations***	**Water Resources and Quality** • Offshore Mineral and Waste Sites • Shoreline Management Plan

	Morecambe Bay SAC
effects?	• Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd • Cumbria Minerals and Waste Development Framework **Air Quality** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd • Cumbria Minerals and Waste Development Framework **Habitat Loss and Fragmentation** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd • Cumbria Minerals and Waste Development Framework **Coastal Squeeze** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan

	Morecambe Bay SAC
	• Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd
Appropriate Assessment **Likelihood of adverse effect on integrity:**	**Water Resources and Quality** • Current Environment Agency[1] data has not assessed the ecological status (including ecological potential) around Heysham in Morecambe Bay. • Chemical status of the estuary was recorded as 'failing to meet good' around Heysham and as 'good' around the estuary at Arnside by the EA[1]. • Groundwater quantity and chemical quality around Heysham are assessed by the EA[1] as being 'good' and 'poor' respectively. • Radioactive discharges are subject to targets monitored by the EA and of the non-radioactive discharges, nitrate contributions are considered to be the most significant[2]. In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges. • Morecambe Bay SAC designated habitats are vulnerable to toxic contamination (Appendix 1, Site Characterisations). 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 the SAC. **Air Quality** • 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 limits[2]. • Changes in air quality can impact upon sensitive designated communities within the SAC. It is

	Morecambe Bay SAC
	suspected that nutrient deposition on many sand dunes throughout the UK is already above their critical threshold for impacts on vegetation (Jones *et al* 2002[18] and 2004[19]). The consequence of this for dune slacks is the tendency to a speeded up succession away from dune slack vegetation. • Site-specific air quality data provided by the UK Air pollution Information system[20] states that nitrogen deposition for dune systems and perennial vegetation of stony banks are at, or are in exceedence of critical loads at Morecambe Bay. • Air quality has been identified as a vulnerability for, perennial vegetation of stony banks, atlantic salt meadows, Humid dune slacks and Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) As such, likely significant effects as a result of air quality impacts cannot be ruled out at this stage. **Habitat Loss and Fragmentation/Coastal Squeeze** • The extent of the loss and/or fragmentation of marine, intertidal and terrestrial habitats from the construction of nuclear reactors, construction areas and other infrastructure and facilities relating to the operation of the nuclear power station is currently unknown given that the exact scope of the development and the requirements for coastal or sea defence infrastructure remain undetermined at this stage. Any loss of designated habitat would be considered significant. At this strategic stage where detailed development plans are unknown, it is therefore not possible to conclude that no adverse impacts upon the SAC will arise from the proposed development with regards to loss and fragmentation of habitats and species.
Possible Avoidance and Mitigation Measures – *includes recommendations for*	**Water Resource and Quality** • Adverse impacts upon surface, ground and estuarine waters should be avoided through the implementation of appropriate safety measures and water quality monitoring. This is primarily the

[18] JONES, M.L.M. *et al.* 2002. Changing nutrient budget of sand dunes: consequences for the nature conservation interest and dune management CEH, Bangor
[19] 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
[20] http://www.apis.ac.uk/

	Morecambe Bay SAC
policy/proposals	responsibility of the Water Companies (resource planning) and the Environment Agency (abstraction licensing and discharge regulation). However, the Nuclear NPS can require that control and regulation measures relating to supply and discharge are in place prior to the implementation of the nominated site proposals. • Primary data collection and subsequent laboratory analyses of samples for a full suite of parameters (including radioactive elements) should be undertaken to determine current exposure levels within the ecosystems **Air Quality** • The Nuclear NPS should take into account the potential for air quality impacts to arise, particularly at a local level. The implementation of public transport infrastructure and/or non-road transport means, phasing of development, and the implementation of robust monitoring at sites to track changes in air quality over time should be implemented. In addition, the potential for cumulative impacts to arise from other plans and programmes implemented which overlap with the nuclear development in future (for example during the decommissioning phase of the development) should be considered. **Habitat Loss and Fragmentation/ Coastal Squeeze** • Where proposals for design and build remain under development, the Nuclear NPS should seek to prioritise the prevention of any direct adverse impacts upon sensitive habitats which could lead to their loss or fragmentation. Preventative measures implemented should allow for the avoidance of key habitats during construction works, and ensure that adequate measures are implemented within construction environmental management plans to minimise direct and indirect impacts upon habitats of factors such as pollution. The interest features on the designated sites should guide the identification of potential mitigation and compensation measures. • Habitat creation to replace habitats removed as a result of the development and to maintain connectivity of wildlife corridors around the development site should be undertaken as early as possible prior to the development works.

