

Appendices to the Appraisal of Sustainability Site Report for Kirksanton

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

Appraisal of Sustainability of the revised draft Nuclear National Policy Statement

The Appraisal of Sustainability (AoS), incorporating Strategic Environmental Assessment, of the revised draft Nuclear National Policy Statement (Nuclear NPS) has been undertaken at a strategic level. It considers the effects of the proposed policy at a national level and the sites to be assessed for their suitability for the deployment of new nuclear power stations by 2025. These strategic appraisals are part of an ongoing assessment process that started in March 2008 and, following completion of this AoS, will continue with project level assessments when developers make applications for development consent in relation to specific projects. Applications for development consents will need to be accompanied by an Environmental Statement having been the subject of a detailed Environmental Impact Assessment.

The AoS/SEA Reports are presented in the following documents:

AoS Non-Technical Summary

Main AoS Report of revised draft Nuclear NPS

Introduction
Approach and Methods
Alternatives
Radioactive Waste
Findings
Summary of Sites
Technical Appendices

Annexes to Main AoS Report: Reports on Sites

Site AoS Reports
Technical Appendices

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

This document is the Appendices to the Appraisal of Sustainability Site Report for Kirksanton. These appendices have been prepared by the Department of Energy and Climate Change with expert input from a team of specialist planning and environmental consultancies led by MWH UK Ltd with Enfusion Ltd, Nicholas Pearsons Associates Ltd, Studsvik UK Ltd and Metoc plc.

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Appendix 1: Sustainable Development Themes and Appraisal of Sustainability Objectives

* Note: additional decision-aiding questions to aid appraisal have been added in red text.

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
Air Quality	
12. To avoid adverse impacts on air quality	Will it result in the release of low level radionuclides that may adversely affect human health or biodiversity? Will it contribute to an increase in the number or expansion of AQMAs?
Biodiversity and Ecosystem Services	
1. To avoid adverse impacts on the integrity of wildlife sites of international and national importance 2. To avoid adverse impacts on valuable ecological networks and ecosystem functionality 3. To avoid adverse impacts on Priority Habitats and Species including European Protected Species	Will it result in the loss of habitats of international/national importance? Will it affect other statutory or non-statutory wildlife sites? Will it result in harm to internationally or nationally important or protected species? Will it adversely affect the achievement of favourable conservation status for internationally and nationally important wildlife sites? Will it affect the structure and function/ecosystem processes that are essential to restoring, securing and/or maintaining favourable condition of a feature or a site? Will the proposal enable the BAP targets for maintenance, restoration and expansion to be met? Will the proposal result in changes to coastal evolution that is otherwise needed to sustain coastal habitats? Will it result in the release of harmful substances for example oil, fuel and other pollution into waterbodies which could affect aquatic ecosystems? Will it result in the accidental migration of radionuclides which could harm aquatic or terrestrial ecosystems? Will it result in changes to stream hydrology and morphology that could affect aquatic or terrestrial ecosystems? Will it result in thermal discharges that could adversely affect aquatic ecosystems? Will it result in soil contamination that could damage aquatic or terrestrial ecosystems?
Climate Change	
13. To minimise greenhouse gas emissions	Will it take account of future effects and risks of climate change for example sea level rise? Will future changes in weather patterns be considered?

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
	<p>Will it result in increased vehicular emissions (particularly carbon dioxide)? Will it result in increased emissions from asset construction, maintenance and demolition, waste recycling and disposal or other activities ? Note: Adaptation to climate change is discussed in other relevant topic appraisals, eg. biodiversity, water, flood risk.</p>
Communities: Population, Employment and Viability	
<p>4. To create employment opportunities 5. To encourage the development of sustainable communities 10. To avoid adverse impacts on property and land values and avoid planning blight</p>	<p>Will it create both temporary and permanent jobs in areas of need? Will it result in in-migration of population? Will it result in out-migration of population? Will it affect the population dynamics of nearby communities (age-structure)? Will it result in a decrease in property and land values as a result of a change in perceptions or blight?</p>
Communities: Supporting Infrastructure	
<p>8. To avoid adverse impacts on the function and efficiency of the strategic transport infrastructure 9. To avoid disruption to basic services and infrastructure</p>	<p>Will it result in changes to services and service capacity in population centres? Will it result in the direct loss of strategic road/rail/air/port infrastructure? Will it result in increased congestion/pressure on key transport infrastructure? Will it result in loss or disruption to basic services and infrastructure (for example electricity, gas)? Will it place significant pressure on local/regional waste management facilities (non-nuclear waste)?</p>
Human Health and Well-Being	
<p>6. To avoid adverse impacts on physical health 7. To avoid adverse impacts on mental health 11. To avoid the loss of access and recreational opportunities, their quality and user convenience</p>	<p>Will it adversely affect the health of local communities through accidental radioactive discharges or exposure to radiation? Will the storage of radioactive waste result in adverse physical and mental health effects for local communities? Will exposure to noise and vibration as a result of plant activities lead to physical and mental health impacts on nearby communities? Will it adversely affect the health of the workforce? Will the perceptions of adverse risk as a result of activities lead to adverse impacts on mental health for nearby communities? Will it result in the loss of recreational and amenity land or loss of access? Will it adversely affect the ability of an individual to enjoy and pursue a healthy lifestyle?</p>
Cultural Heritage	

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
22. To avoid adverse impacts on the internationally and nationally important features of the historic environment. 23. To avoid adverse impacts on the setting and quality of built heritage, archaeology and historic landscapes	Will it adversely affect historic sites of international/national importance and their setting? Will it adversely affect other historic sites of known value? Will it adversely affect landscapes of historic importance?
Landscape	
24. To avoid adverse impacts on nationally important landscapes 25. To avoid adverse impacts on landscape character, quality and tranquillity, diversity and distinctiveness	Will it adversely affect landscapes within or immediately adjacent to a National Park? Will it adversely affect landscapes in or immediately adjacent to an AONB or National Scenic Area? Will it adversely affect Heritage Coast or Preferred Conservation Zones? Will it adversely affect local landscapes/townscapes of value? Will it affect the levels of tranquillity in an area? Will it adversely affect the landscape character or distinctiveness? Will it result in increased levels of light pollution?
Soils, Geology and Land Use	
19. To avoid damage to geological resources 20. To avoid the use of greenfield land and encourage the re-use of brownfield sites 21. To avoid the contamination of soils and adverse impacts on soil functions	Will it result in the compaction and erosion of soils? Will it lead to the removal or alteration of soil structure and function? Will it lead to the contamination of soils which would affect biodiversity and human health? Will it compromise the future extraction/ use of geological/ mineral reserves? Will it result in the loss of agricultural land? Will it lead to damage to geological SSSIs and other geological sites? Will it result in the loss of Greenfield land? Will it adversely affect land under land management agreements?
Water: Hydrology and Geomorphology	
15. To avoid adverse impacts on surface water hydrology and channel geomorphology (including coastal geomorphology)	Will it result in the increased sedimentation of watercourses? Will it adversely affect channel geomorphology? Will hydrology and flow regimes be adversely affected by water abstraction? Will it result in demand for higher defence standards that will impact on coastal processes? Can the higher defence standards be achieved without compromising habitat quality and sediment transport?
Water: Water Quality (including surface, coastal and marine)	
16. To avoid adverse impacts on surface	Will it cause deterioration in surface water quality as a result of accidental pollution, for example spillages,

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
water quality (including coastal and marine water quality) and assist achievement of Water Framework Directive objectives	leaks? Will it cause deterioration in coastal and / or marine water quality as a result of accidental pollution, for example spillages, leaks? Will it cause deterioration in surface water quality as a result of the disturbance of contaminated soil? Will it cause deterioration in coastal and / or marine water as a result of the disturbance of contaminated soil? Will it affect designated Shellfish Waters? Will it affect Freshwater Fish Directive sites? Will it increase turbidity in water bodies? Will it increase the temperature of the water in water bodies?
Water: Water Supply and Demand	
17. To avoid adverse impacts on the supply of water resources	Will it adversely affect water supply as a result of abstraction? Will it increase demand for water?
Water: Groundwater Quality and Flow	
18. To avoid adverse impacts on groundwater quality, distribution and flow and assist achievement of Water Framework Directive objectives	Will it cause deterioration in groundwater quality as a result of accidental pollution, for example spillages, leaks? Will it cause deterioration in groundwater quality as a result of the disturbance of contaminated soil?
Flood Risk	
14. To avoid increased flood risk (including coastal flood risk) and seek to reduce risks where possible	Will it result in demand for higher defence standards that will impact on coastal processes?

Appendix 2: Appraisal Matrices

Key to Appraisal				
Key to appraisal of Strategic Effects:			Abbreviations:	
Significance		Category of effect	Timescale	
++	Major Significant	Development actively encouraged as it would resolve an existing sustainability problem. Effect considered to be of national/ international significance.	C	Construction stage
+	Minor Significant	No Sustainability constraints and development acceptable. Effect considered to be of national/ international significance.	O	Operation stage
0	No significance	Neutral effect	D	Decommissioning stage
-	Minor Significant	Potential sustainability issues; mitigation and / or negotiation possible. Effect considered to be of national/ international significance.	Likelihood	
--	Major Significant	Problematical because of known sustainability issues; mitigation or negotiation difficult and/ or expensive. Effect considered to be of national/ international significance.	H	High Likelihood
?	Uncertainty	Where the significance of an effect is particularly uncertain, for example because insufficient information is available at the plan stage to fully appraise the effects of the development or the potential for successful mitigation, the significance category is qualified by the addition of '?'.	M	Medium Likelihood
			L	Low Likelihood

Note: Separate appraisal matrices have been completed for each AoS objective under the Water Quality and Resources topic but the findings are presented in an aggregated appraisal under Water Quality and Resources in the site report.

Air Quality
<p>AoS Objective: 12. To avoid adverse impacts on air quality</p> <p>Guide questions: Will it result in the release of low level radionuclides that may adversely affect human health or biodiversity? Will it contribute to the degradation of air quality – both local and transboundary?</p>
Potential Receptors:
<ul style="list-style-type: none"> • Local populations and wider regional population (human health) • Sensitive habitats, including North Walney and Sandscale Haws National Nature Reserves; Duddon Estuary Ramsar site, SPA and SSSI; Duddon Mosses SAC and SSSI; Morecombe Bay SAC; Shaw Meadow and Sea Pasture SSSI; and Annaside and Gutterby Banks SSSI.
Potential Significant Effects and Mitigation Possibilities:
<p>International/ National/ Transboundary</p> <ol style="list-style-type: none"> 1. The release of non-radioactive gaseous emissions during construction and operation is not likely to have a strategically significant effect, as effects from construction and operation will be localised (see regional/local appraisal below) and controlled through appropriate regulatory regimes and consents/permits and management techniques during construction, operation and decommissioning stages. 2. However there is potential for release of radioactive emissions, planned and accidental, during the operation and decommissioning of a nuclear power station and waste storage on the site. The prevailing wind direction is south to south-westerly throughout the year. The prevailing wind direction could cause any emissions to be dispersed over the Irish sea, but additionally in the direction of urbanised areas such as Barrow-in-Furness and, in extreme circumstances (both in terms of releases and meteorological conditions) major conurbations along the west coast of England, such as Blackpool. The potential effects of release of radiation are discussed in the main AoS report; however detailed modelling would be required to be undertaken by the nominator, and would be considered as part of the HSE and Environmental Regulators risk assessment carried out for the consenting process. There is however an opportunity to employ any lessons learned from the decommissioning of nearby existing nuclear power facilities, such as Sellafield (currently ongoing).

Air Quality					
<p>3. There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature conservation interest. Any accidental or planned release of radioactive emissions may also affect sensitive ecosystems. This is discussed further in the Biodiversity and Ecosystem Sections.</p>					
Regional/ Local					
<p>1. Air quality in the North West is generally good. Emissions to air from major industrial sites reduced substantially over the period 1998 to 2006, however emissions from traffic sources (major route corridors and areas of congestion) are continuing to cause pressures on local air quality across the region. No Air Quality Management Areas (AQMAs) have been declared in the Copeland Borough Council region. The effect on air quality from the development is not likely to be significant, provided construction and operation is in accordance with regulatory/consenting regimes.</p> <p>2. It is unlikely that the development project will lead to the designation of any new AQMAs in the region due to the duration of construction activities.</p> <p>3. As with any major infrastructure project, the emission of pollutants to the atmosphere associated with transport and the generation of fine particulates and dust during construction have the potential for local nuisance and impacts on health within a zone of influence from the construction site. Air pollution can be minimised and controlled through working in accordance with good site environmental practices and managed through the use of Construction Environmental Management Plans. This is discussed in further detail in Section 9 of the AoS report.</p> <p>4. The release of radioactive emissions from the site will be governed by HSE and the environmental regulator through the development of appropriate discharge limits, as part of the authorisation under the Environmental Permitting (England and Wales) Regulations 2010. This will be specific to the reactor type being used, alongside the siting of the nuclear power station, and sensitivity of the receiving environment.</p> <p>5. There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature conservation interest. Any accidental or planned release of radioactive emissions may also affect sensitive ecosystems. This is discussed further in the Biodiversity and Ecosystem Sections.</p>					
Summary of Significant Strategic Effects:					
		Timescale	C	O	D
		Significance	-	- ?	- ?
		Likelihood	M	L	L
Significant Effects			Mitigation and Monitoring Possibilities		
<ul style="list-style-type: none"> Release of non-radioactive emissions is unlikely to have a strategically significant effect on air 			<ul style="list-style-type: none"> Please refer to mitigation measures contained in 		

Air Quality	
<p>quality</p> <ul style="list-style-type: none"> • There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature conservation interest. • Release of radioactive emissions (planned and accidental) can have a significant strategic effect on air quality, including an increased risk of transboundary / international effects. The HSE and Environmental Regulator will consider this as part of the HSE and Environmental Regulators risk assessment carried out as part of the consenting process and must be satisfied risk to public health and safety is within acceptable limits. 	<p>the Biodiversity and Ecosystems Sections.</p> <ul style="list-style-type: none"> • Release of radioactive emissions controlled through regulatory process and risk assessment undertaken for consenting process.

Biodiversity and Ecosystems

AoS Objective:

1. To avoid adverse impacts on the integrity of wildlife sites of international and national importance.
2. To avoid adverse impacts on valuable ecological networks and ecosystem functionality.
3. To avoid adverse impacts on Priority Habitats and Species including European Protected Species.

Guide questions:

Will it result in the loss of habitats of international/national importance?

Will it affect other statutory or non-statutory wildlife sites?

Will it result in harm to internationally or nationally important or protected species?

Will it adversely affect the achievement of favourable conservation status for internationally and nationally important wildlife sites?

Will it affect the structure and function/ecosystem processes that are essential to restoring, securing and/or maintaining favourable condition of a feature or a site?

Will the proposal enable the BAP targets for maintenance, restoration and expansion to be met?

Will the proposal result in changes to coastal evolution that is otherwise needed to sustain coastal habitats?

Will it result in the release of harmful substances for example oil, fuel and other pollution into waterbodies which could affect aquatic ecosystems?

Will it result in the accidental migration of radionuclides which could harm aquatic or terrestrial ecosystems?

Will it result in changes to stream hydrology and morphology that could affect aquatic or terrestrial ecosystems?

Will it result in thermal discharges that could adversely affect aquatic ecosystems?

Will it result in soil contamination that could damage aquatic or terrestrial ecosystems?

Potential Receptors:

Designated Sites

- Duddon Estuary SPA/Ramsar – approximately 0.5 km south of the site.
- Duddon Mosses SAC – approximately 6.5 km north east of the site.
- Morecambe Bay SAC – approximately 0.5 km south of the site.
- Morecambe Bay SPA/Ramsar – approximately 12 km south west of the site.
- Drigg Coast SAC – approximately 13 km north of the site.
- Duddon Estuary SSSI – approximately 0.5 km south of the site
- Shaw Meadow and Sea Pasture SSSI – approximately 1.5 km north of the site.
- North Walney NNR – approximately 7 km south of the site.
- Sandscale NNR – approximately 6 km south of the site.
- Hodbarrow RSPB Reserve – approximately 3 km south east of the site.

Biodiversity and Ecosystems

Habitats considered to be potential receptors are as follows:

- Active raised bogs
- Degraded raised bogs still capable of natural regeneration
- Lowland heath
- Estuaries
- Mudflats and sandflats not covered by seawater at all times
- Large shallow inlets and bays
- Perennial vegetation of stony banks
- Salicornia and other annuals colonising mud and sand
- Atlantic salt meadows
- Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- Fixed dunes with herbaceous vegetation ('grey dunes')
- Humid dune slacks
- Sandbanks which are slightly covered by sea water all the time
- Coastal lagoons
- Reefs
- Embryonic shifting dunes
- Atlantic decalcified fixed dunes
- Dunes with *Salix repens* ssp *argentea*
- *Sabellaria alveolata* reef

Species which may be potential receptors include:

- Common bat species (EPS)
- Great crested newt (EPS)
- Natterjack toad (EPS)
- Common species of reptile (adder, common lizard and grass snake)
- Brown hare
- Otter (EPS)
- Water vole

Biodiversity and Ecosystems

- Breeding, passage and over-wintering waders and waterfowl
- Other breeding birds could be affected locally
- Rare and uncommon plants
- Nationally important invertebrate species

**EPS = European Protected Species*

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

Disturbance (noise, light and visual)

1. Potential significant effects may arise due to disturbance from construction activities (duration 6-7 years), increased vehicular movements, machinery, earthworks and excavations, an increase in lighting and increased personnel presence on the site. Similar impacts could also occur during operation (c.60 years) and decommissioning (c.30 years). This could have an adverse impact on fauna, particularly the important bird assemblages of the Duddon Estuary SPA and Ramsar site (including breeding sandwich terns and over wintering northern pintail, red knot and common redshank). Birds may be deterred from utilising key roosting/feeding areas which could result in displacement and impacts on their chances of survival. The nominator will need to assess the potential for disturbance effects on fauna (in particular birds within the designated areas) within the immediate locality and devise appropriate mitigation to avoid or minimise such effects. Mitigation measures should seek to avoid and minimise impacts on important bird assemblages through careful design and site layout. Possible mitigation could incorporate shielding to reduce light pollution, locating particularly noisy activities away from sensitive zones, acoustic screening and timing activities to avoid sensitive periods for key bird species of the SPA.

Loss, damage and fragmentation of important habitats and species

2. Construction activities, earthworks and excavations and provision of new buildings and infrastructure could all result in the direct loss, damage, reduction, alteration or fragmentation of important habitats such as primary interest habitats within the Duddon Estuary Ramsar/SSSI, Morecambe Bay SAC/Ramsar and/or Biodiversity Action Plan Habitats (BAP). Important species (for example legally protected species/UK BAP species) which utilise such habitats will also be affected for example through loss of feeding grounds, roosting or resting places, severance of commuting/wildlife corridors and through food chain impacts such as loss of food sources and prey items. Of particular concern is potential disturbance and loss of habitat

Biodiversity and Ecosystems

associated with important bird assemblages of both Duddon Estuary SPA and Morecambe Bay SPA.

Potential impacts on important habitats/species will need to be investigated further (both the site level and within the wider area). Mitigation will need to avoid or minimise any loss with appropriate measures defined in the nominator's proposals and Environmental Impact Assessment (EIA). Further studies would be required by the nominator to determine a baseline for the prediction of the effects of developing the site on any habitats/species so that suitable mitigation measures can be implemented. Protected species likely to occur in the area include great crested newts, natterjack toad, other common amphibian species, common reptile species, breeding birds, passage and over wintering birds, bats, otter, water vole and invertebrate species.

Mitigation should seek to avoid and minimise impacts where possible through careful site design and layout; buffer zones could be created around sensitive areas and in the event any habitats of importance being lost these should be re-created elsewhere. Opportunities should also be sought for positive improvements for biodiversity within and around the development for example through habitat creation and enhancement.

Coastal Squeeze

3. 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. This may impact upon sedimentation regimes and coastal processes resulting in changes in erosion and deposition cycles along the coast, which may in turn effect the habitats and associated species Duddon Coast Ramsar/SPA and Morecambe Bay SAC/SPA/Ramsar. Until further details of the development footprint and extent (if any) of encroachment onto the coastal fringe is known, a precautionary approach assumes likely impact on the above sites.

Water Resources and Quality

4. Discharge of heated water into waterbodies can impact upon aquatic ecosystems due to the temperature of the water discharged being up to 10 °C above ambient levels. Oxygen is less soluble in water at higher temperatures and a reduction in dissolved oxygen can put aquatic life under stress. Morecambe Bay SAC/Ramsar and Duddon Estuary Ramsar/SSSI are within close proximity to the site and therefore any discharge of heated water into the marine environment and estuarine system could have an adverse impact on the habitats and species for which these sites are designated. Any loss of habitats/plants or invertebrates could in turn have an impact on other species which rely on such sources for feeding. Further studies will be required by the nominator to assess the effects of discharged heated water on aquatic ecology especially any effects which could impact on the Morecambe Bay SAC/SPA/Ramsar and Duddon Estuary SPA/Ramsar/SSSI and their interest features.

The Environment Agency has a statutory duty to ensure the integrity of internationally designated sites are maintained or restored through sustainable water resources management. As part of this duty, they have to ensure that permissions (abstractions licenses, environmental permitting, radioactive substance authorizations, waste management licenses and integrated pollution control (IPC) authorizations) do not have an adverse effect on the

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integrity of the designated sites.

5. Water intake from surface water bodies can lead to the incidental mortality of fish and other aquatic species. Fish, larvae and eggs can be sucked into condenser circuits and be subjected to heat before being returned to the sea. Morecambe Bay SAC/SPA/Ramsar, Duddon Estuary SPA/Ramsar/SSSI and the Hodbarrow RSPB Reserve are within close proximity of the site, and therefore any loss of fish food sources could have an adverse impact on important bird species associated with these sites. A suitable intake system design should be adopted to avoid any significant ecological impacts.
6. Groundwater abstractions may affect groundwater supply to other areas hydrologically linked to the site, this could result in habitat degradation further afield. For example, Shaw Meadow and Sea Pasture SSSI is located approximately 1.5 km north of the site, this area contains habitats such as lowland heath, marshy grassland and mire, which could be vulnerable to groundwater extraction. Further hydrological studies will be required by the nominator to assess the effects of any proposed water abstraction on local ecology, particularly on wetland habitats (such as those associated with Shaw Meadow and Sea Pasture SSSI), Morecambe Bay SAC/SPA/Ramsar and Duddon Estuary SPA/Ramsar/SSSI which may be vulnerable to groundwater abstraction.
7. New drainage systems on or within the site could result in adverse impacts on both terrestrial and aquatic habitats during both construction and operation. During installation of the new drainage systems this could result in physical loss of habitats. During operation it may result in increased sediment loading of watercourses/estuarine habitats and altered run off rates. This could affect the hydrology and morphology of watercourses/estuarine habitats, which could impact on aquatic flora and fauna. In addition nutrient enrichment could alter the composition of habitats within aquatic ecosystems. Further hydrological studies will be required by the nominator to assess the effects of any drainage infrastructure on local ecology, particularly aquatic habitats and/or areas of valuable habitat such as those associated with Morecambe Bay SAC/SPA/Ramsar, Duddon Estuary SPA/Ramsar/SSSI and Shaw Meadow and Sea Pasture SSSI.
8. Routine radioactive discharges to the aquatic environment may have a negative impact on both terrestrial and aquatic ecology. Depending on dosage lethal, genetic or reproductive effects may result. Radionuclides may also accumulate in organisms such as invertebrates and plants which could have both direct and indirect effects, in particular on the Morecambe Bay SAC/SPA/Ramsar and Duddon Estuary SPA/Ramsar/SSSI and their interest features such as important bird assemblages. There is also potential that radionuclides will be transported over considerable distances through the Irish Sea to effect marine and aquatic ecology in England, Isle of Man, Ireland, Northern Ireland and South West Scotland. Further studies will be required to understand fully the extent and likely significance of effects on ecology of any proposals for radioactive discharges from the site. Any new nuclear power stations would require a permit from the relevant regulator (i.e. Environment Agency in England) under the Environmental Permitting (England and Wales) Regulations 2010 before making any discharges of radioactivity and regular water quality monitoring will be required.
9. There is a very small risk of accidental release of radiation (either through the air, water or soil) into the environment which could affect aquatic or terrestrial fauna or flora associated with the Morecambe Bay SAC/SPA/Ramsar and Duddon Estuary SPA/Ramsar/SSSI as well as biodiversity in the area as a whole. Such an event could occur during operation, interim radioactive waste storage, decommissioning or final transport of waste for

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disposal. There is also the potential for accidental pollution of watercourses due to leaks or spillages from water treatment plants. This could cause toxic contamination of aquatic or terrestrial ecology. Given the proximity of Morecambe Bay SAC and Duddon Estuary Ramsar/SSSI, key interest features of these designated sites could be impacted, for example contaminants could have lethal effects or sub-lethal effects on aquatic organisms impairing reproduction, physiology, genetics and health, or compounds could be bioaccumulated within tissues and could subsequently enter the food chain. Operation of the power station including waste storage, and decommissioning activities and the transport of radioactive waste, will be subject to strict regulatory controls which aim to minimise such risks, and the likelihood of any effect is considered low. However, further studies are likely to be required to assess the risks and potential effects of such events on the designated sites and on biodiversity in the wider area as a whole and regular monitoring of water quality will be required.

Air quality

10. The development of the site may affect air quality. In particular through construction activities (duration 6-7 years) and as a result of increased vehicular movements (both within the site itself and via increased traffic on access roads to and from the development). Increased vehicular emissions and mobilisation of dust could both impact on the sensitive habitats of the Morecambe Bay SAC/SPA/Ramsar and Duddon Estuary SPA/Ramsar/SSSI as well as biodiversity in the general locality, particularly if the dust is of a different acidity to the surrounding habitats. Further background environmental condition information and modelling will be needed to be undertaken by the nominator in order to predict potential impacts of changes in air quality on biodiversity. During construction good site environmental practices should be put in place to minimise risk to ecosystems and should be implemented through a construction environmental management plan or similar document.

Cumulative Effects

11. The North West area could be a focus of a number of high profile projects involving both nuclear, renewable energy, gas storage and infrastructure projects, the cumulative effects of which could be significant to the overall impacts on biodiversity. Ongoing or potential new development projects in the area include Walney Wind Farm, Duddon Estuary Road Bridge from Askam to Millom, Morecambe Bay Barrage, Gateway Off-shore Gas storage facility and existing/potential new nuclear facilities at Sellafield and Heysham.

Regional/Local

Water Resources and Quality

12. During construction, operation and decommissioning there is a risk of adverse impacts to flora and fauna through accidental pollution (for example spillages of oil, fuel or other contaminants) which could affect terrestrial or aquatic habitats on or near to the site. Further studies should be undertaken by the nominator to assess the effects of any pollution on local biodiversity. Good site environmental management practices should be put in place to

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minimise the above risks.

Loss, damage and fragmentation of important habitats and species

13. Impacts on the internationally designated sites have been considered above however development of the site could also have adverse impacts on important habitats such as BAP habitats and legally protected/BAP species within or immediately adjacent to the site. It is unknown at the present time what habitats and species are present at a more local level. Further site level studies will need to be undertaken by the nominator to determine a baseline for predicting the effects of developing the site on habitats and species so that appropriate mitigation measures can be implemented. Mitigation should seek to avoid and minimise impacts where possible through careful site design and layout; connectivity for local wildlife should be maintained and buffer zones could be created around sensitive areas and in the event any habitats of importance being lost these should be re-created elsewhere. Opportunities should also be sought for positive improvements for biodiversity within and around the development for example through habitat creation and enhancement.

Biodiversity and Ecosystems					
Summary of Significant Strategic Effects:		Timescale	C	O	D
		Significance	--?	-- ?	--?
		Likelihood	M	M	M
Significant Effects	Mitigation and Monitoring Possibilities¹				
Loss, damage and fragmentation of important habitats and species					
<ul style="list-style-type: none"> Noise, visual and light disturbance during construction on fauna such as legally protected species, in particular on important bird assemblages associated with the Duddon Estuary SPA and Morecambe Bay SPA. Loss, damage or alteration of important habitats and subsequent disturbance to protected species (through severance of wildlife corridors) due to new buildings, infrastructure and coastal squeeze etc. 	<ul style="list-style-type: none"> Mitigation measures should seek to avoid and minimise impacts on important bird assemblages through careful design and site layout. Possible mitigation could incorporate shielding to reduce light pollution, locating particularly noisy activities away from sensitive zones, acoustic screening and timing activities to avoid sensitive periods for key bird species of the Duddon Estuary SPA and Morecambe Bay SPA. Mitigation should seek to avoid and minimise impacts where possible through careful site design and layout. Upgraded coastal protection measures if needed should seek to avoid the effects of coastal squeeze, connectivity between sites should be maintained, as should protective buffer zones around sensitive areas. In the event of any habitats of importance being lost (such as those within the SAC/UK BAP priority habitats) these should be re-created elsewhere. 				

¹ Appropriate mitigation will be defined in detail during the EIA process for the site

Biodiversity and Ecosystems	
<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Discharge of heated water into aquatic habitats could alter ecosystems associated with the Duddon Estuary SPA/Ramsar and Morecambe Bay SAC. • Abstraction of water for cooling purposes can lead to incidental mortality of fish and aquatic invertebrates, this could impact on interest features, especially birds, of the Duddon Estuary SPA/Ramsar and Morecambe Bay SPA/Ramsar. • Groundwater abstraction and drainage systems can alter important habitats reliant on ground water supplies. 	<p>Opportunities should also be sought for positive improvements for biodiversity within and around the development for example through habitat creation and enhancement.</p> <ul style="list-style-type: none"> • Ecological mitigation and management plan, informed by further site level baseline surveys. • Mitigation should seek to avoid and minimise impacts through careful layout and design of the outfall system and careful operation. • The design and placement of the intake system should be carefully considered so as to avoid/minimise any impacts on habitats and species of value. • Any impacts should be minimised through careful design of drainage features and during construction good site environmental practices should be put in place to minimise effects such as increased sediment run off into watercourses/systems. During construction good site environmental management practices should be put in place to minimise risks to ecological receptors and should be implemented through a construction environmental management plan or similar document. • Further hydrological studies to determine potential impacts of water abstraction on

Biodiversity and Ecosystems	
<ul style="list-style-type: none"> • Routine releases of radioactive discharges into water could impact aquatic ecosystems either directly or indirectly, for example through bioaccumulation of toxins within food chains. This could impact on interest features, especially birds, of the Duddon Estuary SPA/Ramsar and Morecambe Bay SPA/Ramsar. • Accidental pollution from for example, leakage of radioactive waste or other chemical compounds. Such risks are present throughout construction, operation and decommissioning. • Construction and operation of new drainage infrastructure could impact on both terrestrial and aquatic ecosystems. 	<p>surrounding habitats</p> <ul style="list-style-type: none"> • Modern techniques to minimise radioactive discharges should be incorporated into the design of the site. Regular monitoring of water quality and the surrounding environment should also be undertaken. • During design, the layout and citing of potential sources of pollution should be carefully considered so as to avoid and minimise potential impacts on sensitive areas. During construction good site environmental management practices should be put in place to minimise risks to ecological receptors and should be implemented through a construction environmental management plan or similar document. • Any impacts should be minimised through careful design of drainage features and during construction good site environmental practices should be put in place to minimise effects such as increased sediment run off into watercourses/systems. During construction good site environmental management practices should be put in place to minimise risks to ecological receptors and should be implemented through a construction environmental management plan or similar document. • Further studies required to determine impact.

Biodiversity and Ecosystems	
<ul style="list-style-type: none"> Improper management of materials during construction, operation and decommissioning could lead to contamination of soil, water and air through leakages and spills. This in turn could have adverse impacts on local biodiversity. <p>Air Quality</p> <ul style="list-style-type: none"> Reduction in air quality, particularly due to increased dust and vehicle emissions, could have potential impacts on local biodiversity. <p>Cumulative Effects</p> <ul style="list-style-type: none"> Cumulative impacts of other high profile developments/plans in the area must be considered in terms of their overall effect on local biodiversity. Ongoing or potential new development projects include Walney wind farm, Duddon estuary road bridge, Morecambe Bay barrage, Gateway off-shore gas storage facility and existing/potential new nuclear facilities at Sellafield and Heysham. 	<p>Avoid impacts through safe site operation, decommissioning and waste transfer.</p> <ul style="list-style-type: none"> Regular monitoring of water quality. Avoid through safe materials management practices guided by an Environmental Management Plan. <ul style="list-style-type: none"> Dust impacts should be minimised through careful site design. During construction good site environmental management practices should be put in place to minimise risk to ecosystems and should be implemented through a construction environmental management plan or similar document. Possible mitigation measures could include phasing operations to avoid sensitive periods (for example for birds) and avoiding weather conditions which could encourage dust dispersal. Dust generating activities should be placed away from sensitive locations and in zones which give maximum protection from wind. Construction Environmental Management Plan to minimise impacts. Further studies required to determine impacts.

Climate Change
<p>AoS Objective: 13. To minimise greenhouse gas emissions</p> <p>Guide questions: Will it result in increased vehicular emissions (particularly carbon dioxide)?</p> <p>Will the development result in an overall reduction in greenhouse gas emissions over its life time resulting from changes in:</p> <ul style="list-style-type: none"> • Transport of people and goods • Scope, form and methods of asset construction, maintenance and demolition • Waste recycling and disposal • Land management practices • Other secondary activities in the wider local and national economy <p>Note: Adaptation to climate change is discussed in other relevant topic appriasals, eg. biodiversity, water, flood risk.</p>
Potential Receptors:
Human population and environment at all geographical scales.
Potential Significant Effects and Mitigation Possibilities:
<p>International/ National/ Transboundary</p> <ol style="list-style-type: none"> 1. There are national and international potential effects of changes in greenhouse gas emissions as a result of a new nuclear power station on the nominated site, particularly when combined with a wider nuclear programme. The benefits of low carbon emissions from the operation of nuclear power stations independent of the site chosen are considered in the overarching AoS report. Emissions during the operational phase of the power station are significantly lower than that of any non-nuclear (conventional fossil fuel-powered) facility delivering equivalent power output. 2. During the operational phase, the carbon footprint is similar to that of wind power with equivalent output but with significantly less land or area coverage. This consideration is independent of any life-cycle (embodied) carbon emission analysis, which is currently outside the scope of this study.

Climate Change

3. Although the effects of any emissions will be felt globally, the emissions during construction and decommissioning will largely be determined by regional and local factors (for example local transport infrastructure and how the location of the site will affect transport emissions).
4. Construction and decommissioning activities will have both direct and indirect greenhouse gas emissions regardless of the location of the nuclear power plants. A comparison of these construction and decommissioning related emissions to those of fossil-fuelled power plants will largely depend upon the design parameters of such plants, with the exception of specific sub-activities associated with nuclear fuel and nuclear wastes.

Regional/Local

5. The provision of a nuclear power station for energy generation at the site will make a positive contribution to the objective of the Cumbria Climate Change Strategy to incorporate carbon reduction as a requirement of public sector investment decisions and procurement, when compared to some other sources of energy. The combination of nuclear power generation with increased investment in renewable energy sources will assist in reducing greenhouse gas emissions compared to a non nuclear power facility option. The Cumbria Climate Change Strategy states concerns which include the lack of grid connections, grid instability and the distance from the location of energy demand.
6. The activities involved in the construction of the plant are likely to have a negative impact on targets for reductions in carbon emissions, as a result of emissions from transport and construction. The materials incorporated in the plant will also contribute to levels of embodied carbon in the region. The extent will depend upon the methods of transport and construction adopted and on the types and quantities of materials incorporated in the plant. Another option for transportation to consider will be the use of the current rail infrastructure in place. The indirect impacts associated with the construction phase could be higher in totality than the emissions of the construction activity itself. These include the influx of labour population, increased population vehicular usage, transport of materials, higher demand on utilities.
7. Energy and climate change impacts from decommissioning the plant at the end of its life are not sensitive to the site location other than the distance that will be required to transport nuclear waste to any long-term waste Geological Depository Facility. The means of disposing of nuclear waste, including spent fuel, from new nuclear power stations is being considered as part of the Government's programme for Managing Radioactive Waste Safely.
8. The site is situated in the North West of England and has experienced the following climatic trends:
 - 20 % decrease in summer rainfall over the last century
 - Increase in high intensity rainfall since the 1960s
 - Seasonal rainfall varying by as much as 15% from the average in the last 30 years
 - Increased flooding of some of the region's major rivers in the last few decades

Climate Change				
Summary of Significant Strategic Effects:	Timescale	C	O	D
	Significance	-	+?	-?
	Likelihood	M	H	?
<p>Significant Effects</p> <ul style="list-style-type: none"> • The reductions in greenhouse gas emissions due to the operation of nuclear power plants compared to alternative fossil fuel sources of energy will have positive long term effects during the operational stage and longer term. The cumulative benefits of a nuclear programme for climate change are further discussed in the main AoS report. • This site is particularly susceptible to the future impacts of climate change associated with coastal erosion, sea level rise, flooding and drought. Of these, coastal erosion and sea level rise are most likely to affect the latter half of the site's operational and decommissioning phases. These effects will be addressed in detail in the section associated with Flood Risk. • Locating a nuclear power station on the site could have a positive multiplier effect on further investment and implementation of renewable (low carbon) energy sources in the region. • Construction activity will produce an increase in greenhouse gas emissions, but will make only a relatively small addition to the regional inventory of emissions in comparison to the low carbon energy output of the power station. This is discussed in the main AoS Report. • The operational phase of the power station is likely to have a far lower carbon footprint compared to those of fossil-fuel powered stations providing similar power output. • The Cumbria Climate Change Strategy has stated the following concerns: lack of grid connections, grid instability and the distance from the location of energy demand. 	<p>Mitigation and Monitoring Possibilities</p> <ul style="list-style-type: none"> • Appropriate sea and coastal defence measures (see the Flood Risk section of this appendix) • The impacts during construction may be mitigated by selection of carbon-efficient forms of transport and construction. There is also the possibility of offsetting the emissions. • The greenhouse gas emissions arising from construction and operation should be monitored to inform carbon reduction through the lifetime of the project. • Further enhancement of electrical transmission systems, road and rail systems could be co-ordinated and integrated in such a way as to minimise greenhouse gas emissions. 			