	Morecambe Bay SAC
	• Any direct impacts that may not be mitigated for successfully should be addressed through appropriate compensation measures agreed with Statutory Bodies and implemented prior to the commencement of development proposals. • Further studies are necessary to determine the significance of potential impacts associated with the proposed development upon the ecological integrity of the SAC with regard to habitat loss/fragmentation and coastal squeeze.
Conclude no adverse effect on integrity?	• It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Heysham will not have significant adverse effects on Morecambe Bay SAC as a result of impacts to water quality, air quality and habitat loss and fragmentation.

Morecambe Bay SPA

- **Location: 025721W/ 540719N**
- **Size (ha): 37404.8 ha**
- **Designation: SPA**

	Morecambe Bay SPA
Qualifying Features	Article 4.1 Qualification **During the breeding season:** • Little Tern *Sterna albifrons*, 26 pairs representing at least 1.1% of the breeding population in Great Britain • Sandwich Tern *Sterna sandvicensis*, 290 pairs representing at least 2.1% of the breeding population in Great Britain **Over winter:** • Bar-tailed Godwit *Limosa lapponica*, 2,611 individuals representing at least 4.9% of the wintering population in Great Britain • Golden Plover *Pluvialis apricaria*, 4,097 individuals representing at least 1.6% of the wintering population in Great Britain Article 4.2 Qualification by supporting populations of European importance of the following migratory species: **During the breeding season;** • Herring Gull *Larus argentatus*, 11,000 pairs representing at least 1.2% of the breeding Northwestern Europe (breeding) and Iceland/Western Europe - breeding population

	Morecambe Bay SPA
	• Lesser Black-backed Gull *Larus fuscus*, 22,000 pairs representing at least 17.7% of the breeding Western Europe/Mediterranean/Western Africa population **On passage;** • Ringed Plover *Charadrius hiaticula*, 693 individuals representing at least 1.4% of the Europe/Northern Africa - wintering population • Sanderling *Calidris alba*, 2,466 individuals representing at least 2.5% of the Eastern Atlantic/Western and Southern Africa - wintering population **Over winter;** • Curlew *Numenius arquata*, 13,620 individuals representing at least 3.9% of the wintering Europe - breeding population • Dunlin *Calidris alpina alpina*, 52,671 individuals representing at least 3.8% of the wintering Northern Siberia/Europe/Western Africa population • Grey Plover *Pluvialis squatarola*, 1,813 individuals representing at least 1.2% of the wintering Eastern Atlantic - wintering population • Knot *Calidris canutus*, 29,426 individuals representing at least 8.4% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96) • Oystercatcher *Haematopus ostralegus*, 47,572 individuals representing at least 5.3% of the wintering Europe and Northern/Western Africa population • Pink-footed Goose *Anser brachyrhynchus*, 2,475 individuals representing at least 1.1% of the wintering Eastern Greenland/Iceland/UK population • Pintail *Anas acuta*, 2,804 individuals representing at least 4.7% of the wintering Northwestern Europe population • Redshank *Tringa totanus*, 6,336 individuals representing at least 4.2% of the wintering Eastern

	Morecambe Bay SPA
	Atlantic - wintering population • Shelduck *Tadorna tadorna*, 6,372 individuals representing at least 2.1% of the wintering Northwestern Europe population • Turnstone *Arenaria interpres*, 1,583 individuals representing at least 2.3% of the wintering Western Palearctic - wintering population **Assemblage qualification: A seabird assemblage of international importance** The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds During the breeding season, the area regularly supports 61,858 individual seabirds including: Herring Gull *Larus argentatus*, Lesser Black-backed Gull *Larus fuscus*, Little Tern *Sterna albifrons*, Sandwich Tern *Sterna sandvicensis*. **Assemblage qualification: A wetland of international importance.** The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl Over winter, the area regularly supports 210,668 individual waterfowl including: Great Crested Grebe *Podiceps cristatus*, Bar-tailed Godwit *Limosa lapponica*, Pink-footed Goose *Anser brachyrhynchus*, Shelduck *Tadorna tadorna*, Pintail *Anas acuta*, Oystercatcher *Haematopus ostralegus*, Grey Plover *Pluvialis squatarola*, Knot *Calidris canutus*, Dunlin *Calidris alpina alpina*, Curlew *Numenius arquata*, Golden Plover *Pluvialis apricaria*, Turnstone *Arenaria interpres*, Black-tailed Godwit *Limosa limosa islandica*, Cormorant *Phalacrocorax carbo*, Wigeon *Anas penelope*, Teal *Anas crecca*, Mallard *Anas platyrhynchos*, Eider *Somateria mollissima*, Goldeneye *Bucephala clangula*, Red-breasted Merganser

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	Mergus serrator, Ringed Plover *Charadrius hiaticula*, Lapwing *Vanellus vanellus*, Sanderling *Calidris alba*, Redshank *Tringa totanus*, Whimbrel *Numenius phaeopus*.
Conservation Objectives	Subject to natural change, to maintain in favourable condition the habitats of the **internationally** important populations of regularly occurring bird species listed on Annex 1 of the Birds Directive**,** in particular: • Shingle areas Subject to natural change, to maintain in favourable condition the habitats of the internationally important assemblage of waterfowl and seabirds and the internationally important populations of regularly occurring migratory species, in particular: • Intertidal mudflat and sandflat communities • Intertidal and subtidal boulder and cobble skear communities • Saltmarsh communities • Coastal lagoon communities
Key Environmental Conditions (factors that maintain site integrity)	• Avoidance of pollution • Management of saltmarsh grazing • Control of bait digging, shell fisheries and dredging • Maintenance of prey availability for example control of shell-fishing • Maintenance of uninterrupted views • Open ground with short vegetation cover for feeding and roosting birds • Maintain hydrology of wet grassland (for waders)

	Morecambe Bay SPA
	• Limited disturbance to birds (land and waterbased) • No physical constraints to natural migration of mobile habitats • Maintenance of natural sedimentation patterns • Control of non-native species
Vulnerabilities (includes existing pressures and trends)	The SPA is subject to a wide range of pressures such as land-claim for agriculture, overgrazing, dredging, overfishing, industrial uses and unspecified pollution. However, overall the site is relatively robust and many of those pressures have only slight to local effects and are being addressed thorough Management Plans. The breeding tern interest is very vulnerable and the colony has recently moved to the adjacent Duddon Estuary.
Predicted Impacts ***What are the issues arising from the plan and how might the site be affected?***	**Water Resources and Quality** Potential • Increased/ altered drainage from earthworks and excavation • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) • Alteration of flow from abstraction • Changes to water temperature from controlled discharge • Sedimentation and changes in organic and nutrient loading arising from construction during the construction and decommissioning phases **Air Quality** • Local level impacts (reduced air quality arising from increased emissions from road/ transport/ generation sources) arising from construction decommissioning activities. • Potential impacts from planned aerial release of argon-41, krypton-85 and tritium, carbon dioxide, sulphur dioxide, nitrogen oxide, sulphur dioxides, volatile organic compounds and accidental radioactive emissions.

	Morecambe Bay SPA
	Habitat Loss and Fragmentation • Construction activities (during construction, operation and decommissioning) have the potential to result in direct loss and fragmentation of SPA supporting habitats for example inter-tidal habitats. **Coastal Squeeze** • Any development encroaching on the coastal fringe may lead to habitats being 'squeezed' between an eroding seaward edge and fixed flood defence walls and lead to indirect loss of supporting habitats. **Disturbance (noise, light and visual)** • Local level impacts relating primarily to construction and decommissioning activities.
Potential In-combination effects (screening) ***What other plans and programmes could lead to in-combinations effects?***	**Water Resources and Quality** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd • Cumbria Minerals and Waste Development Framework **Air Quality** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2)