Communities: Population, Employment and Viability	
AoS Objective:	<p>4. To create employment opportunities.</p> <p>5. to encourage the development of sustainable communities</p> <p>10. To avoid adverse impacts on property and land values and avoid planning blight</p>
Guide questions:	<p>Will it create both temporary and permanent jobs in areas of need?</p> <p>Will it result in in-migration of population?</p> <p>Will it result in out-migration of population? Will it affect the population dynamics of nearby communities (age-structure)?</p> <p>Will it result in a decrease in property and land values as a result of a change in perceptions or blight?</p>
Potential Receptors:	
	<p>Local and regional resident workforce</p> <p>Local and regional population</p>
Potential Significant Effects and Mitigation Possibilities:	
International/ National/ Transboundary	<p>No significant effects identified at this scale.</p>
Regional/ Local	<p>1. Short-medium term positive effects through creation of new jobs for local and regional population. The quality and quantity of employment during the construction stages (approx 5-6 years) of the reactor will differ to the operational stage (approx 60 years), where longer-term employment will lead to quality of life benefits. Labour requirements will tail-off towards the end of the operational stage, however decommissioning will still require significant levels of labour for a minimum of 30 years. The significance of the effect is greater at the local level. At the regional level this is of minor significance, as jobs are absorbed into regional employment figures.</p>

Communities: Population, Employment and Viability

2. The existing Sellafield nuclear power station is a significant local employer, employing approximately 10,500 staff. A new power station may assist in offsetting job-losses from the decommissioning of the existing power station at the Sellafield site - however it is noted the time differences between decommissioning of the Sellafield power station (estimated to be 2040) and construction of any new reactor may require employees to seek employment elsewhere.
3. The existing power station at Sellafield Calder Hall is now undergoing active decommissioning, the Windscale facility is undergoing decommissioning and the Sellafield reprocessing facility future may be revised if a new nuclear new build was to happen
4. Positive effects through the provision of training, education and upskilling for employees and contractors in the region.
5. Positive multiplier effects (for both nuclear-related industry and wider industry as a result of increased demand from an incoming population) of greater significance at the local level.
6. Some uncertainty is identified as the construction works may affect the ability of other industries/projects to source labour, for example for house-building in the region, and other major construction projects.
7. Likely changes to the population dynamics of local communities - with potential positive and negative effects dependent on the source of labour, for example from local community or outside. Possible negative effects during construction stage if a temporary new community (construction labour) does not integrate with the existing community. For longer term changes, new employees are likely to be drawn in from a wider area, including local communities, generally up to a 0.25 km radius, with less pressure on local services. Positive economic and social benefits are likely as new population will require new services and facilities and will help to support existing services.
8. Potential for adverse effects on property values within close proximity to the site. Mitigation possible. No evidence to suggest significant effects beyond immediate site surrounds.

Summary of Significant Strategic Effects:

Timescale	C	O	D
Significance	+?	+?	0
Likelihood	H	H	M

Significant Effects

- Strategic effects are considered minor positive with regard to the creation of temporary jobs during construction and permanent full-time employment during operation, although some uncertainty is identified as the project may lead to a shortage of local construction workers to

Mitigation and Monitoring Possibilities

- Consideration may need to be given to potential negative effects/difficulties in sourcing labour and the effects of this on the

Communities: Population, Employment and Viability	
meet the needs of other industries and major projects.	local/regional construction industry.

Communities: Supporting infrastructure
<p>AoS Objective: 8. to avoid adverse impacts on the function and efficiency of the strategic transport infrastructure 9. to avoid disruption to basic services and infrastructure</p> <p>Guide questions: Will it result in changes to services and service capacity in population centres? Will it result in the direct loss of strategic road/rail/air/port infrastructure? Will it result in increased congestion/pressure on key transport infrastructure? Will it result in loss or disruption to basic services and infrastructure (for example electricity, gas)? Will it place significant pressure on local/regional waste management facilities (non-nuclear waste)?</p>
Potential Receptors:
<ul style="list-style-type: none"> • Local and regional population • Existing transportation and service infrastructure • Existing waste management infrastructure
Potential Significant Effects and Mitigation Possibilities:

Communities: Supporting infrastructure

International/ National/ Transboundary

1. The nearest part of the national road network is the M6 but this is some distance from the site (approximately 50 km). Congestion or traffic impacts related to the site are therefore unlikely to have a significant effect on the national road network. However, during construction and decommissioning stages there may be a need to assess the operation of junctions 36, 40 and 43 of the M6 to see whether they could accommodate large loads.
2. The A66 route from junction 40 of the M6 requires vehicles to travel through Keswick in the centre of the National Park. This route would need careful consideration prior to it being identified for construction or decommissioning traffic.
3. Further information would be required to determine whether these effects would extend to the M6 and beyond as Sellafield is remote from this part of the national core transport network. This may include physical improvements, carrying of large loads outside of peak period, construction transport management plans, and green travel plans for the construction and operational workforces to encourage sustainable travel.
4. Rail should also be considered as an alternative option, particularly for the transport of construction materials, using the existing line along the coast between the West Coast Mainline and Whitehaven. This may have impacts on existing rail movements on this line, although such effects can be mitigated through appropriate planning and management plans.
5. Impacts of the transportation of Nuclear Waste are unknown until the location of a long-term waste geological depository facility is known. This is being considered as part of the Government's programme for Managing Radioactive Waste Safely.
6. Impacts of the storage and disposal of nuclear waste are dealt with separately in the main AoS Report.
7. Impacts of the transportation of Nuclear Waste are unknown the location of a long-term waste geological depository facility is known. This is being considered as part of the Government's programme for Managing Radioactive Waste Safely.
8. Impacts of the storage and disposal of nuclear waste are dealt with in the main AoS Report.

Regional/ Local

9. Potential for negative effects on the regional and local transport network through congestion to A5093, A595 and A66(T) during construction, operation and decommissioning stages. The A5093 and A595(T) throughout the whole of West Cumbria is a single carriageway route and provides the primary access to Sellafield.
10. The A595(T) section from the north passes through Whitehaven and Egremont, along with other smaller settlements on the way to Kirksanton. There

Communities: Supporting infrastructure

is the potential for negative effects on these settlements from site related traffic. South of Sellafield the A595 is narrow and winding. Much of the route would need to be assessed in terms of its suitability for large vehicles.

11. The A595 and the A590 from Kirksanton east to the M6 is winding and indirect. Access to the A595 is via the A5093 which passes through the centre of Kirksanton. There are potential negative effects for the communities in Kirksanton.
12. Determining the nature of effects for the A595, A590/A5092 and the A5093 will require details on the construction workforce, timeframes and volumes of materials to be transported.
13. Negative effects identified for transportation network. Nature and significance of effects depend on mode of transport, and further details on construction workforce, timeframes and volume of materials to be transported.
14. Mitigation measures can be implemented to minimise effects on the A595, A590/A5092 and the A5093 through appropriate planning. This may include physical improvements, carrying of large loads outside of peak period, construction transport management plans, and green travel plans for the construction and operational workforces to encourage sustainable travel.
15. Access by water would only be possible if some temporary wharf facility could be constructed at the site itself. This may be difficult to achieve without possible impacts to the beach and sand dunes.
16. Non-nuclear construction waste will need to be further considered once details are available, including the volume and type of waste likely to be produced and transportation routes.
17. Capacity of the regional infrastructure that exists at the particular lifecycle stage of the facility will need to be considered to ensure sufficient planning of the management of wastes generated. Implementation of current good practice and initiatives will assist in minimising impacts on existing waste facilities. Such initiatives include the preparation of a Construction Waste Management Plan during the construction stage, and sustainable waste management / minimization during operation.
18. As with the operation of any medium to large industrial facility, there is the potential for accidental releases of non-radiological, but hazardous, wastes (such as waste oils and lubricants) during the operational and decommissioning phase of the facility that can impact on habitats and species, including wintering birds, and migratory fish. It is anticipated any effects will be local however and not strategic: implementation of sustainable management techniques during these phases will reduce the risk of any such releases.
19. Operational waste (non-radiological), including those classed as hazardous (waste oils, lubricants etc) will have impacts upon the capacity of existing waste management services. Any such impacts are however not expected to be significant as it may be possible to mirror the current arrangements for

Communities: Supporting infrastructure

the existing nearby Sellafield nuclear power facility.

- 20. It is not likely that significant impacts on the current waste management infrastructure will be caused by non-radiological wastes generated during the decommissioning phase of the facility. Best practice and statutory obligations at the time of the process shall be implemented to ensure a sustainable approach is taken to the management of the wastes generated and protect the wider environment (local air quality and amenity). There is however an opportunity to employ any lessons learned from the decommissioning of the existing nearby Sellafield nuclear power facility (currently underway).
- 21. Long term pressures and effects on the (non-radiological) waste management infrastructure are unlikely to be significant.
- 22. Onshore wind: The boundary of the nominated site partially overlaps with the existing Haverigg Onshore windfarm. There is therefore potential for construction of the nuclear power station to cause an adverse impact on the windfarm, if it is still operational at the time of construction. Detailed design at the project development phase would need to take account of the existing wind farm in order to avoid or minimise significant adverse impacts.
- 23. The development of a nuclear power station at Kirksanton may require new power lines to be built, or existing lines to be upgraded, to connect the facility with the National Grid. The potential impact of new or upgraded power lines will be considered in a separate Networks National Policy Statement (NPS).

Summary of Significant Strategic Effects:

Timescale	C	O	D
Significance	- ?	- ?	- ?
Likelihood	M	M	M

Significant Effects

- Potential for significant effects on regional and local road infrastructure through increased congestion/ disruption of traffic on the A595, A590/A5092 and A5093 during construction, operation and decommissioning stages.
- Potential for effects on strategic road network through carrying of large loads during construction – however this can be mitigated.
- Potential for effects on local communities in the settlements along the A595 and the A5093.

Mitigation and Monitoring Possibilities

- Further studies will be required to assess in detail the effects on the road network, including the A595, A590/A5092, A5093, A66 and M6 motorway.
- Appropriate mitigation measure to reduce the effects of transportation could include a Transport Management Plan (construction and decommissioning) and Green Travel Plan

Communities:Supporting infrastructure	
	(construction, operation and decommissioning). Consideration of alternatives to road for the transport of large loads (for example transport by rail).

Human Health and Well-being

AoS Objective:

- 6. To avoid adverse impacts on physical health.
- 7. To avoid adverse impacts on mental health.
- 11. to avoid the loss of access and recreational opportunities, their quality and user convenience.

Guide questions:

- Will it adversely affect the health of its workforce or local communities through accidental radioactive discharges or exposure to radiation during construction, operation, decommissioning and interim storage of radioactive waste on the site?
- Will it lead to unacceptable community disturbance during construction, operation or decommissioning?
- Are there any particularly vulnerable local communities that could be affected?
- Will it help to reduce any health inequalities?
- Will local perceptions of risk associated with the proposed power station lead to adverse impacts on mental health for nearby communities?
- Will it adversely affect the ability of an individual to enjoy and pursue a healthy lifestyle?

Potential Receptors:

- Temporary local and regional resident workforce during construction and decommissioning phases.
- Permanent and temporary workforce during site operational phase.
- Local and regional resident population, visiting tourists and recreational users.
- National and international resident population.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

1. National and transboundary health risks: There is a potential for any radioactive material discharged from a new nuclear power station development at the site to travel both nationally and internationally (for example, to the Republic of Ireland). However, current radiological monitoring of the nuclear power stations and other nuclear installations at the nearby Sellafield site since 1956 (see Appendix 4), suggests that the risk to the public is low with total dosage from all sources (including direct radiation) being less than 38% of the limit specified in the Ionising Radiations Regulations 1999. With regard to transboundary effects, there is a requirement under Article 37 of the Euratom Treaty for the United Kingdom, before plant authorisation can

Human Health and Well-being

be granted, to submit its assessment of the likely effects to a panel of European experts who decide whether contamination of the water, soil or airspace of another Member State is likely to take place.

2. Exposure Limits: The radiation to which members of the public are exposed by the operations of a nuclear power station is limited to 1 mSv per year.² This limit applies to all members of the public, including those who receive the highest doses as a result of the location of their homes and their habits of life. It also applies to the cumulative effects of planned exposures from all sources of radiation, excluding medical exposures of patients and natural background radiation. This will need to be taken into account when planning all future power plants in terms of their size, design, position and allowed emissions and discharges. Therefore, the exposures of people living near to a new nuclear power stations have to be less than the dose limit taking into account exposures from any other nearby sites and any past controlled releases. This statutory dose limit is reinforced by the concept of ALARP (As Low As Reasonably Practicable), which is used by the nuclear regulators to reduce doses to as low as is reasonably practicable

Regional/ Local

3. Health impacts from routine discharges: The strict regulatory framework, to restrict both routine discharges from nuclear power stations and direct radiation exposures to workers and the general public, should reduce potential health impacts to acceptable levels and ensure that radiation doses are well within internationally agreed limits. The relevant regulators, by means of a statutory authorisation procedure, will require the operators of nuclear plants to ensure that the exposure of workers and the public to radioactivity from nuclear sites is kept below stringent legal limits which are as low as is reasonable achievable. This system of regulation should ensure that the permitted discharges from the proposed nuclear power station at Kirksanton do not cause unacceptable risk to health.
4. Transmission Lines: It is possible that the proposed power station will require additional electricity transmission lines to link its output to the national grid system. Given the current uncertainty regarding the health effects of prolonged low level exposure to electromagnetic fields (EMFs) it is recommended that, in keeping with Health Protection Agency advice³, a precautionary approach be adopted to the routing of any required power lines.
5. Risk of accident - unplanned release of radiation: During the operation of the nuclear power station, there is a risk of unplanned release of radiation into the environment leading to adverse health impacts. However, the risk of such an accident is very small because of the strict regulatory regime in the UK (referred to above) and the generic design assessment being carried out by the Health and Safety Executive (HSE) . This assessment, and the Executive's input into the nuclear site licensing regime, is designed to ensure that several levels of protection and defence are provided against

² This is through the Ionising Radiations Regulations 1999 <http://www.statutelaw.gov.uk> (which includes all activities carried out under a nuclear site licence granted by the Nuclear Installations Inspectorate under the Nuclear Installations Act 1965) http://www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1965/cukpga_19650057_en_1, the Radioactive Substances Direction 2000 <http://www.defra.gov.uk/ENVIRONMENT/radioactivity/government/legislation/pdf/rsd2000.pdf> and the Radioactive Substances (Basic Safety Standards) (Scotland) Regulations 2000 <http://www.opsi.gov.uk/legislation/scotland/ssi2000/20000100.htm>

³ http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733817602

Human Health and Well-being

significant faults or failures, accident management and emergency preparedness strategies are prepared and that all reasonably practicable steps have been taken to minimise the radiological consequences of an accident

6. Risk of accident - transport of nuclear material: The transportation of nuclear materials to and from the site increases the possibility of an accident with radiological consequences. However, the safety record for the transport of nuclear material suggests that the risks are very low. Data from the Radioactive Materials Transport Event Database (RAMTED) for the period 1958 to 2006 showed that of the recorded 850 events associated with the transport of radioactive materials no 'significant dose events' were associated with the nuclear power industry. Rather, all nineteen recorded significant dose events involved the transport of industrial radiography sources that were moved without the source being properly returned to the container.
7. Health services: The influx of workers required for the construction phase of the new power station may put a strain on local health services. The same would be true for the operational staff, though to a lesser extent. Given this situation it would be prudent to review the need for appropriate additional health service capacity during the planning process.
8. Health and safety issues: The work associated with the construction and operation of a nuclear power plant at Kirksanton brings with it the possibility of health and safety incidents. However, nuclear power stations are highly regulated in this regard and must not only comply with the requirements of the Health and Safety at Work Act 1974 but also with the requirements of the Nuclear Installations Act 1965 and the Ionising Radiations Regulations 1999. This means that the potential operator must have a licence from the Nuclear Installations Inspectorate (NII) before construction can begin. Such a licence will only be granted if the NII is satisfied that the power station can be built, operated and decommissioned safely with risks being kept to 'as low as reasonably practicable' (ALARP) at all times. The licence will, therefore, have conditions attached to it which will allow NII to control safety risks throughout the lifetime of the project.
9. Recreation: With regard to recreation, there is a potential impact associated with the coastal path which passes the site. It is likely that this path may need to be closed during some phases of power station construction but this effect will be temporary and can readily be mitigated by providing a bypass path around the site.
10. Perception of risk: It is possible that the perception of risk associated with living or working near to a nuclear power plant could adversely affect the health and well-being of relevant individuals. However, there is little literature available on this potential impact which suggests that it has not been a significant problem in the past. In any event, in the case of the Kirksanton, there has been a nuclear power station within 25 km of the site since 1956 so people living and working nearby have had a long time to get used to there being an adjacent nuclear plant. This is therefore unlikely to be a problem at this location.
11. Community well-being: The Copeland Borough Council area is a deprived area with barriers to housing and services being a particular problem. The siting of a new nuclear power station at Kirksanton should help to alleviate this deprivation somewhat as more jobs will be created in the area leading to an increase in community wealth, additional housing and other associated neighbourhood infrastructure.

Human Health and Well-being

12. Community disturbance: The presence of, and more particularly the construction of, a nuclear power station at the nominated site is certain to increase community disturbance to some degree when compared to the current situation. Potential disturbances in the construction phase include noise and vibration, dust and increased traffic although these effects would be temporary. Construction noise will be variable and transient in nature and will need to be mitigated by the use of good construction practice, regulation and timing of construction operations, the use of noise controlled plant and equipment and noise and vibration monitoring. There is also likely to be some disturbance associated with increased traffic during the operational and decommissioning phases of the power station. These effects should be considered, and mitigated if necessary, during the planning stage of the power station project by considering the adoption of an environmental management plan for the construction phase and an appropriate transport plan for all project phases. In particular, significant benefits would result if potential sources of noise emissions could be reduced through a combination of engineering design solutions.
13. Employment: Whilst employment levels in the Copeland Borough Council area are reasonable when compared to the rest of England, there are still people seeking work in this area and the region in general. As has been demonstrated⁴, being in work can contribute to individual healthiness, and being unemployed can be harmful to both mental and physical health. The development of a new nuclear power station at Kirksanton can thus be expected to improve the general mental and physical health and well-being of the area's population by providing more short term (construction and decommissioning phases) and long term (operational phase) work opportunities.

Summary of Significant Strategic Effects:

Timescale	C	O	D
Significance	+	+	+
Likelihood	M	M	M

Significant Effects

- The rigorous system of regulating routine radioactive discharges from the potential nuclear power station at Kirksanton should ensure that there are no unacceptable risks to health when the plant is operating normally
- The potential for electromagnetic fields generated by any required additional power lines to cause adverse health effects in the local and regional population
- The potential requirement for appropriate additional health service capacity for the influx of both construction and operational workers
- The construction and operation of the proposed nuclear power station may cause an

Mitigation and Monitoring Possibilities

- Ensure potential cumulative effects are calculated and assessed when planning and consenting all future nuclear power plants
- Carry out a review of local health provision to ensure it is adequate for the expected influx of power station workers
- Ensure an environmental construction management plan and an all-phase travel plan are produced, observed and monitored

⁴ Waddell G and Burton K (2006): 'Is work good for your health and well-being?', TSO, London

Human Health and Well-being

adverse impact by leading to community disturbance

- It is likely that the presence of a new nuclear power station at Kirksanton will lead to an increase in employment, community wealth, additional housing and other associated neighbourhood infrastructure – these positive effects are likely to be much more significant than any potential negative consequences assuming any effects on population health are not realised

- Ensure sufficient monitoring of power station discharges and effects on local health is undertaken throughout the operational and decommissioning phases of the project

Cultural heritage	
<p>AoS Objective: 22. To avoid adverse impacts on the internationally and nationally important features of the historic environment. 23. To avoid adverse impacts on the setting and quality of built heritage, archaeology and historic landscapes</p> <p>Guide questions: Will it adversely affect historic sites of international/national importance and their setting? Will it adversely affect other historic sites of known value? Will it adversely affect landscapes of historic importance?</p>	
Potential Receptors:	
Scheduled Monuments Listed Buildings Conservation Areas Historic Landscape Archaeology	
Potential Significant Effects and Mitigation Possibilities:	
International/ National/ Transboundary	
<ol style="list-style-type: none"> 1. The nearest scheduled monument is the Giants Graves standing stones which is located within 1.5 km of the site. A potential effect on its setting may arise from the development of a new nuclear power station, as for other scheduled monuments in the wider vicinity. 2. There are 2 Grade I listed buildings within an approximate distance of 5 km of the site and a potential effect on their settings may arise from the development. 3. Mitigation possibilities include appropriate landscaping/planting schemes to reduce adverse setting effects. 	
Regional/ Local	
<ol style="list-style-type: none"> 4. A Conservation Area exists at Kirksanton and there is a potential setting effect. 5. There are around 19 Grade II listed buildings within an approximate 5 km distance of the site and there may be an effect on their settings. 6. Some of the fields within or close to the site are shown on a 19th century Ordnance Survey map and there is potential for historic landscape to exist. 7. Neolithic axes and a Bronze Age habitation site have been found either within or very close to the site. The site of RAF Millom, a World War II airfield, 	

Cultural heritage

also lies within close vicinity if not within the site. The presence of these features indicates prehistoric and historic activity within and close to the site. As such the area is likely to be considered of at least local to regional archaeological importance.