	Morecambe Bay SPA
	• Gas Storage Facility, Gateway Storage Company Ltd • Cumbria Minerals and Waste Development Framework **Habitat Loss and Fragmentation** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd • Cumbria Minerals and Waste Development Framework **Coastal Squeeze** • Offshore Mineral and Waste Sites • Shoreline Management Plan • Lancashire Minerals and Waste Local Plan • Cumbria Local Transport Plan (LTP2) • Gas Storage Facility, Gateway Storage Company Ltd **Disturbance (noise, light and visual)** • Thornton Area Action Plan (AAP) • South Lakeland District Council's Core Strategy • Cumbria Local Transport Plan (LTP2)
Appropriate Assessment	**Water Resources and Quality** • Current Environment Agency[1] data has not recorded the ecological status (including ecological

	Morecambe Bay SPA
Likelihood of adverse effect on integrity:	potential) around Heysham in Morecambe Bay. • Chemical status of the estuary was recorded as 'failing to meet good' around Heysham and as 'good' around the estuary at Arnside by the EA[1]. • Groundwater quantity and chemical quality around Heysham are assessed by the EA[1] as being 'good' and 'poor' respectively. • Radioactive discharges are subject to targets monitored by the EA and of the non-radioactive discharges, nitrate contributions are considered to be the most significant[2]. In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges. • Morecambe Bay SPA's supporting habitats are vulnerable to the predicted impacts listed above and 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 that the SPA will not be significantly affected. **Air Quality** • 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 limits[2]. • Changes in air quality can impact upon sensitive supporting habitats within the SPA. It is suspected that nutrient deposition on many sand dunes throughout the UK is already above their critical threshold for impacts on vegetation (Jones *et al* 2002[3] and 2004[4]). Data provided by the UK Air pollution Information system[5] also appears to support works carried by Jones *et al* and states that nitrogen deposition for dune systems and perennial vegetation of stony banks are at, or are in exceedence of critical loads at Morecambe Bay. The consequence of this for dune slacks is the tendency to a speeded up succession away from dune slack vegetation. • Air quality has been identified as a vulnerability for, perennial vegetation of stony banks, atlantic salt

	Morecambe Bay SPA
	meadows, humid dune slacks and dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) As such, likely significant effects as a result of air quality impacts cannot be ruled out at this stage. **Habitat Loss and Fragmentation/Coastal Squeeze** • The extent of the loss and/or fragmentation of marine, intertidal and terrestrial habitats from the construction of nuclear reactors, construction areas and other infrastructure and facilities relating to the operation of the nuclear power station is currently unknown given that the exact scope of the development and the requirements for coastal or sea defence infrastructure remain undetermined at this stage. As any decrease in extent of designated habitats would be considered significant. Any loss of designated habitat would be considered significant. At this strategic stage where detailed development plans are unknown, it is therefore not possible to conclude that no adverse impacts upon the SAC will arise from the proposed development with regards to loss and fragmentation of habitats and species. **Disturbance (noise, light and visual)** • Local level impacts relating primarily to construction and decommissioning activities, also relevant offsite. • No published studies on disturbance of birds within the SPA were found. However published studies on disturbance impacts more generally highlight vulnerabilities for qualifying interests of the SPA, namely little tern[21] although most studies relate to recreational disturbance and highlight the significance of disturbance from dog walkers and close proximity to humans. • Given that Heysham lies directly adjacent to the SPA designation, without knowing the full extent and nature of the development proposals, it is not possible to determine how the nature or timing of the development may affect interest feature birds or to conclude that there will be no significant effect.

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

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Possible Avoidance and Mitigation Measures – *includes recommendations for policy/proposals*	**Water Resource and Quality** • Adverse impacts upon surface, ground and estuarine waters should be avoided through the implementation of appropriate safety measures and water quality monitoring. This is primarily the responsibility of the Water Companies (resource planning) and the Environment Agency (abstraction licensing and discharge regulation). However, the Nuclear NPS can require that control and regulation measures relating to supply and discharge are in place prior to the implementation of the nominated site proposals. • Primary data collection and subsequent laboratory analyses of samples for a full suite of parameters (including radioactive elements) should be undertaken to determine current exposure levels within the ecosystems **Air Quality** • The Nuclear NPS should take into account the potential for air quality impacts to arise, particularly at a local level. The implementation of public transport infrastructure and/or non-road transport means, phasing of development, and the implementation of robust monitoring at sites to track changes in air quality over time should be implemented. In addition, the potential for cumulative impacts to arise from other plans and programmes implemented which overlap with the nuclear development in future (for example during the decommissioning phase of the development) should be considered. **Habitat Loss and Fragmentation/ Coastal Squeeze** • Where proposals for design and build remain under development, the Nuclear NPS should seek to prioritise the prevention of any direct adverse impacts upon sensitive habitats which could lead to their loss or fragmentation. Preventative measures implemented should allow for the avoidance of key habitats during construction works, and ensure that adequate measures are implemented within construction environmental management plans to minimise direct and indirect impacts upon habitats of factors such as pollution. The interest features on the designated sites should guide the identification of potential mitigation and compensation measures.