8. Operational effects include potential setting effects on historic assets in the wider vicinity.
9. If a buried archaeological resource exists significant effects to this resource are possible during decommissioning as excavations are likely to be required.
10. Adverse effects on the settings of the Conservation Area and listed buildings closest to the site could be minimised by locating the power station development adjacent to the existing power station. Mitigation possibilities also include appropriate landscaping / planting schemes to reduce adverse setting effects. It is likely that a detailed archaeological investigation of the area may be required, including intrusive investigation (for example trial trenching and detailed recording). If they survive a survey of any buildings and features associated with the airfield will also probably be required in order to fully assess their significance.

Summary of Significant Strategic Effects:

Timescale	C	O	D
Significance	-	-	-
Likelihood	M	M	M

Significant Effects

- If a buried archaeological resource, historic landscape and any structures and features associated with the wartime airfield are present the main effects would be at a local to regional scale, but within the footprint of the nominated new facility. Effects would be permanent and irreversible.
- Immediately surrounding the site, there may be potential effects on the settings of historic assets. The significance will depend on distance, topography and the ability to mitigate.

Mitigation and Monitoring Possibilities

- Detailed investigations (trial trenching etc.) may be required prior to construction, with an excavation and/or watching brief potentially required prior to and during the construction phase.
- If structures and features associated with the wartime airfield are present detailed survey will probably be required prior to construction.
- It may be possible to mitigate against potential adverse setting effects on heritage assets through appropriate landscaping/planting schemes.

Landscape
<p>AoS Objective: 24. To avoid adverse impacts on Nationally important landscapes. 25. to avoid adverse impacts on landscape character, quality and tranquillity, diversity and distinctiveness.</p> <p>Guide questions: Will it adversely affect landscapes within or immediately adjacent to a National Park? Will it adversely affect landscapes in or immediately adjacent to an AONB? Will it adversely affect Heritage Coast or Preferred Conservation Zones? Will it adversely affect local landscapes/townscapes of value? Will it affect the levels of tranquillity in an area? Will it adversely affect the landscape character or distinctiveness?</p>
Potential Receptors:
<ul style="list-style-type: none"> • The landscape character of the adjacent Lake District National Park and its visitors and residents. • The landscape character of National Character Area 7 and the adjacent National Character Area 8 (within 5 km) and their visitors and residents. • The landscape character of the adjacent Landscape of County Importance and its visitors and residents. • The visual amenity of local residents, workers and visitors to surrounding areas including the National Park, surrounding landscape character areas, recreational areas, walkers on public footpaths, local transport network users including cyclists on National Cycle Network and users of the nearby prison site.
Potential Significant Effects and Mitigation Possibilities:
<p>International/ National/ Transboundary</p> <p>Views from the Isle of Man (55 km west of the coast) towards the site are possible on clear days but the distance means that effects on viewers are likely to be insignificant.</p> <p>2. The Lake District National Park lies adjacent to the northern boundary of the site and significant views of the site are possible from many popular locations within the National Park including Black Combe (height 600 m) situated less than 5 km from the site area, the Whicham Valley and Scafell Pike and other peaks. We anticipate that the introduction of a nuclear power station on the site is likely to have an adverse impact upon users of the National Park and an adverse impact on the landscape character of the National Park arising from the potential grid connectivity infrastructure.</p>

Landscape

Adverse visual effects are likely to arise as there is not an existing power station at this location and it would add significantly to the existing group of prison buildings and wind farm infrastructure in this area.

3. The impact on the landscape character of the National Park and the visual impact will not be able to be fully mitigated until after decommissioning, which is likely to be completed after a period of up to 96 years (including construction, operation and decommissioning) in the case of the new power station. Over such time periods, it is difficult to have certainty over the future land use of the decommissioned areas.

Regional/ Local

The site is located within National Character Area (NCA) 7: West Cumbria Coastal Plain, which identifies the area where the site is located as follows :
Strong industrial history associated formerly with the mining of coal and iron ore and, more recently, the chemical industry, power generation and nuclear reprocessing; extensive urban fringe areas within the coastal belt with large highly visible factories and manufacturing and processing plants, particularly near Workington, Whitehaven, Sellafield and Barrow.

The introduction of a nuclear power station will mean that there are likely to be direct adverse impacts on this Character Area. However, the presence of existing industrial features and large arable fields within the Character Area suggest that the local effects on the landscape character are likely to be of less significance than those on the National Park.

The site is not located in a locally designated landscape but land adjacent to it, on its northern and southern boundaries lies within a Landscape of County Importance (LOCI) and within the landscape character type known as Low Farmland as described in the Cumbria and Lake District Joint Structure Plan 2001 - 2016: Technical Paper 5: Landscape Character 2003. The introduction of a nuclear power station will mean that there are likely to be indirect adverse impacts on the landscape character of the adjoining designated LOCI areas. In addition we anticipate that there will be significant direct adverse effects on part of the Low Farmland landscape character type.

Given the likely scale of any new development and the open nature of the landscape surrounding the site, it will not be possible to mitigate for all the landscape and visual impacts over a long timescale, either immediately surrounding the site or from surrounding areas of higher ground, from which the site is visible.

Construction of a marine landing platform and/or water cooling culverts would potentially have direct adverse landscape and visual impacts resulting from changes to the intertidal zone and coastal landscape. Direct adverse landscape and visual impacts would also result from the creation of construction compound areas, new power station buildings, new pylons, ancillary facilities and a new sea defence wall, if required. The visual effects of construction and the operation of a new power station on residents and visitors in the surrounding areas including effects associated with lighting and traffic may also be significant.

Mitigation potential includes the following measures:

Landscape						
<ul style="list-style-type: none"> • Protection measures allowing for the conservation of existing vegetation including hedgerows and vegetation within the temporary construction laydown area. • Avoidance of temporary laydown areas on the foreshore where views are prominent. • Siting of new power station building and ancilliary facilities in close proximity to the existing wind farm and prison infrastructure to avoid a significant broadening of visual impact. • Sensitive design and/or alignment of the water cooling facility and a low impact design for the marine landing platform to avoid adverse impact on the coastline. • Provision of buffer zones between construction areas and nearby residential areas; • Delivery of construction materials by sea to reduce road use • The use of strict directional cut off low level lighting and restricted working hours to limit light pollution. <p>Key positive mitigation opportunities include the creation of a landscape framework and off site enhancement measures, which might include; the creation of woodland areas, hedgerow restoration, the creation of wetland and improvements to the adjoining beaches. Long term delivery of landscape and habitat enhancement could be achieved through the development of an integrated land management plan for the site.</p> <p>With this potential site design and mitigation in place, local impacts could be reduced to a slight adverse to neutral level after decommissioning, however, there are still likely to be some localised long term adverse effects.</p>						
Summary of Significant Strategic Effects:			Timescale	C	O	D
			Significance	--	--	0?
			Likelihood	M	M	M
Significant Effects			Mitigation and Monitoring Possibilities			
<ul style="list-style-type: none"> • During construction and operation the main direct impacts would be at a local level and over time these could be largely compensated for. However, there are likely to be some long lasting national level adverse landscape and visual impacts on the nearby Lake District National Park with limited potential for mitigation. The existing wind farm and prison are already visible from viewpoints within the National Park. Further development is highly likely to lead to a perceptible deterioration in some views, which would not be able to be mitigated, given the scale of new buildings. 			<ul style="list-style-type: none"> • Given the scale of the likely development, fully effective mitigation during the construction and operational phases of adverse effects is unlikely. • There is some potential for landscape/ecological mitigation and restoration and the potential for these to be delivered and monitored through an integrated land management plan. However, the 			

Landscape

- The decommissioning of the facilities may allow some landscape restoration of previously developed areas (airfield). However, the long term land uses for restored areas is difficult to predict.

time scales involved present uncertainties as to long term land uses and therefore the final form of any landscape mitigation.

Soils, Geology and Land use

AoS Objective:

- 19. to avoid damage to geological resources
- 20. to avoid the use of greenfield land and encourage the re-use of brownfield sites
- 21. to avoid the contamination of soils and adverse impacts on soil functions

Guide questions:

- Will it result in the compaction and erosion of soils?
- Will it lead to the removal or alteration of soil structure and function?
- Will it lead to the contamination of soils which would affect biodiversity and human health?
- Will it compromise the future extraction/ use of geological/ mineral reserves?
- Will it result in the loss of agricultural land?
- Will it lead to damage to geological SSSIs and other geological sites?
- Will it result in the loss of Greenfield land?
- Will it adversely affect land under land management agreements?

Potential Receptors:

The site lies within an area of agricultural land use. Duddon Estuary geological SSSI designated site lies within the local vicinity.

Shore and Meadow and Sea Pastures and Duddon Estury SSSI, SPA and Ramsar site – approximately 0.5 km south of the site.
Morecombe Bay SAC, SPA and Ramsar site – approximately 0.5 km south of the site.

Some land management areas are designated within the local vicinity including countryside steward schemes.

Adjacent agricultural land/greenfield land (to be confirmed by nomination) adjacent to the site.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

- 1. Duddon SSSI geological designations lies within the local vicinity.
- 2. Construction of new plant upon greenfield sites, would result in a local reduction in greenfield sites locally. The loss of greenfield land is not considered

Soils, Geology and Land use						
<p>to be significant on a national level.</p> <p>3. The site is adjacent to the Shaw Meadow and Sea Pastures SSSI, Duddon Estuary SSSI, SPA and Ramsar site and Morecambe Bay SAC SPA and Ramsar site. Construction activities and operational activities are likely to have a detrimental effect to the short/medium term soil quality within the area of the proposed development. Compaction/removal/alteration of soils is likely to affect the soil quality within these designated sites. Possible impacts on the flora and fauna of these sites is addressed in the Biodiversity section.</p>						
Regional/ Local						
<p>4. The site lies within a region classified to be of low fertility by the National Soils Resources Institute. Any development is likely to have a local effect on agricultural land use and agriculture prevalent in the local area. The extent of the loss of agricultural land is unlikely to be significant in a national context. Soils could be returned to a similar agricultural importance once the site has been decommissioned however the original soils matrix is unlikely to be restored.</p> <p>5. Construction of new plant upon greenfield sites, would result in a local reduction in greenfield sites locally. The loss of greenfield land is likely to be of local significance.</p> <p>6. Radioactive contamination of soils is not covered as part of this assessment but is covered by the additional research being undertaken as part of the wider radioactive waste issue. The project would fall within national permitting requirements and measures for the effective management of the site to prevent the contamination of soils will be required under the legislative requirements.</p>						
Summary of Significant Strategic Effects:			Timescale	C	O	D
			Significance	-?	-?	-?
			Likelihood	M	M	M
Significant Effects			Mitigation and Monitoring Possibilities			
<ul style="list-style-type: none"> The construction of the power station and associated infrastructure (including transmission lines/towers) will lead to the direct loss of soil structure. This may include impacts on soils that maintain terrestrial habitats, including designated nature conservation sites; Duddon Estuary SPA/Ramsar Morecambe Bay SAC, Morecambe Bay SPA/Ramsar, Duddon Estuary SSSI, Shaw Meadow and Sea Pasture SSSI. This is considered further in the biodiversity appraisal. 			<ul style="list-style-type: none"> Limitation of the footprint of the development reducing the area of soils affected. Avoidance of any soils within designated sites of ecological importance. 			

Water - Hydrology and Geomorphology	
AoS Objective:	15. To avoid adverse impacts on surface water hydrology and channel geomorphology (including coastal geomorphology).
Guide questions:	<p>Will it result in the increased sedimentation of watercourses?</p> <p>Will it adversely affect channel geomorphology?</p> <p>Will hydrology and flow regimes be adversely affected by water abstraction?</p> <p>Will it result in demand for higher defence standards that will impact on coastal processes?</p> <p>Can the higher defence standards be achieved without compromising habitat quality and sediment transport?</p>
Potential Receptors:	
Local and district resident population and tourists, local and district ecosystems in lakes, fluvial and coastal waters and on the foreshore.	
Potential Significant Effects and Mitigation Possibilities:	
International/National/Transboundary	
The potential effects on surface water hydrology and fluvial and coastal geomorphology are likely to be limited to the coastline within approximately 10-20 km of the site. It will be necessary for the nominator to undertake a data collection and modelling exercise to confirm the spatial extent of this impact.	
Regional/Local	
<ol style="list-style-type: none"> The site is surrounded by areas which are shown on Environment Agency (EA) maps as being at risk of flooding from rivers and sea without defences. Flood defences are shown on the EA web site to the east of Haverigg. Accordingly, during the life span of a nuclear power station, and as a result of potential sea-level rises, the site is likely to require the construction of new flood defences. These defences would be designed to counteract the effects of existing fluvial and coastal processes, but are likely to have the secondary effect of impacting the movement of sediment in the river system and along the coast. These may have further effects on fluvial and marine ecosystems. The effects are likely to continue as long as the defences need to be maintained to protect the site. It is likely, however, that after a period of time, a new, stable equilibrium condition will be attained. It is not possible to assess whether these effects will be positive or negative without further information on the proposed design of the defences, and a more detailed investigation of the local and regional fluvial and coastal physical processes/dynamics. The effects of the construction and long-term presence of upgraded coastal defences on coastal process, hydrodynamics and sediment transport along the coast could be reduced or possibly eliminated by the adoption of suitable, environmentally-friendly designs. 	

Water - Hydrology and Geomorphology

2. The provision of cooling water for the proposed power station may require excavation/dredging in the foreshore and coastal waters to enable the construction of a channel and/or pipeline for the abstraction and return of cooling water. Construction disturbance associated with these works may have the short-term effect of accelerated delivery of sediment to water bodies. Over the longer-term, during operation, there is the possibility that the discharge of cooling water may affect local fluvial and coastal hydrodynamics and sedimentation processes. The effects of construction and operation of the cooling water system on fluvial and coastal processes and hydrodynamics and sediment transport could be reduced or potentially eliminated by suitable design and construction methods.

3. The potential effects of the development on the local river network might include construction of fluvial flood defences, the modification of the local drainage network through local diversion of small watercourses and drainage ditches, the removal of riparian vegetation and associated bank collapse, and increased loading of channel banks from construction machinery. During construction there is also a risk of increased sediment transfer to water courses from excavated areas and stockpiles. In addition, there is the risk of increased transfer of sediment from site drainage and from dredging activities to water bodies. The development is also likely to affect surface water run-off through increasing the impermeable areas (for example roads and car parking areas). These potential adverse effects may, however, be reduced by suitable mitigation methods, for example, Sustainable Drainage Systems (SuDs), including the use of permeable pavements, and retention ponds or swales to retain drainage water and sediments.

Summary of Significant Strategic Effects:

Timescale	C	O	D
Significance	-	0	?
Likelihood	H	M	M

Significant Effects

- Potential new defence works on fluvial and coastal processes, hydrodynamics and sediment transport, and any indirect effects on internationally designated habitats.
- Works to provide (and discharge) cooling water on coastal processes, hydrodynamics and sediment transport, and any indirect effects on internationally designated habitats.

Mitigation and Monitoring Possibilities

- Suitable design, including use of SuDs.
- Selection of appropriate construction methods

Water - Water Quality (including surface, coastal and marine)	
AoS objective:	16. To avoid adverse impacts on water quality (including surface, coastal and marine water quality) and to help meet the objectives of the Water Framework Directive.
Guide questions:	<p>Will it cause deterioration in surface water quality as a result of accidental pollution, for example spillages, leaks? Will it cause deterioration in coastal and / or marine water quality as a result of accidental pollution, for example spillages, leaks?</p> <p>Will it cause deterioration in surface water quality as a result of the disturbance of contaminated soil? Will it cause deterioration in coastal and / or marine water as a result of the disturbance of contaminated soil? Will it affect designated Shellfish Waters? Will it affect Freshwater Fish Directive sites? Will it increase turbidity in water bodies? Will it increase the temperature of the water in water bodies?</p>
Potential Receptors:	
Local and district resident population and tourists, local and district ecosystems in lakes, rivers and coastal waters and on the foreshore. Regional and international receptors could potentially be affected by releases of persistent contaminants.	
Potential Significant Effects and Mitigation Possibilities:	
International/National/Transboundary	
Not significant.	
Regional/Local	
1. The main liquid discharges from the proposed power station during routine operation are expected to be treated effluent from the wastewater treatment plant and the return of cooling water to the sea at elevated temperatures (if this mode of cooling were to be selected). The EA will be responsible for consenting the discharges and it is anticipated that they will seek to apply standards that ensure that the discharges lead to no deterioration in water quality or meet the statutory water quality standards (whichever is the most stringent).	

Water - Water Quality (including surface, coastal and marine)						
<p>2. In the case of the discharge of cooling water it is unlikely to be feasible to eliminate some changes in thermal conditions locally. Detailed appraisal of the proposals for disposal of cooling water will be required to assess the acceptability of this effect.</p> <p>3. Liquid waste streams are separated from the radioactive materials; accordingly radioactive materials are not expected to be present in any of the routine discharges of liquid waste. It is expected that liquid discharges will be treated to standards set by the EA to ensure compliance with all relevant legislation.</p>						
Summary of Significant Strategic Effects:			Timescale	C	O	D
			Significance	0	-	-
			Likelihood	L	M	M
Significant Effects			Mitigation and Monitoring Possibilities			
<ul style="list-style-type: none"> Thermal impact of cooling water discharges (if this mode of cooling were to be adopted). This effect is of local and regional significance. 			<ul style="list-style-type: none"> Thermal discharges will need to be consented by the EA. The discharge quality will need to comply with existing standards or meet the no deterioration standard. 			

Water – Water supply and demand	
AoS objective:	17. To avoid adverse impacts on the supply of water resources.
Guide questions:	Will it adversely affect water supply as a result of abstraction? Will it increase demand for water?
Potential Receptors:	
Local and district resident population and tourists. District ecosystems dependent on surface water features.	
Potential Significant Effects and Mitigation Possibilities:	
International/National/Transboundary.	
Not significant.	
Regional/Local	
<ol style="list-style-type: none"> 1. The site lies above the West Cumbria Permo-Triassic Sandstone aquifer but is not connected to the West Cumbria Aquifer Groundwater Management Unit (GWMU). There are no groundwater source protection zones in the vicinity of the site and no impact is expected. 2. The construction and operation of a nuclear power station at the site may increase demand for potable supplies both at the site and in local communities where the workforce will live. Depending on the nature of the demand and the potential efficiency savings, there may be implications for meeting this demand. However, this is unlikely to be significant in the operational phase where the numbers of additional workers is small; it may be more significant during the construction period when a substantial increase in the local population is likely. 	

Water – Water supply and demand						
Summary of Significant Strategic Effects:			Timescale	C	O	D
			Significance	-	-	-
			Likelihood	M	M	M
<p>Significant Effects</p> <ul style="list-style-type: none"> Increased demand during the construction phase. The potential magnitude and duration of increased water demand will depend on the timing of the new site development. Similar significant effects are likely to apply to wastewater production from the site. 	<p>Mitigation and Monitoring Possibilities</p> <ul style="list-style-type: none"> Studies to ensure that capacity of water and wastewater infrastructure in WRZ is sufficient. 					

Water - Groundwater Quality and Flow																
AoS Objective: 18. To avoid adverse impacts on groundwater quality, distribution and flow and to help meet the objectives of the Water Framework Directive																
Guide questions: Will it cause deterioration in groundwater quality as a result of accidental pollution, for example spillages, leaks? Will it cause deterioration in groundwater quality as a result of the disturbance of contaminated soil?																
Potential Receptors:																
Local and district resident population and tourists, local and district ecosystems with connections to groundwater.																
Potential Significant Effects and Mitigation Possibilities:																
International/National/Transboundary. Not significant.																
Regional/ Local																
<ol style="list-style-type: none"> 1. There is an aquifer beneath the site but no groundwater source protection zone in close vicinity of the site. The geology and hydrogeology at the site potentially provide connectivity between activities at the site and the aquifer. Discharges from this groundwater body may support local groundwater dependent surface water aquatic ecosystems. Localised groundwater pathways are likely to exist, hence accidental discharges or construction disturbance at the site could cause deterioration in groundwater quality and flow quantity in the major aquifer. 2. The site is not in the West Cumbria Aquifer, but any increased groundwater abstraction locally during construction/operation could lead to impacts on groundwater dependent surface water features and aquatic ecosystems. 																
Summary of Significant Strategic Effects:				<table border="1"> <tr> <td>Timescale</td> <td>C</td> <td>O</td> <td>D</td> </tr> <tr> <td>Significance</td> <td style="background-color: yellow;">-</td> <td style="background-color: yellow;">-</td> <td style="background-color: yellow;">-</td> </tr> <tr> <td>Likelihood</td> <td>L</td> <td>L</td> <td>L</td> </tr> </table>	Timescale	C	O	D	Significance	-	-	-	Likelihood	L	L	L
Timescale	C	O	D													
Significance	-	-	-													
Likelihood	L	L	L													
Significant Effects			Mitigation and Monitoring Possibilities													
<ul style="list-style-type: none"> • Potential impacts of accidental discharges or construction disturbance could cause deterioration in quality and flow of local groundwater bodies. 			<ul style="list-style-type: none"> • Studies to ensure that local groundwater bodies are investigated and suitable design is adopted to mitigate potential impacts. 													

Flood Risk	
AoS Objective:	14. To avoid increased flood risk (including coastal flood risk) and seek to reduce risks where possible
Guide questions:	Will it result in demand for higher defence standards?
Potential Receptors:	
Site workers. Local, District ecosystems in coastal water and on foreshore.	
Potential Significant Effects and Mitigation Possibilities:	
International/ National/ Transboundary	
No potential effects.	
Regional/ Local	
<ol style="list-style-type: none"> 1. The site located in Flood Zone 1 (low probability) but surrounded by Flood Zone 3 (high probability), as indicated on the Environment Agency's Floodmap. 2. The Flood Zone 3 areas surrounding the site are at risk of flooding from both tidal and fluvial sources. 3. It is likely through the impacts of climate change on sea level rise that flood risk to the site will increase. 4. There are no flood defences at the site. The only formal flood defences in the vicinity are at Haverigg, about 2km to the south east, which is defended by a coastal defence scheme comprising of armoured protection and constructed in 1993. There is evidence of coastal erosion in the vicinity of the site that may be a direct result of the existing defences further along the coast as they will disrupt the coastal sediment processes, reduce sediment inputs from erosion at one point which damage the natural features, which depend on their free functioning, and as a result, increase the risk of erosion downdrift and destroy habitats and features of importance. 	

Flood Risk						
<p>5. To mitigate against flood risk for the lifetime of the development construction of new flood defences and maintenance and improvement of existing defences is likely to be required. This could result in both positive and negative effects, for example a positive impact as it would reduce flood risk but a negative impact as it could adversely effect coastal processes.</p> <p>6. To mitigate against these effects any improvement in existing or construction of new defences will require appropriate design, construction and management.</p> <p>7. Local land raising of the site could also mitigate against increased flood risk.</p> <p>8. Without further investigation the impact of constructing new defences or raising the existing coastal defences on coastal processes is unknown.</p>						
Summary of Significant Effects:			Timescale	C	O	D
			Significance	-	-	-
			Likelihood	M	M	M
Significant Effects			Mitigation and Monitoring Possibilities			
<ul style="list-style-type: none"> Main effects are through the construcion of new flood defences and continued management and improvement of existing defences which may effect coastal processes. 			<ul style="list-style-type: none"> It may be possible to mitigate these effects by suitable design and selection of appropriate construction methods and also appropriate management of the defences. 			

Appendix 3: Plans and Programmes Review (Regional)

Regional Spatial Strategy for the North West 2008-2021 (North West Regional Development Agency) , revoked July 2010⁵

The Regional Spatial Strategy (RSS) for the North West replaces all of the structure plan policies of the Joint Lancashire Structure Plan (2005). It outlines sub-regional policy and guidance for sustainable development in housing, jobs, transport, climate change and environmental sectors.

Economic;

- The Regional Economic Strategy (RES) for the North West identified that the Gross Value Added (GVA) for the North West is 12% lower than the England average.
- The RSS sets out to promote the shift to modern industries to support an economic revival.

Transport:

- *“Fewer people use public transport in the region than the national average”*
- The RES aims to improve choice and access to work locations through improving public transport services and reducing the use of private cars through a Regional Transport Strategy.

Natural Environment :

- The North West contains 438 SSSI's however less than half of these are considered to be in favourable condition.
- The habitats and species of the North West will be protected in accordance with the North West Biodiversity Action Plan.

Renewable Energy:

- The region has higher than average emissions of greenhouse gases and produces only 6% of its energy from renewable means.
- In line with the North West Sustainable Energy Strategy the RSS aims to double its installed Combined Heat and Power (CHP) capacity by 2010 from 866 MWe to 1.5 GW.

⁵ Data from the Regional Spatial Strategies (RSS) and other regional plans and strategies were used to inform the AoS reports published in November 2009. On 6 July 2010, the Secretary of State for Communities and Local Government, announced the revocation of Regional Strategies and the other documents noted with immediate effect. However, the RSS and other revoked regional documents remain a useful source of background data on regional sustainability issues, so references to these documents have been retained in later revisions of the AoS. The strategies and policies set out in the revoked regional documents may in future be taken forward by other means in local or strategic planning and applicants will need to consider this in developing their future plans.

Regional Spatial Strategy for the North West 2008-2021 (North West Regional Development Agency) , revoked July 2010⁵

Historic Environment:

- The historic environment of the North West will be protected and enhanced by supporting conservation led regeneration of historically important areas.

Coastal Planning and flood risk:

- Careful siting of infrastructure to avoid future loss or excessive costs of coastal defences.
- Sea levels predicted to rise between 12 and 67cm by 2050s.
- The majority of the region's coastal zone is low lying (below the 10m contour), comprised of soft sediments and therefore vulnerable to coastal erosion and flooding.
- Minimise the loss of coastal habitats and avoid damage to coastal processes.

Water Resources:

- Integrated water management for the protection of ground, surface and coastal waters utilising plans and strategies such as the River Basin Management Plan.

Waste Management:

- Plans and strategies for waste management which reflect those set out in the Waste Strategy for England 2007.
- Growth in municipal waste to be reduced to zero by 2014.
- 40% of household waste to be reused, recycled or composted by 2010; 45% by 2015; and 55% by 2020.

Mineral extraction:

- The region has important reserves of minerals in offshore, coastal and estuary locations, notably hydrocarbons but also marine sand and consumption of aggregates is the fourth highest in England.
- Working with the construction industry to achieve a target of 20% of construction aggregates to be from secondary or recycled sources by 2010 and 25% by 2021.

LINK: http://www.nwrpb.org.uk/downloads/documents/sep_08/nwra_1222761279_Sustainability_Appraisal_Non_T.pdf

Regional Economic Strategy for North West England 2006-2026 (North West Regional Development Agency), revoked July 2010⁶

The Vision of the RES is for “*A dynamic, sustainable international economy which competes on the basis of knowledge, advanced technology and an excellent quality of life for all*”.

The RES identifies three major drivers to achieve the vision;

- Improve productivity and grow the market
- Grow the size and capability of the workforce
- Create and maintain the conditions for sustainable growth

LINK: <http://www.nwda.co.uk/PDF/RES06v2.pdf>

⁶ Data from the Regional Spatial Strategies (RSS) and other regional plans and strategies were used to inform the AoS reports published in November 2009. On 6 July 2010, the Secretary of State for Communities and Local Government, announced the revocation of Regional Strategies and the other documents noted with immediate effect. However, the RSS and other revoked regional documents remain a useful source of background data on regional sustainability issues, so references to these documents have been retained in later revisions of the AoS. The strategies and policies set out in the revoked regional documents may in future be taken forward by other means in local or strategic planning and applicants will need to consider this in developing their future plans.

North West Climate Change Action Plan 2008 (North West Climate Change Partnership), revoked July 2010⁷

The action plan has been developed with regional authorities and will be delivered by the North West Climate Change Partnership.

The relevant priority objectives are;

- Ensure that all regional plans and policies have sustainable energy and climate change impacts at their core.
- Develop regional targets for increasing renewable energy generation and decreasing greenhouse gas emissions.
- Deliver clear business support and advice resource and energy efficiency, sustainable transport planning and climate change risks and opportunities.
- Promote best practise in personal and workplace travel planning.
- Assess future regional risks and priorities for energy generation technologies to meet future forecast energy demands.
- Encourage installations of micro generation and energy efficient technologies for commercial property owners and householders.
- Increase the availability of funding for research, commercialisation and development for low carbon technologies and fuels.
- Identify and support the largest public, private and domestic sector greenhouse gas emitters in the region to identify and implement the best opportunities to reduce their contribution.

LINK: http://www.climatechangenorthwest.co.uk/assets/files/documents/nov_08/cli_1226075071_CCAP_40pp.pdf

Cumbria Biodiversity Action Plan (BAP) (2000-2010) (Cumbria Wildlife Trust)

The Cumbrian BAP has 39 species and habitat action plans covering over 700 individual actions. The Cumbrian BAP also encompasses a “Coastal Action Plan” for the protection of Cumbria’s coastline as 80% of this coast is classified as of international importance for wildlife. This includes habitats in the EU Habitats Directive such as, intertidal mud/sand flats, saltmarshes and sand dune systems

The main objectives of the Coastal Action Plan are;

- To improve the management of European Marine Sites (for example Morecambe Bay and Duddon Estuary)
- To promote Integrated Coastal zone Management focusing on multi-user resource use and sustainable development
- To maintain coastal water quality and improve where necessary
- To halt and where necessary reverse the disruption to coastal processes through the use of Shoreline Management Plans (SMP’s) as well as Coastal Habitat Management Plans (CHaMP’s)

⁷ Data from the Regional Spatial Strategies (RSS) and other regional plans and strategies were used to inform the AoS reports published in November 2009. On 6 July 2010, the Secretary of State for Communities and Local Government, announced the revocation of Regional Strategies and the other documents noted with immediate effect. However, the RSS and other revoked regional documents remain a useful source of background data on regional sustainability issues, so references to these documents have been retained in later revisions of the AoS. The strategies and polices set out in the revoked regional documents may in future be taken forward by other means in local or strategic planning and applicants will need to consider this in developing their future plans.

- To improve artificial and natural coastal defences (i.e. saltmarshes) by 2010

LINK: <http://www.wildlifeincumbria.org.uk/uploads/resources/Coastal%20Action%20Plans.pdf>

Shoreline Management Plan Review: Boundary Review (Cumbria County Council)

This review is prior to a group of Shoreline Management Plan's (SMP's), which are currently being created for Cumbria as part of Defra's 'Making Space for Water strategy. The current SMP is being reviewed and the coast is being split into sections for more effective coastal zone management. Kirksanton and the Duddon Estuary will fall into cell 11d of the new SMP, which will focus on the following key issues;

- The impacts of the railway viaduct
- The reconciliation of coastal defence and natural interests
- Changes to habitats and features
- Effects of sea level rise
- Effects on agriculture activities

The new SMP's are due out before 2010 and will also contain Coastal Flood Management Plans (CFMP's)

LINK: <http://mycoastline.org/documents/boundary1.pdf>

Future Generation: A Strategy for Sustainable Communities in West Cumbria 2007-2027 (Copeland Borough Council)

This strategy outlines a joint vision for West Cumbria, Allerdale, and Copeland Borough Councils.

The Vision is to:

- Be globally recognised as a leading nuclear, energy, environment and related technology business cluster, building on its nuclear assets and its technology and research strengths
- Be a strong, diversified and well-connected economy, with a growing, highly-skilled population with high employment
- Protect and enhance its European and internationally important natural environments and be recognised by all as an area of outstanding natural beauty and vibrant lifestyle, which attracts a diverse population and visitor profile
- Be home to a strong and healthy community which offers all of its people a good quality of life

LINK: http://www.copeland.gov.uk/CIS/pdf/250907_full_9_appa.pdf

Joint Municipal Waste Management Strategy 2008-2020 (Cumbria Strategic Waste Partnership)

By 2020, the Municipal Waste Management Strategy aims to; reduce biodegradable municipal waste to 35% less than 1995, recycle/compost at least 50% of household waste and recover value from 75% of municipal waste (i.e. by obtaining value through recycling, composting or recovery of energy).

The report focuses on :

- Promoting and enabling waste reduction and re-use and maximise recycling and composting whilst minimise landfill disposal as far as practicable
- Develop strong partnerships between local authorities, community groups and the private sector
- Deal with waste as near to where it is produced as possible
- Achieve sustainable environmental waste management within Cumbria at an acceptable cost

LINK: <http://www.cumbria.gov.uk/eLibrary/Content/Internet/534/39339153747.pdf>

River Basin Management Plan for the North West 2009 (Environment Agency)

This plan outlines what the Environment Agency, under the guidelines of the UK Water Framework Directive, aim to achieve with regards to improving the water environment over the next 20 years. The plan focuses on the pressures facing the water environment in the North West River Basin District, and the actions that will address them.

The key targets of the plan are:

- By 2015, 17% of surface waters (rivers, lakes, estuaries) in this river basin district are going to improve for at least one biological, chemical or physical element. This includes an improvement of over 1860km of river, in relation to fish, phosphate, specific pollutants and other elements
- 34% of surface waters will be at good or better ecological status/potential and 65% of groundwater bodies will be at good status by 2015
- At least 38% of assessed surface waters will be at good or better biological status by 2015

The following challenges are addressed in the plan:

- diffuse pollution from agriculture and other rural activities
- point source pollution from water industry sewage works
- physical modification of water bodies
- diffuse pollution from urban sources

LINK: <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/northwest/Intro.aspx>

Appendix 4: Baseline Information

Note: Information on Comparators and Trends is included where applicable/available.

Air

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Air				
North West Air Quality	1,2,3	<p>Air quality in the North West is generally good. Emissions to air from major industrial sites have reduced substantially, however emissions from traffic sources (major route corridors and areas of congestion) are continuing to cause pressures on local air quality across the region.</p> <p>In 2006, only 4 % of air pollution incidents were classed as major or significant (Category 1 and 2).</p> <p>The prevailing wind direction for the region is south to south-south west.</p> <p>There are 47 Air Quality Management Areas (AQMAs) declared in the North West region of England, the majority of which serve to control emissions of nitrogen dioxide and particulate matter from traffic. No AQMAs have been declared within the Copeland Borough Council area.</p>		<p>The average number of days with moderate or higher air pollution in 2006 rose from 2005 levels, and was slightly higher than the average for urban sites in England, but lower than the England rural average. The increase in 2006 (as with an increase in 2003) correlates with hot, sunny weather experienced during these years, causing the production of elevated levels of ozone.</p> <p>Traffic in the region increased by 15 % between 1995 and 2005, leading to air quality problems from major route corridors, and particularly congestion areas and at peak travelling times. Continuance of this trend will add further pressures on meeting air quality objectives.</p> <p>Both minor and serious pollution incidents reported to air increased from 2005 to 2006. Category 3 incidents increased from 436 in 2005 to 460 in 2006; Category 1 and 2 incidents from 17 to 19.</p>

Key to Data Sources

1	Environment Agency (May 2008). State of the Environment – North West. http://www.environment-agency.gov.uk/research/library/publications/34061.aspx [accessed 12 March 2009]
2	UK Air Quality Archive. http://www.airquality.co.uk/archive/lqgm/lqgm.php [accessed 12 March 2009]
3	Meteorological Office. Regional Climate – North West England and Isle of Man. http://www.metoffice.gov.uk/climate/uk/nw/ [accessed 12 March 2009]

Biodiversity and Ecosystems

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Biodiversity and Ecosystems				
North West Biodiversity Audit Protected Habitats	1	North West England is rich in wildlife and habitats with coasts, estuaries, uplands and wetlands of international importance. A total of 82 habitats of which 37 are UK key habitats have been identified in the North West Biodiversity Audit and 18 % of land within the north west is protected through designations. Regional targets for important habitats are delivered through Local Biodiversity Action Plans. The Cumbria Biodiversity Action Plan is relevant to the site.		
North West Biodiversity Audit Protected Species	1	97 species of particular conservation importance are identified within the North West Biodiversity Audit including UK BAP priority species and those which are endemic to the region. Regional targets for important species are delivered at a more local level through Local Biodiversity Action Plans. The Cumbria Biodiversity Action Plan (BAP) is most relevant to the site.		
Cumbria Biodiversity Action Plan	2, 3	The Cumbria BAP was published in April 2001 and contains over 700 actions within 21 Species Action Plans, 18 Habitat Action Plans and four generic 'Action Plans for Common Themes'. The latter cover issues of public involvement, legislation and planning, land management and policy for the wider environment and data and information.		
Natura 2000 sites (N2K)	4	There are 7 N2K sites within 20 km of the site : <ul style="list-style-type: none"> • Duddon Mosses SAC, approximately 6.5 km from the site • Duddon Estuary SPA, approximately 0.5 km from the site • Morecambe Bay SAC, approximately 0.5 km from the site • Morecambe Bay SPA, approximately 12 km from the site 		The draft Marine Bill was published by Defra on 3 April 2008 ⁸ and proposes Marine Conservation Zones (MCZ's) around certain areas of the UK. These zones will help to halt the decline in biodiversity and allow the protection of habitats and species of national

⁸ See Details on the draft Marine Bill at <http://www.defra.gov.uk/marine/biodiversity/marine-bill.htm>