	Morecambe Bay SPA
	• Habitat creation to replace habitats removed as a result of the development and to maintain connectivity of wildlife corridors around the development site should be undertaken as early as possible prior to the development works. • Any direct impacts that may not be mitigated for successfully should be addressed through appropriate compensation measures agreed with Statutory Bodies and implemented prior to the commencement of development proposals. • Avoidance of impacts through the safe operation and decommissioning of the development and of interim waste storage management should be sought. • Further studies are necessary to determine the significance of the potential impacts associated with the proposed development upon the ecological integrity of the SAC with regard to habitat loss/fragmentation and coastal squeeze. **Disturbance (noise, light and visual)** • Noise, light and visual impacts may be managed at a site level through phasing and timing that takes account of breeding and feeding cycles and should be supported by information on flight lines and migration routes as well as feeding and roosting areas. These measures would be included within a construction environmental management plan, which would help to minimise disturbance. The precise detail and the nature of the measures required would need to be agreed with the Statutory Body prior to the commencement of development but could include for example the use of visual screens. These measures would form part of the wider site management plan that developers would be required to agree and implement prior to commencement.
Conclude no adverse effect on integrity?	• It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Heysham will not have significant adverse effects on Morecambe Bay SPA as a result of impacts to water quality, air quality, disturbance and habitat loss and fragmentation, including coastal squeeze.

Morecambe Bay Ramsar

- **Location: 025721W/ 540719N**
- **Size (ha): 37404.6 ha**
- **Designation: Ramsar**

	Morecambe Bay Ramsar
Qualifying Features	Ramsar criterion 4 • The site is a staging area for migratory waterfowl including internationally important numbers of passage Ringed Plover *Charadrius hiaticula*. Ramsar criterion 5 Species with peak counts in winter: • Waterfowl Ramsar criterion 6 Species regularly supported during the breeding season: • Lesser Black-backed Gull • Herring Gull • Sandwich Tern Species with peak counts in spring/autumn: • Great Cormorant • Common Shelduck • Northern Pintail • Common Eider • Eurasian Oystercatcher

	Morecambe Bay Ramsar
	• Ringed Plover • Grey Plover • Sanderling • Eurasian Curlew • Common Redshank • Ruddy Turnstone • Lesser Black-backed Gull Species with peak counts in winter: • Great Crested Grebe • Pink-footed Goose • Eurasian Wigeon • Common Goldeneye • Red-breasted Merganser • European Golden Plover • Northern Lapwing • Red Knot • Dunlin • Bar-tailed Godwit
Conservation Objectives	None recorded, but likely to be similar to Morecambe Bay SPA conservation objectives.
Key Environmental Conditions (factors that maintain site integrity)	None recorded, but likely to be similar to Morecambe Bay SPA.
Vulnerabilities (includes existing pressures and	

	Morecambe Bay Ramsar
trends)	None recorded, but likely to be similar to Morecambe Bay SPA.
Predicted Impacts ***What are the issues arising from the plan and how might the site be affected?***	None recorded, but likely to be similar to Morecambe Bay SPA.
Potential In-combination effects (screening) ***What other plans and programmes could lead to in-combinations effects?***	None recorded, but likely to be similar to Morecambe Bay SPA.
Appropriate Assessment Likelihood of adverse effect on integrity:	None recorded, but likely to be similar to Morecambe Bay SPA.
Possible Avoidance and Mitigation Measures – *includes recommendations for policy/proposals*	None recorded, but likely to be similar to Morecambe Bay SPA.
Conclude no adverse effect on integrity?	• It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Heysham will not have significant adverse effects on Morecambe Bay Ramsar as a result of impacts to water quality, air quality, disturbance as well as habitat loss and fragmentation, including coastal squeeze.

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