Indicator	Data Source	Current Data	Comparators	Trend
		<ul style="list-style-type: none"> • Drigg Coast SAC, approximately 13 km from the site • Roudsea Wood and Mosses SAC, approximately 18.5 km from the site • Subberthwaite, Blawith and Torver Low Commons SAC, approximately 12.5 km from the site <p>The areas of seashore and sea within the Duddon SPA form the Duddon Estuary European Marine Site (EMS). EMS is the collective term for SAC's and SPA's that are covered by tidal water and protect some of the most special marine and coastal habitats and species of European importance.</p> <p>Also, the Morecambe Bay SAC and SPA form the Morecambe Bay EMS.</p> <p>N2K Sites considered to be most relevant in relation to any development of the site are described in more detail below:</p>		<p>importance.</p> <p>It is intended that the MCAs will incorporate existing marine nature reserves, as well as additional new offshore sites to form a suite of marine nature conservation sites.</p> <p>Four regional projects are currently being developed. Several of the N2K sites surrounding Kirksanton fall within the Irish Sea MCZ project area.</p>
Duddon Mosses SAC	5	<p>Duddon Mosses are considered one of the best areas in the UK for active raised bogs and degraded raised bogs still capable of natural regeneration.</p> <p>The Duddon Mosses qualify as an SAC for the following Annex II Habitats:</p> <ul style="list-style-type: none"> • Active raised bogs • Degraded raised bogs still capable of natural regeneration. 		
Duddon Estuary SPA	6	<p>The Duddon Estuary is designated as an SPA for the following important bird assemblages:</p> <ul style="list-style-type: none"> • Breeding sandwich terns <i>Sterna sandvicensis</i> • Over wintering northern pintail <i>Anas acuta</i>, red knot <i>Calidris canutus</i> and common redshank <i>Tringa tetanus</i>. 		
Morecambe Bay SAC	7	<p>Morecambe Bay is the confluence of four principal estuaries. Collectively these form the largest single area of continuous intertidal mudflats and sandflats in the UK.</p> <p>The Morecambe Bay area qualifies as an SAC for the following Annex I Habitats:</p> <ul style="list-style-type: none"> • Estuaries • Mudflats and sandflats not covered by seawater at all times • Large shallow inlets and bays • Perennial vegetation of stony banks • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows 		

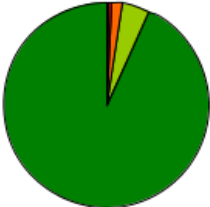
Indicator	Data Source	Current Data	Comparators	Trend
		<ul style="list-style-type: none"> • Shifting dunes along the shoreline with ammophila arenaria ('white dunes') • Fixed dunes with herbaceous vegetation ('grey dunes') • Humid dune slacks 		
Morecambe Bay SPA	8	<p>Annex I Habitats present as a qualifying feature but not a primary reason for selection of the site</p> <ul style="list-style-type: none"> • Sandbanks which are slightly covered by sea water all the time • Coastal lagoons • Reefs • Embryonic shifting dunes • Atlantic decalcified fixed dunes • Dunes with Salix repens ssp argentea <p><i>In addition the UKBAP indicates that Sabellaria alveolata reefs have recently developed off the coast close to the site. This habitat is also an Annex I Habitat type and is currently dominating two hectares of boulder scar where it had been absent for 30 years⁹.</i></p> <p>Annex II species that are a primary reason for selection of this site great crested newt</p>		<p>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. Very large numbers of geese, ducks and waders are present over winter, and also use the site (especially waders) in spring and autumn migration periods. The bay is of particular importance during migration periods for waders moving up the west coast of Britain.</p> <p>Morecambe Bay SPA supports the following:</p> <ul style="list-style-type: none"> • Internationally important assemblages of waterfowl and seabirds • Internationally important populations of regularly occurring migratory species • Internationally important populations of regularly occurring Annex I species <p>Bird species include significant numbers of breeding sandwich tern and over wintering waders and waterfowl including pintail, pink footed goose, turnstone, dunlin, red knot, oystercatcher, bar-tailed godwit, curlew, grey plover, shelduck, redshank and ringed plover.</p>

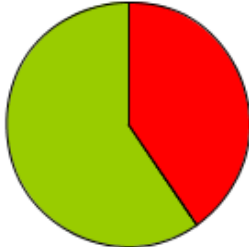
⁹ See UK Biodiversity Action Plan. Priority Habitat Description at <http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf#SAR>

Indicator	Data Source	Current Data	Comparators	Trend												
Drigg Coast SAC	9	<p>The Drigg Coast qualifies as a SAC for the following primary and qualifying Annex 1 Habitats:</p> <ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide • <i>Salicornia</i> and other annuals colonising mud and sand • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) • Embryonic shifting dunes • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (`white dunes`) • Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature • Humid dune slacks <p>Annex II species associated with the SAC include great crested newt <i>Tristurus cristatus</i>.</p>														
Ramsar sites	10	<p>There are two Ramsar sites within 20 km of the site.</p> <ul style="list-style-type: none"> • Duddon Estuary • Morecombe Bay <p>Both are considered to be relevant to any development of the site. Note: The Ramsar sites cover the same area as the Duddon Estuary and Morecambe Bay SPA designations.</p>														
Sites of Special Scientific Interest (SSSI)	11	<p>There are 445 SSSI's within the North West of which 278 are situated within Cumbria. This list excludes SSSI's (with the exception of Duddon Estuary SSSI) which form component parts of N2K sites. The condition of the SSSI land in England is assessed by Natural England. There are six reportable condition categories: favourable; unfavourable recovering; unfavourable no change; unfavourable declining; part destroyed and destroyed.</p> <p>Condition Summary of SSSI's in the North West Region (445 SSSI's)</p> <table border="1"> <thead> <tr> <th>% Area meeting PSA¹⁰ target</th> <th>% Area favourable</th> <th>% Area unfavourable recovering</th> <th>% Area unfavourable no change</th> <th>% Area unfavourable declining</th> <th>% Area destroyed / part destroyed</th> </tr> </thead> <tbody> <tr> <td>88.94%</td> <td>48.50%</td> <td>40.44%</td> <td>8.91%</td> <td>2.13%</td> <td>0.02%</td> </tr> </tbody> </table>			% Area meeting PSA ¹⁰ target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed	88.94%	48.50%	40.44%	8.91%	2.13%	0.02%
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¹⁰ PSA Target = The Government's Public Service Agreement (PSA) target to have 95% of the SSSI area in favourable or recovering condition by 2010.

Indicator	Data Source	Current Data	Comparators	Trend												
		<div data-bbox="546 352 965 564"> <ul style="list-style-type: none"> ■ % Area favourable ■ % Area unfavourable recovering ■ % Area unfavourable no change ■ % Area unfavourable declining ■ % Area destroyed / part destroyed </div> <div data-bbox="1025 328 1301 596"> </div> <p data-bbox="539 644 1227 671">Condition Summary of SSSI's in Cumbria (278 SSSI's)</p> <table border="1" data-bbox="539 715 1709 874"> <thead> <tr> <th>% Area meeting PSA target</th> <th>% Area favourable</th> <th>% Area unfavourable recovering</th> <th>% Area unfavourable no change</th> <th>% Area unfavourable declining</th> <th>% Area destroyed / part destroyed</th> </tr> </thead> <tbody> <tr> <td>85.68%</td> <td>35.54%</td> <td>50.14%</td> <td>11.21%</td> <td>3.07%</td> <td>0.03%</td> </tr> </tbody> </table> <div data-bbox="546 938 815 1075"> <ul style="list-style-type: none"> ■ % Area favourable ■ % Area unfavourable recovering ■ % Area unfavourable no change ■ % Area unfavourable declining ■ % Area destroyed / part destroyed </div> <div data-bbox="853 922 1028 1098"> </div> <p data-bbox="539 1139 1406 1166">There are 26 SSSI's within 20 km of the site, 2 are within 5 km these are:</p> <ul data-bbox="539 1203 1675 1262" style="list-style-type: none"> Duddon Estuary SSSI (part of the Duddon Estuary SPA), approximately 0.5 km from the site Shaw Meadow and Sea Pasture SSSI, approximately 1.5 km from the site <p data-bbox="539 1299 1899 1326">SSSI's considered to be most relevant in relation to any development of the site are described in more detail below:</p>			% Area meeting PSA target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed	85.68%	35.54%	50.14%	11.21%	3.07%	0.03%
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85.68%	35.54%	50.14%	11.21%	3.07%	0.03%											

Indicator	Data Source	Current Data	Comparators	Trend												
Duddon Estuary SSSI	12	<p>The Duddon Estuary is formed by the River Duddon and the smaller Kirkby Pool opening into the Morecambe Bay at the south-west corner of the Lake District. The mouth of the estuary forms an extensive flat sand plain, with the sands being very mobile. The mid and upper reaches of the estuary are flanked by saltmarsh. Above high water extensive sand dunes are present at both the north and south sides of the mouth of the estuary. These sand dune systems are particularly important for a diverse range of community types, supporting a number of rare and uncommon plants, as well as a variety of nationally rare and scarce invertebrate species.</p> <p>The Duddon Estuary is of international and national importance for wintering wildfowl and waders and provides a vital link in the chain of west coast estuaries used by migrating birds, as well as being of particular importance as one of a series of estuaries on the north-west coast where the majority of the British population of natterjack toads occur.</p> <p>Condition Summary: Duddon Estuary SSSI</p> <table border="1"> <thead> <tr> <th>% Area meeting PSA target</th> <th>% Area favourable</th> <th>% Area unfavourable recovering</th> <th>% Area unfavourable no change</th> <th>% Area unfavourable declining</th> <th>% Area destroyed / part destroyed</th> </tr> </thead> <tbody> <tr> <td>97.66%</td> <td>93.13%</td> <td>4.53%</td> <td>1.61%</td> <td>0.67%</td> <td>0.05%</td> </tr> </tbody> </table> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;"> <ul style="list-style-type: none"> ■ % Area favourable ■ % Area unfavourable recovering ■ % Area unfavourable no change ■ % Area unfavourable declining ■ % Area destroyed / part destroyed </div>  </div>	% Area meeting PSA target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed	97.66%	93.13%	4.53%	1.61%	0.67%	0.05%		
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97.66%	93.13%	4.53%	1.61%	0.67%	0.05%											
Shaw Meadow and Sea Pasture SSSI	13	<p>This SSSI site lies on the Cumbrian coast 1 km south-west of Silecroft and 6 km west of Kirksanton. It comprises shaw meadow an area of lowland heath, Sea pasture an area of species-rich wet pasture to the north, and the land to the east supports a mosaic of heath, mire, gorse scrub and further species rich grassland.</p> <p>Condition Summary: Shaw Meadow and Sea Pasture SSSI</p>														

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59.64%	0.00%	59.64%	0.00%	40.36%	0.00%												
National Nature Reserves (NNR)	14	<p>There are 31 NNRs within the North West, 24 within Cumbria. The following NNRs are within 20 km of the site:</p> <ul style="list-style-type: none"> • Duddon Mosses, forms part of Duddon Mosses SAC, approximately 9 km from the site • Roudsea Wood and Mosses, forms part of the Roudsea Mosses SAC, approximately 18.5 km from the site • North Walney, approximately 7 km from the site • Sandscale Haws, approximately 6 km from the site <p>NNR's considered to be most relevant in relation to any development of the site are described in more detail below.</p>															
North Walney NNR	15	<p>North Walney NNR is a complex coastal site which comprises sand dunes, slacks, salt marsh, wet and dry heath, and grassland.</p>															

Indicator	Data Source	Current Data	Comparators	Trend
		<p>Important numbers of redshank and knot are found in the area together with large populations of oystercatcher, ringed plover, curlew and dunlin. Pintail, shelduck and red-breasted merganser are also seen here in large numbers.</p> <p>As well as birds the site supports a large number of natterjack toads with as much as a quarter of the UK's entire natterjack population living in the area.</p> <p>Rare invertebrates found on the reserve include digger wasps and solitary bees, and moths such as the shore wainscot and Portland.</p> <p>Many rare plants can be found in the area including dune and green-flowered helleborine, seaside centaury, coralroot orchid and variegated horsetail.</p>		
Sandscale Haws NNR	16	<p>The reserve is north of, and immediately adjacent to, North Walney NNR and comprises a mosaic of sand dunes, dune slacks, saltmarsh, shingle, grassland and freshwater marsh. There are also small areas of woodland and scrub.</p> <p>The site is part of the Duddon Estuary a Special Protection Area (SPA), it supports large populations (at least 20,000) of waterfowl species listed in Annex 1 of the EU Birds Directive. In addition, it is also designated due to its breeding Sandwich Tern colony and important overwintering populations of Pintail, Red Knot and Common Redshank..</p> <p>The common lizard and all six native amphibians (common frog, common toad, natterjack toad, smooth newt, palmate newt and great crested newt) occur on the site which supports around 15 % of the British natterjack toad population.</p> <p>The reserve is one of the most botanically rich coastal sites in the UK with over 600 recorded species. Scarce plants found in the area include marsh and dune helleborine, coral root orchid and round-leaved wintergreen.</p>		

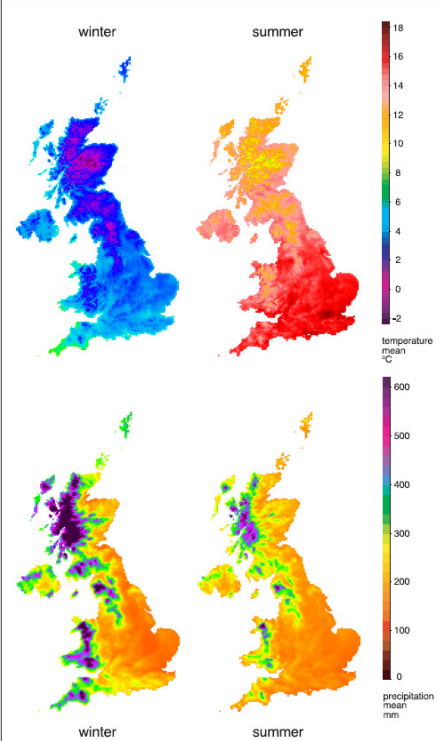
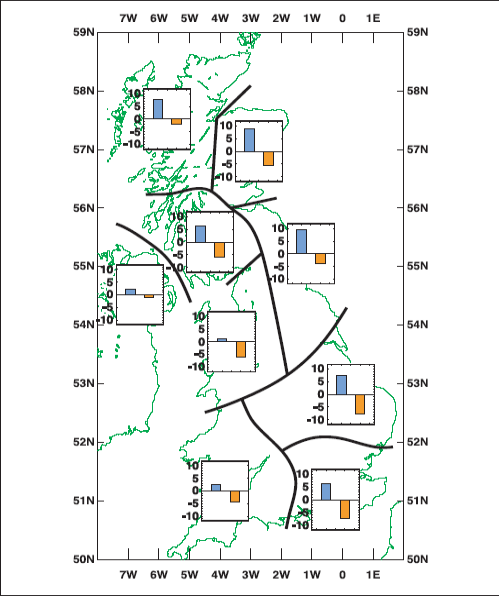
Indicator	Data Source	Current Data	Comparators	Trend
		<p>The mammal population includes brown hare and five bat species: pipistrelle, Daubenton's, brown long-eared, whiskered and noctule.</p> <p>A number of rare invertebrates can be found at Sandscale Haws, the silver spiny digger wasp and ruby-tailed wasp, the bee fly, southern grass bug, flat-backed millipede and Adonis' ladybird.</p>		
Local Nature Reserves (LNR)	17	<p>There are 122 LNR within the North West, 9 within Cumbria. The following 2 LNR's are within 20 km of the site:</p> <ul style="list-style-type: none"> • Driggs Dune and Gullery, Ravenglass, approximately 16 km from the site • Millom Ironworks, approximately 4.5km to the east of the site 		
Hodbarrow RSPB Reserve	18	<p>Hodbarrow lagoon RSPB reserve was formed by the flooding of a former mine; it hosts a wide array of breeding birds including sandwich, common, little and artic tern populations. The reserve is approximately 3.5 km from the site.</p>		
Local Wildlife Sites	19	<p>Information to be obtained from a local record centre at the appropriate time.</p>		
<p>Legally protected Species</p> <p>*EPS = European Protected Species</p>	20	<p>The following legally protected species have been recorded within 10 km of the site (please note this excludes birds, plants and terrestrial invertebrates, for which there are a vast number of different species):</p> <ul style="list-style-type: none"> • Common bat species (EPS) • Great crested newt (EPS) • Natterjack toad (EPS) • Common species of reptile (adder, common lizard a grass snake) • Otter (EPS) • Water vole <p>Further information on species records within the area will need to be obtained from a Local Records Centre by the nominator at the appropriate time to inform the EIA. The above list gives an early indication only of what may occur in the area. It is likely that additional species will need to be considered once further information has been obtained.</p>		

Key to Data Sources

1	North West Biodiversity Forum. http://www.biodiversitynw.org.uk/default.asp
2	Cumbria Wildlife Trust. Cumbria Biodiversity Action Plan. http://www.wildlifeincumbria.org.uk/cbap/generic_biodiversity.asp
3	Joint Natural Conservation Committee (JNCC). Cumbria Biodiversity Action Plan: http://www.ukbap.org.uk/lbap.aspx?ID=436
4	JNCC. UK SAC Sites. http://www.jncc.gov.uk/page-1458
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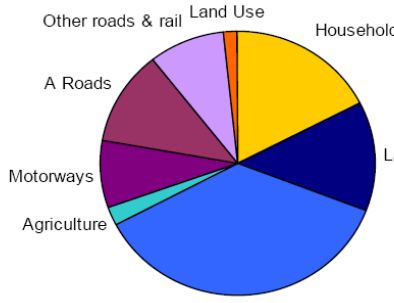
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Climate Change

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Climate Change				
<p>North West England, Region (Precipitation and Temperature)</p>	<p>1,2,3</p>	<p>Compared with the rest of England, Cumbria has a cold climate and winters are severe, with heavy snowfall in the mountains. This region is the wettest part of England and in the Lake District the average annual rainfall is over 2,540 mm (100 inches); elsewhere in the county it is in the region of 1,520-2,540 mm (60-100 in).</p> <p>The following trends have been observed in the North West Region:</p> <ul style="list-style-type: none"> • 0.4°C rise in annual mean temperature at Manchester Airport between 1988 and 1997 (compared to the 1961 – 1990 30 year average) • 20% decrease in summer rainfall over the last century • Increase in high intensity rainfall since the 1960s • Seasonal rainfall varying by as much as 15% from the average in the last 30 years • Sea level rise at Liverpool of around 6cm in the last 50 years • Increased flooding of some of the region’s major rivers in the last few 	 <p>Figure 18: Average observed 1961-1990 winter and summer temperature (°C, top) and precipitation (mm, bottom) in the UK. Data on a 5 km grid.</p>	 <p>Figure 12: The trend (1961 to 2000) in the fraction of the total seasonal precipitation contributed by the "most intense" precipitation events in winter (left-hand bars) and in summer (right-hand bars) for a number of UK regions. Positive (blue) numbers indicate an increasing trend in the proportion of the total precipitation that comes from the "most intense" events, i.e., "most intense" events are increasing either in frequency or in intensity. The lower bound to the class of "most intense" events is defined (separately for each season and region) by an amount (mm) calculated from the 1961 to 1990 period, namely the daily precipitation exceeded on a minimally sufficient number of days necessary to account for precisely 10 per cent of the seasonal precipitation. [Source Tim Osborn]</p>

Indicator	Data Source	Current Data	Comparators	Trend
		<p>decades</p> <ul style="list-style-type: none"> Evidence of coastal erosion with potential serious consequences for this region (1909-2055 in the Merseyside region) 	<p>It is envisaged that extreme weather, such as heat waves, droughts, storms and floods, will become more frequent and more severe. This will have a major impact on the people, landscapes and businesses of Cumbria. The consequences predicated for the North West are:</p> <ul style="list-style-type: none"> The frequency of extreme weather events, such as floods, droughts, and storms, is likely to increase in Cumbria, causing disruption to services, and affecting people's health and wellbeing A rise in sea levels due to climate change-related events A rise in temperature would put areas such as the Lake District National Park, part of the Yorkshire Dales National Park, the North Pennines, and the Solway Firth at risk of drought and deterioration of plant life and melting of snow caps Large parts of Cumbria have been identified as key areas for mosquito habitation should temperatures increase. This could have profound implications on health, as mosquitoes can spread a range of diseases It is possible that climate change could bring some benefits to Cumbria. An increase in temperature and hours of sunshine could help bring an increase in investment and spending to Cumbria's coastal resorts 	

Indicator	Data Source	Current Data	Comparators	Trend
Greenhouse Gas Emissions	3,6	<p>The recent NWRA Energy and Greenhouse Gas Emissions Inventory sets out the challenges facing Cumbria on climate change and they include:</p> <ul style="list-style-type: none"> • Of the 5 sub-regions, Cumbria has the lowest overall emissions (measured as CO₂ equivalent), but the highest per capita emissions (CO₂ equivalent), due mainly to its dispersed population and the need to travel by road; • CO₂ represents the greatest source of greenhouse gas emissions in Cumbria at 75%, but this figure is considerably lower than in other sub-regions (Greater Manchester – 91%, Merseyside 91%, Cheshire – 90%, Lancashire – 86%). This is due to a much higher contribution in Cumbria of methane (17%) and nitrous oxide (6%) emissions arising from agriculture and natural processes. • Cumbria is the only sub-region where transport is the largest sector contributing to carbon emissions (representing 28% of total emissions). 		
Cumbria County Council Greenhouse Gas Emissions	2,4,6,7	<p>The breakdown of CO₂ emissions in Cumbria is shown in the pie chart below. Total CO₂ emissions in the county amount to 7.4 million tonnes per year, of which 607,000 tonnes (8%) is attributed to traffic on the M6 (the accounting of emissions from the M6 should be omitted from local data). Just over 3.8 million tonnes (52%) are due to industry and commerce and, of this, 988,000 tonnes are emitted by 14 large manufacturing sites. Tourism accounts for between 750,000 and 1,080,000 tonnes (10-15% of total emissions).</p>		

Indicator	Data Source	Current Data	Comparators	Trend												
		<div data-bbox="560 316 1444 778" style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Cumbria CO2 Emissions 2005 - kT CO2</p>  <table border="1" data-bbox="1070 542 1433 742" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2">Total CO2 Emissions:</td> </tr> <tr> <td colspan="2" style="text-align: center;">7,420,000 tonnes</td> </tr> <tr> <td>Industry & Commerce</td> <td style="text-align: right;">52%</td> </tr> <tr> <td>Transport</td> <td style="text-align: right;">29%</td> </tr> <tr> <td>Households</td> <td style="text-align: right;">17%</td> </tr> <tr> <td>Land Use</td> <td style="text-align: right;">2%</td> </tr> </table> <p style="font-size: small;">Source: Defra LA Area CO2 Indicator Analysis, EU ETS</p> </div> <p data-bbox="548 810 1444 1149">The table below shows that emissions as a result of energy use in the industrial and domestic sectors are relatively high compared to national figures. For domestic emissions, households in the North West emit, on average, 6.2tCO₂Eqv, compared to a national average of 5.4tCO₂Eqv. This is despite above average levels of fuel poverty in the region, and is likely to reflect the age and quality of the housing stock. Other sources of CO₂ emissions; from industrial processes, waste and agriculture; are comparatively small. However, of the other greenhouse gases, it is worth noting that the North West accounts for just over 30% of national emissions of Hydroflouorocarbons (HFCs) as a result of production facilities in the region.</p>	Total CO2 Emissions:		7,420,000 tonnes		Industry & Commerce	52%	Transport	29%	Households	17%	Land Use	2%		
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Indicator	Data Source	Current Data		Comparators		Trend	
			UK CO ₂ emissions (thousand tonnes)	NW CO ₂ emissions (thousand tonnes)	% of UK emissions (for that sector)		% of regional total emissions
		Domestic	133,802.67	18,506.67	13.83	29.73	
		Industrial	97,177.84	13,787.43	14.19	22.15	
		Services	58,445.15	6,148.31	10.52	9.88	
		Energy transformation	39,948.80	3,781.05	10.82	6.07	
		Energy Industry use	45,370.78	2,959.39	6.52	4.75	
		Fugitive emissions	20,258.24	1,751.01	8.64	2.81	
		Other	9,507.55	1,116.17	11.74	1.79	
		Transport	128,134.07	14,189.54	11.07	22.8	
		TOTAL	527,645.10	62,239.56	11.80		
		<p>Cumbria Strategic Partnership has signed up to the Local Area Agreement indicator NI 186 to reduce per capita CO₂ emissions across Cumbria as a whole, excluding emissions from large industry, motorways, large scale renewables and excluding 'indirect emissions' from food or imported goods into the county. The target is 11.5% savings by 2010/11, which equates to savings of 619,000 tonnes CO₂ per year. Of this, national initiatives are assumed to contribute 7.75%, leaving 3.75% to be achieved by local actions, or the local component of national programmes. This equates to around 202,000 tonnes CO₂ per year. The baseline CO₂ emissions for Cumbria for this indicator are 5,379,000 tonnes, split by district and sector as shown below.</p>					

Indicator	Data Source	Current Data	Comparators				Trend	
		CO2 emissions (kt CO2) 2005 by End User						
		Industry and Commercial (not inc ETS installations or diesel railways)	Domestic	Road Transport (not including motorways)	Total emission for indicator	Population Thousands	Per capita Total CO2 (tonnes)	
		Local Authority						
		Allerdale	748	258	280	1,286	94.4	13.6
		Barrow-in-Furness	396	162	70	628	71.9	8.7
		Carlisle	406	269	245	919	102.9	8.9
		Copeland	240	182	120	542	70.0	7.7
		Eden	475	137	293	905	51.7	17.5
		South Lakeland	440	301	359	1,099	104.9	10.5
		CUMBRIA TOTAL	2,704	1,309	1,366	5,379	496	10.85
		TOTAL NORTH WEST	22,137	17,062	9,647	48,845	6,840	7.1
		UK TOTAL	191,654	151,278	104,651	447,583	60,238	7.4
		<p>The site is located in the Copeland Local Authority (4th row from the top).</p> <p>The Cumbria Climate Change Strategy states that locally the electricity network remains vulnerable to the impacts of severe storms, particularly in rural areas, and the grid is insufficiently flexible to accommodate new connections.</p>						

Indicator	Data Source	Current Data	Comparators	Trend								
Copeland Borough Council Greenhouse Gas Emissions	2,7	Local Authority and Government Office Region	Industry and Commercial	Domestic	Road Transport	Land use change and forestry	Total	Population Thousands ⁽¹⁾	Per capita Total CO2 (tonnes)	Domestic per capita CO2 (tonnes)		
		Allerdale	804	254	305	41	1404	93	15.0	2.7		
		Barrow-in-Furness	323	159	75	5	563	72	7.8	2.2		
		Carlisle	480	265	363	25	1132	101	11.2	2.6		
		Copeland	290	179	132	4	606	69	8.7	2.6		
		Eden	803	135	628	26	1593	50	32.0	2.7		
		South Lakeland	500	296	589	23	1409	102	13.8	2.9		
		TOTAL NORTH WEST										
			27201	16872	16637	607	61317	6730	9.1	2.5		
Topic: Energy												
Energy	8,9,10	<u>Electricity Consumption 2007 (Copeland)</u> Overall: 263.2 GWh (0.08% of UK) Average Domestic Consumption: 4,397 kWh Average Industrial Consumption: 42,281 kWh <u>Total Energy Consumption 2006 (Copeland)</u> 1,447.3 GWh					Copeland's electricity consumption accounts for less than 0.1% of Britain's electricity consumption. 18% of Copeland's energy consumption comes from electricity. The Regional Spatial Strategy for North West England seeks to: <ul style="list-style-type: none"> Promote and exploit low carbon and renewable energy technologies and 					

Indicator	Data Source	Current Data	Comparators	Trend
		<p><u>Electricity Consumption 2007 (North West England)</u></p> <p>Overall: 35,352.7 GWh</p> <p>Average Domestic Consumption: 4,226 kWh</p> <p>Average Industrial Consumption: 91,275 kWh</p> <p><u>Electricity Consumption 2007 (Great Britain)</u></p> <p>Overall: 309,669.5 GWh</p> <p>Average Domestic Consumption: 4,392 kWh</p> <p>Average Industrial Consumption: 79,077 kWh</p> <p><u>Total Energy Consumption 2006</u></p> <p>North West England: 200,208.9 GWh</p> <p>UK: 2,120,261.5 GWh</p>		<p>increase the amount of electricity and energy for heating from renewable sources supplied and consumed within the Region.</p> <ul style="list-style-type: none"> • Policy EM 18: Decentralised Energy Supply Plans and strategies should encourage the use of decentralised and renewable or low-carbon energy in new development [...]
Renewable Energy	8,10	<p><u>Energy Consumption from Renewable Sources 2006 (Copeland)</u></p> <p>6.2 GWh (0.4%)</p> <p><u>Total Energy Consumption from Renewable Sources 2006</u></p> <p>North West England: 701.4 GWh (0.35%)</p> <p>UK: 6,939.5 GWh (0.3%)</p>		<p>The Regional Spatial Strategy (RSS) for North West England states:</p> <ul style="list-style-type: none"> • Policy DP 9: [...]. Measures to reduce emissions might include as examples: Increasing renewable energy capacity [...] • Policy EM 17: Renewable Energy By 2010 at least 10% of electricity supplied within the region should come from renewable energy sources (15% by 2015, 20% by 2020). <p>The North West Sustainable Energy Strategy states:</p> <ul style="list-style-type: none"> • The North West possesses some of the best renewable energy resources in the

Indicator	Data Source	Current Data	Comparators	Trend
				<p>UK.</p> <ul style="list-style-type: none"> It also contains some of its most beautiful and ecologically fragile landscapes, which are particularly sensitive to the siting of some renewable energy technologies.
Current Capacity	11,12	<p>Sellafield B power station has a capacity of 1,188 MW. It is expected to operate until 2035.</p> <p>Sellafield A Power Station ceased operation in 2006 and had a power output of 420 MW.</p> <p>Other power stations in the vicinity include:</p> <ul style="list-style-type: none"> Roosecote Power Station: CCGT, 229 MW, 16 km Heysham 1 and 2 Power Stations: Nuclear, 1,150 MW and 1,250, 32 km 		

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10	Wikipedia (July 2008). Power Stations in the North West http://en.wikipedia.org/wiki/Category:Power_stations_in_North_West_England

¹¹ Data from the Regional Spatial Strategies (RSS) and other regional plans and strategies were used to inform the AoS reports published in November 2009. On 6 July 2010, the Secretary of State for Communities and Local Government, announced the revocation of Regional Strategies and the other documents noted with immediate effect. However, the RSS and other revoked regional documents remain a useful source of background data on regional sustainability issues, so references to these documents have been retained in later revisions of the AoS. The strategies and policies set out in the revoked regional documents may in future be taken forward by other means in local or strategic planning and applicants will need to consider this in developing their future plans

Communities: Population and Economy

Indicator	Data Source	Current Data			Comparators		Trend
Topic: Population							
Age of population	1, 2, 3		Millom Without	Copeland (Non-Metropolitan District)	North West	England	<p>This data is taken from the April 2001 Census. The site falls within the ward boundary of Millom Without. The North West population was stated as 6.7 million with approximately 10 % living in the Copeland District.</p> <p>The North West had a population of 6.9 million in 2006. Population has increased by 1.2 % compared with mid-2001, but has decreased by 1.3 % since 1981. The largest percentage change was a 20 % increase in Eden².</p> <p>The population of Copeland is 70,300 - 2006 mid-year estimate (69,318 in 2001 Census).</p>
		All People (Count)	1,430	69,318	6,729,764	49,138,831	
		People aged 0-4 (%)	3.50	5.37	5.88	5.96	
		People aged 5-7 (%)	3.22	3.57	3.78	3.74	
		People aged 8-9 (%)	2.03	2.60	2.74	2.61	
		People aged 10-14 (%)	6.50	6.84	6.93	6.57	
		People aged 15 (%)	1.96	1.34	1.37	1.27	
		People aged 16-17 (%)	3.22	2.59	2.66	2.51	
		People aged 18-19 (%)	2.59	2.23	2.47	2.40	
		People aged 20-24 (%)	2.94	4.78	5.79	6.01	
		People aged 25-29 (%)	2.80	5.70	6.18	6.65	
		People aged 30-44 (%)	18.88	22.78	22.09	22.65	
		People aged 45-59 (%)	25.80	20.12	19.06	18.88	
		People aged 60-64 (%)	7.34	5.65	5.09	4.87	
		People aged 65-	9.23	9.28	8.59	8.35	

Indicator	Data Source	Current Data			Comparators		Trend
		74 (%)					
		People aged 75-84 (%)	7.41	5.59	5.55	5.60	
		People aged 85-89 (%)	1.47	1.05	1.24	1.30	
		People aged 90 and over (%)	1.12	0.52	0.61	0.64	
		Mean age of population in the area	43.59	39.61	38.61	38.60	
		Median age of population in the area	46.00	39.00	38.00	37.00	
		<p>The population in Millom Without and Copeland is older than the national and regional average.</p> <p>In Millom Without about 10 % of the population is aged over 75 years, with 2.6 % aged over 85 years.</p> <p>People aged 65 years and older make up approximately 16.4 % of the Copeland population. This is higher than the national average.</p> <p>The population of Copeland is 70,300 - 2006 mid-year estimate (69,318 in 2001 Census).</p> <p>Of this 70,300 population; 12,800 are aged 0 to 15, 43,200 are of working age, and 14,300 are older than working age. The mean average age is 40 years old compared with an average age of 39 for England and Wales.</p> <p>2.2 % of the resident population is retired compared with 13.2 % in England and Wales overall. The Borough has low numbers of resident ethnic minority groups, and the population is overwhelmingly 'white' (Census classification), with 99.3 % of the resident population belonging to this category.</p>					

Indicator	Data Source	Current Data	Comparators	Trend	
		Although two thirds of the Borough lies within the Lake District National Park, only about 4000 people live within the National Park boundaries.			
Topic: Employment					
Percentage Economically Active – Employed %	1, 2	Millom Without	Copeland (Non-Metropolitan District)	North West	England
		Full Time 31.22	37.26	38.77	40.81
		Part Time 9.99	12.80	11.87	11.81
		<p>In the second quarter of 2007 the employment rate (for people of working age) in the North West was 73 %, slightly lower than the UK rate of 74 %.</p> <p>Full time employment levels are lower at ward and district level than the regional and national average.</p> <p>Part time employment levels at ward level are lower than the national and regional average. They are higher at district level.</p>			
Percentage Economically Active – unemployed %		2.40	5.02	3.63	3.35
		Unemployment levels are lower at ward level than the regional and national average. There are higher at the district levels.			
Industry of employment		Millom Without	Copeland (Non-Metropolitan District)	North West	England
All persons		100% (660)	100% (29,222)	100% (2,900,020)	100% (22,441,498)
Agriculture/Forestry (%)		16.21	2.87	1.22	1.45

Indicator	Data Source	Current Data		Comparators		Trend
Fishing (%)		0.00	0.05	0.01	0.02	
Mining (%)		1.21	0.35	0.16	0.25	
Manufacturing (%)		14.39	27.19	16.89	14.83	
Electricity/Gas/ Water Supply (%)		0.61	3.35	0.77	0.71	
Construction (%)		6.06	8.97	6.49	6.76	
Wholesale/ Retail Trade (%)		10.15	12.33	17.82	16.85	
Hotels/ Restaurant (%)		6.67	5.99	5.13	4.73	
Transport/ Communication s (%)		3.03	3.84	6.79	7.09	
Financial (%)		0.91	1.06	3.77	4.80	
Real Estate (%)		8.79	8.20	10.80	13.21	
Public Admin (%)		7.73	4.92	5.68	5.66	
Education (%)		9.39	6.21	7.95	7.74	
Health and Social Work (%)		12.42	10.93	11.97	10.70	
Other (%)		2.42	3.73	4.54	5.20	
Self Employed (%)		20.56	6.40	7.10	8.32	

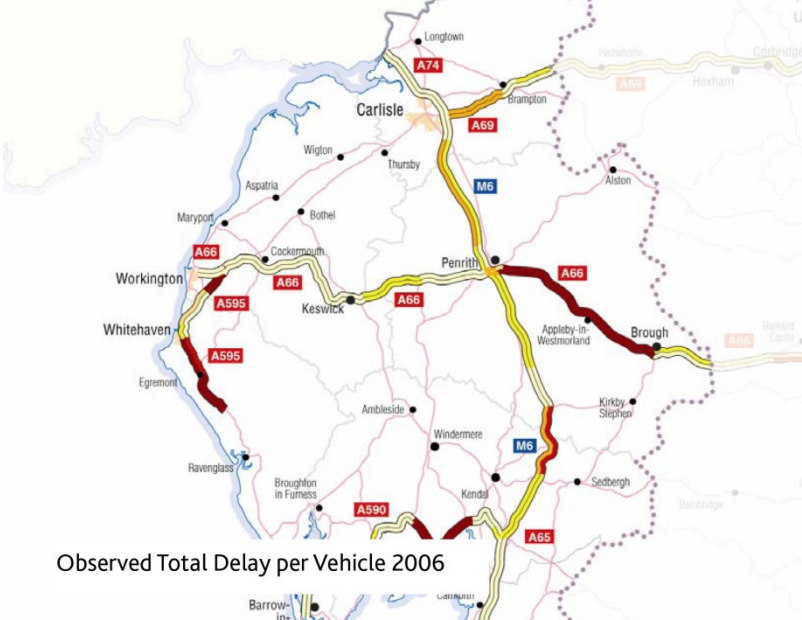
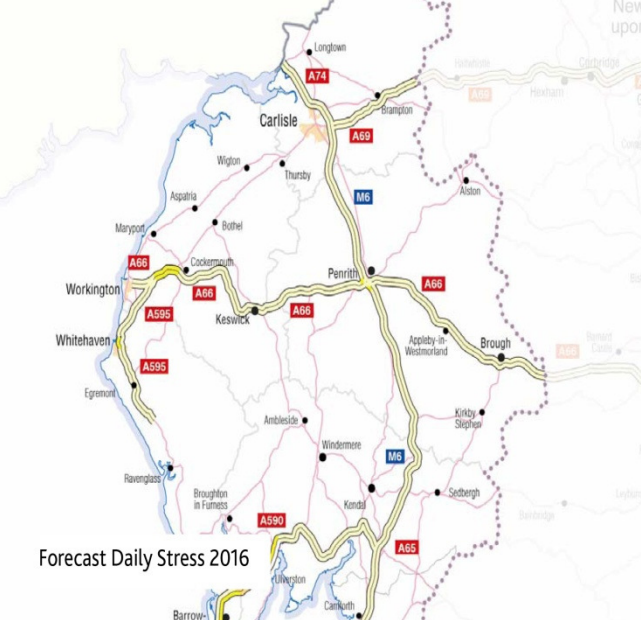
Indicator	Data Source	Current Data		Comparators		Trend
Socio-Economic Classifications 2001 (% Persons aged 16-74)		Millom Without	Copeland (Non-Metropolitan District)	North West	England	
Large employers and higher managerial occupations		4.23	2.64	2.86	3.50	
Higher professional occupations		6.05	3.09	4.17	5.11	
Lower managerial and professional occupations		17.29	13.96	16.78	18.73	
Semi-routine occupations		7.68	13.01	12.17	11.65	
Routine occupations		6.72	11.73	9.82	9.02	
Never Worked		1.73	2.65	3.13	2.72	
Full-time students		4.61	4.04	6.97	7.03	
		<p>According to the 2001 Census, the unemployment rate in Copeland was 5 %.</p> <p>41 % of the population was working in 2001.</p> <p>Of the 28,618 jobs in Copeland, around 50 % of those depend on the Sellafield nuclear power station (including jobs on site, and jobs which rely on the site).</p>				



Indicator	Data Source	Current Data	Comparators	Trend
		<p>There has been a decline of around 3,500 manufacturing jobs in recent years, although this has been masked by continued recruitment at Sellafield.</p> <p>34 % of the 16-74 year old population have no educational qualifications. This compares to a national average of 29 %.</p>		

Key to Data Sources

1	Office for National Statistics (2001). Neighbourhood Statistics: Millom. http://neighbourhood.statistics.gov.uk/dissemination/LeadAreaSearch.do;jsessionid=ac1f930d30d766b26c1de04a4ed6937de22a12f85f21?a=7&r=1&i=1001&m=0&s=1241011397923&enc=1&areaSearchText=Millom&areaSearchType=14&extendedList=false&searchAreas=Search&nsjs=true&nsck=true&nssvg=true&nswid=1003
2	National Statistics. http://www.statistics.gov.uk/cci/nugget.asp?id=1127
3	Copeland Borough Council. Copeland Fast Facts. http://www.copeland.gov.uk/default.aspx?Page=341

Communities: Supporting Infrastructure

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Transport				
Regional Freight Routes	4	 <p>Observed Total Delay per Vehicle 2006</p>	 <p>Forecast Daily Stress 2016</p>	

Indicator	Data Source	Current Data	Comparators	Trend
		 <p>Observed Stress 2006</p>	 <p>Forecast Daily Stress 2026</p>	<p>West Cumbria is crossed by north to south strategic transport corridors, en route from Carlisle to Barrow-in-furness. The M6 and other core national routes are remote from the area. The main transport corridors are:</p> <p>Road</p> <ul style="list-style-type: none"> • M6 (Carlisle to Manchester); • A66(T) (Penrith to Cockermouth, via Keswick) – Single carriageway from Penruddock to Cockermouth • A595 (to Carlisle and trunked on the northern section) • A590/A5092 (to M6 junction 36). <p>Rail</p> <ul style="list-style-type: none"> • West coast main line; • Cumbrian Coast line (Camforth to Carlisle via Whitehaven);

Indicator	Data Source	Current Data	Comparators	Trend
		<p>The county road network may be characterised as:</p> <ul style="list-style-type: none"> • Unreliable journey times; • Low overall journey speed; • Environmental impact upon roadside communities; and • Variable standard of highway provision. 		
Topic: Waste				
Municipal Waste	1,2,3	<p>A total of 4,215,000 tonnes of wastes were generated in the North West of England in 2006/07. Landfill remains the predominant method of municipal waste disposal in the East of England, where 66 % of waste was dealt with in this manner in 2007. During this period, 31 % of municipal waste was recycled, with the remaining 3 % incinerated.</p> <p>Cumbria County Council acts as the Waste Disposal Authority (WDA) for Copeland Borough Council. In 2006/07 351,403 tonnes of municipal wastes were generated within the area. Of this total, 68 % was sent to landfill, and the remaining 32 % recycled. A relatively insignificant proportion (25 tonnes) was incinerated during this period.</p> <p>Cumbria's seven local authorities have formed the Cumbria Strategic Waste Partnership (CSWP). The County Council is currently in the process of procuring MBT waste treatment plant for sites at Carlisle and Barrow (contract currently approved). Two MBT plants will provided for the region, with a treatment capacity of 70,000 tonnes of waste each.</p> <p>There are currently three non-hazardous landfill sites in the region. No detailed information exists as to their projected capacity. There are currently no hazardous waste landfills or treatment facilities in the Cumbria County region, although established waste management contractors are known to operate and provide services within the region.</p>		<p>Over the period 2000/01 to 2006/07, there has been an overall increase of just over 2 % in the amount of municipal wastes generated in the North West of England, rising from 4,125,000 to a peak of 4,380,000 in 2003/4, and subsequently declining steadily to the 2006/7 figure of 4,215,000 tonnes.</p> <p>There has however been a consistent and noticeable reduction in the amount of wastes disposed of at landfill sites, which has reduced from 90 % in 2000/01 to 66 % in 2006/07. This reduction largely correlates with the increase in recycling rates across the region, particularly as the amount of municipal wastes treated at Energy fom Waste plants has largely remained the same throughout that period at 1 %.</p>
Radio-active and		<p>The operation of a new nuclear power station at the site will require the interim storage of spent fuel and intermediate level waste on site for a</p>		

Indicator	Data Source	Current Data	Comparators	Trend
Hazardous Waste		period of approximately 100 years after operation has ceased. The arrangements for dealing with all types of radioactive and hazardous waste arising from the operation and decommissioning of new power stations, (including gaseous and liquid radioactive discharges), are appraised in Chapter 6 of the Main AoS Report.		

Key to Data Sources

1	Department for Environment, Food and Rural Affairs (April 2008). Municipal Waste Management Statistics. http://www.defra.gov.uk/environment/statistics/wastats/bulletin07.htm [accessed 18 March 2009]
2	Cumbria County Council. Joint Municipal Waste Management Strategy: Cumbria Strategic Waste Partnership. http://www.cumbria.gov.uk/planning-environment/waste-management/JMWMS.asp
3	Urban Mines. Municipal Waste Procurements. http://www.urbanmines.org.uk/?i=1459&s=1111 [accessed 18 March 09]
4	West of England Partnership (2006). Final Joint Local Transport Plan 2006/07 - 2010/11. Freight Supporting Statement. http://www.westofengland.org/transport/jltp/final-joint-local-transport-plan-200607-201011

Human Health and Well-Being

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Human Health and Well-being				
Community well-being	1	<p>A useful gauge of the overall well-being of the area can be obtained from the various deprivation indices on the Office of National Statistics, Neighbourhood Statistics web page. From this data the following comparison between Super Output Area, Copeland 008E and England as a whole can be drawn:</p> <ul style="list-style-type: none"> • Income deprivation is less than average • Employment deprivation is slightly less than average • Health deprivation is approximately average • Education deprivation less than average • Barriers to housing and services are much greater than average • Crime is much less than average • Living environment deprivation is greater than average 		
Index of multiple deprivation (2007)	2	The Department of Communities and Local Government's index of deprivation (an index combining a range of economic, social and housing issues into a single deprivation score) shows Copeland Borough Council's	<p>Other borough councils in Cumbria are ranked as follows:</p> <ul style="list-style-type: none"> • Allerdale is 119 • Barrow-in-Furness is 29 	

Indicator	Data Source	Current Data	Comparators	Trend																				
		area ranked as 78 out of 354 (where 1 is most deprived). This ranking shows that the Copeland area is deprived.	This indicates that levels of deprivation in the region in general are high, with Barrow-in-Furness, which is adjacent to Copeland, being one of the most deprived areas in England.																					
Age profile (mid 2006)	1	<p>In the Super Output Area, Copeland 008E the age profile of the population is as follows:</p> <table border="1"> <thead> <tr> <th>Age Band (years)</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>0 – 15</td> <td>14.0</td> </tr> <tr> <td>16 – 64 (males)</td> <td rowspan="2">61.3</td> </tr> <tr> <td>16 – 59 (females)</td> </tr> <tr> <td>65+ (males)</td> <td rowspan="2">24.7</td> </tr> <tr> <td>60+ (females)</td> </tr> </tbody> </table>	Age Band (years)	Percentage	0 – 15	14.0	16 – 64 (males)	61.3	16 – 59 (females)	65+ (males)	24.7	60+ (females)	<p>For comparison, the age profile for the UK as a whole in 2006 is as follows:</p> <table border="1"> <thead> <tr> <th>Age Band (years)</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>0 – 15</td> <td>20.1</td> </tr> <tr> <td>16 – 64 (males)</td> <td rowspan="2">61.6</td> </tr> <tr> <td>16 – 59 (females)</td> </tr> <tr> <td>65+ (males)</td> <td rowspan="2">18.3</td> </tr> <tr> <td>60+ (females)</td> </tr> </tbody> </table> <p>As can be seen from the tables, Copeland has a lower proportion of younger people and a correspondingly higher proportion of people in the upper age bracket (retired or approaching retirement) compared to the UK as a whole. There is therefore a similar percentage of people of working age in the area.</p>	Age Band (years)	Percentage	0 – 15	20.1	16 – 64 (males)	61.6	16 – 59 (females)	65+ (males)	18.3	60+ (females)	
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General health (2001)	1	<p>For the census in 2001, people were asked whether their health over the preceding twelve months was 'good', 'fairly good' or 'not good'. The results for the Super Output Area, Copeland 008E were as follows:</p> <ul style="list-style-type: none"> • Good – 70.6 % 	<p>For comparison purposes, the same data for the overall Copeland area and England are as below:</p> <table border="1"> <thead> <tr> <th></th> <th>Copeland</th> <th>England</th> </tr> </thead> <tbody> <tr> <td>Good</td> <td>66.7</td> <td>68.8</td> </tr> <tr> <td>Fairly good</td> <td>22.9</td> <td>22.2</td> </tr> </tbody> </table>		Copeland	England	Good	66.7	68.8	Fairly good	22.9	22.2												
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Indicator	Data Source	Current Data	Comparators	Trend												
		<ul style="list-style-type: none"> Fairly good – 19.4 % Not good – 10.0 % 	<table border="1"> <tr> <td>Not good</td> <td>10.3</td> <td>9.0</td> </tr> </table> <p>Overall there are more people reporting good health in the Super Output Area, Copeland 008E than in England as a whole although a slightly higher percentage report poor health.</p>	Not good	10.3	9.0										
Not good	10.3	9.0														
Life expectancy at birth (Jan 04 – Dec 06)	1	<p>2001 census data showed that the life expectancy at birth in Copeland Borough council were:</p> <table border="1"> <thead> <tr> <th></th> <th>Copeland</th> </tr> </thead> <tbody> <tr> <td>Males</td> <td>79.80</td> </tr> <tr> <td>Females</td> <td>82.90</td> </tr> </tbody> </table>		Copeland	Males	79.80	Females	82.90	<table border="1"> <thead> <tr> <th>NW of England</th> <th>England</th> </tr> </thead> <tbody> <tr> <td>78.30</td> <td>77.32</td> </tr> <tr> <td>82.30</td> <td>81.55</td> </tr> </tbody> </table> <p>As can be seen from above, the life expectancy in the Copeland Borough Council area is good with ages slightly above the national average for England.</p>	NW of England	England	78.30	77.32	82.30	81.55	Data from the same source for previous years show that these figures for life expectancy at birth in the Copeland Borough Council area have risen slightly for both males and females since 2001.
	Copeland															
Males	79.80															
Females	82.90															
NW of England	England															
78.30	77.32															
82.30	81.55															
Infant mortality (Jan 03 – Dec 05)	1	<p>Infant mortality in the Copeland Borough Council area for the years in question was 4.5 persons in every 1000.</p>	<p>This compares to the figure of 4.2 persons for the North-west of England region and 5.1 persons per thousand in England as a whole.</p>	Data from the same source for previous years show that figures for infant mortality in the Copeland Borough Council area have risen slightly from a low in 2002-04 but are lower than they were in 1998-2000.												
Proximity to medical services	3	<p>Medical services in the area of the Millom site are as follows:</p> <ul style="list-style-type: none"> One General Practitioner (GP) practice (Waterloo House Surgery) within 5 km of the site. Four other GP practices are within 10 km of the site. 														

Indicator	Data Source	Current Data	Comparators	Trend
		<ul style="list-style-type: none"> Closest hospital is Millom Hospital (3.7 km) but this has no Accident and Emergency department Closest hospital with an Accident and Emergency department is Furness General Hospital at Dalton Lane, Barrow-in-Furness which is 11.6 km away The nearest hospital providing mental health services is Parkwood Hospital which is 48.4 km away 		
Education - examination results for young people (2006 – 07)	1	In the Super Output Area, Copeland 008E, 59 % of pupils achieved 5 or more A*- C grade passes including English and Mathematics at GCSE or equivalent.	This compares to the figure of 34 % of students for the Copeland Borough Council area and 46 % of students for England as a whole.	
Housing – total unfit dwellings (Apr 06)	1	The total percentage of unfit dwellings in the Copeland Borough Council area for the year in question was 5.5 %.	This compares to a percentage of 5.2 % for the North-west of England region and 4.2 % for England as a whole.	Data from the same source show that the percentage of unfit dwellings has reduced since April 2001.
Radioactivity monitoring	4	There is no existing power station at the Kirksanton site and so no specifically targeted radiological monitoring has been carried out in the immediate vicinity. However, as the site is close to the former nuclear power station at Calder Hall, Sellafield, conclusions derived for this site by The Food Standards Agency in its annual RIFE (Radioactivity In Food and the Environment) report for 2007 are also relevant to the Kirksanton site as follows:	<p>The dose limit for members of the public specified in The Ionising Radiation Regulations 1999 is 1 millisievert (mSv) per year for all artificial sources of radiation.</p> <p>Estimations of dosage levels to the public from the Sellafield sampling were as follows:</p> <ul style="list-style-type: none"> estimated dose from locally grown foodstuffs (on land with seaweed added) was 0.012 mSv estimated dose to local fish and 	<p>Trends in the data noted from sampling in previous years are as follows:</p> <ul style="list-style-type: none"> estimated dose from locally grown foodstuffs (on land with seaweed added) was 0.013 mSv estimated dose to local fish and shellfish consumers (using personal habits derived

Indicator	Data Source	Current Data	Comparators	Trend
		<ul style="list-style-type: none"> • the power station at Sellafield (Calder Hall) ceased operation in 2003 • the other nuclear activities on the Sellafield site (two fuel reprocessing plants, decommissioning and clean-up, manufacture of mixed oxide fuel and waste treatment and storage) make it difficult to apportion any radiological effects measured • water, sediment, beach and terrestrial and marine food and animal samples were collected from around the Sellafield site in 2007 • concentrations of all radionuclides associated with gaseous discharges from the site were low • concentrations of artificial radionuclides in seafood are generally dropping or remaining static with the exception of certain of the heavier elements in lobsters • across a wide range of sampling locations and shellfish species, concentrations of lighter radionuclides were generally reduced from 2006 values • in the vicinity of Sellafield, slightly elevated concentrations of the heavier radionuclides were detected in lobsters and a range of molluscs 	<p>shellfish consumers (using personal habits derived in 2007) was 0.46 mSv (where 0.21 mSv was assessed as being due to nuclear industry discharges)</p> <ul style="list-style-type: none"> • the total dose from all sources, including direct radiation, was assessed as being 0.37 mSv 	<p>in 2006) was 0.50 mSv (where 0.24 mSv was assessed as being due to nuclear industry discharges)</p> <ul style="list-style-type: none"> • the total dose from all sources, including direct radiation, was assessed as being 0.44 mSv
Health related	5	There is no existing power station at the	For comparison purposes, the figures	

Indicator	Data Source	Current Data	Comparators	Trend
to nuclear installations		<p>Kirksanton site and so no historical data concerning incidence of childhood leukaemia, non-Hodgkin lymphoma and other malignant tumours exists at this site. However, the Committee on Medical Aspects of Radiation in the Environment (COMARE) did carry out such a study on the nearby Sellafield site in 2005 with the following results:</p> <ul style="list-style-type: none"> • actual cases of childhood leukaemia and non-Hodgkin lymphoma between 1969 and 1993 in a 25 km area around the plant were 25 • actual cases of childhood solid tumours between 1969 and 1993 in a 25 km area around the plant were 40 	<p>derived using statistics for Britain as a whole are as follows:</p> <ul style="list-style-type: none"> • the expected number of cases of childhood leukaemia and non-Hodgkin lymphoma between 1969 and 1993 in a 25 km area around the plant should have been 21.95 • the expected number of cases of childhood tumours between 1969 and 1993 in a 25 km area around the plant should have been 35.96 <p>It was concluded, from the above statistics, that there was no evidence of excess numbers of these cases in the 25 km area which would include either primary exposure to radioactive discharges or secondary exposure from re-suspended material.</p>	

Key to Data Sources

1	Office of National Statistics. Neighbourhood Statistics. http://neighbourhood.statistics.gov.uk/dissemination/home.do;jessionid=ac1f930c30d607c6170cbe3146ada704c9cac1978fc7?m=0&s=1236174480737&enc=1&bhcp=1&nsjs=true&nsck=true&nssvg=false&nswid=996
2	Department of Communities and Local Government. Indices of Deprivation. http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/
3	NHS 'Find Services'. http://www.nhs.uk/servicedirectories/Pages/ServiceSearch.aspx
4	Food Standards Agency (2008). Radioactivity In Food and the Environment (RIFE), 2007 Report. http://www.food.gov.uk/science/surveillance/radiosurv/rife13
5	Committee on Medical Aspects of Radiation in the Environment (COMARE) (2005). Tenth Report. The incidence of childhood cancer around nuclear installations in Great Britain. Health Protection Agency, June 2005. http://www.comare.org.uk/comare_docs.htm

Cultural Heritage

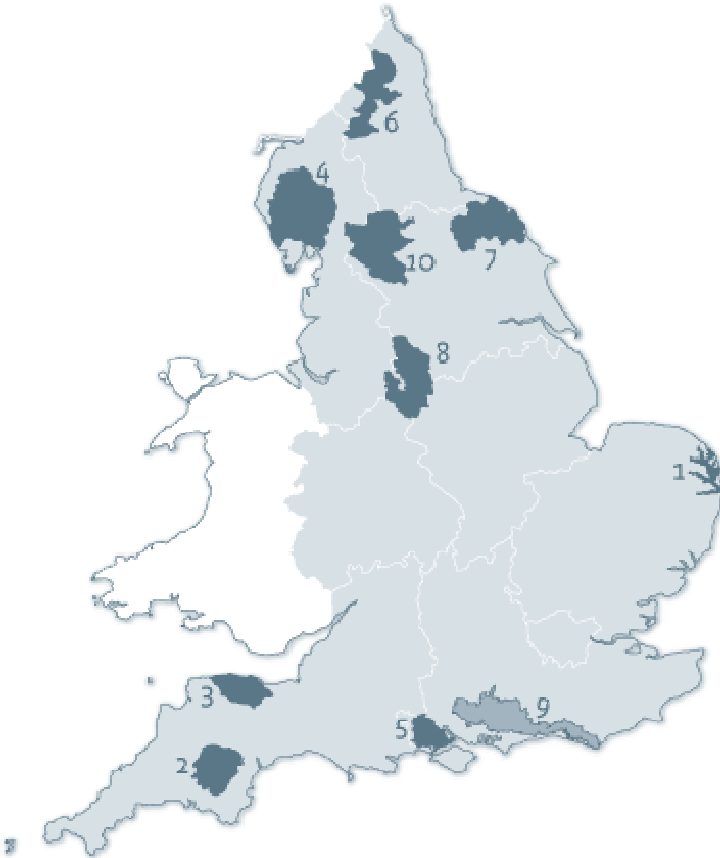
Indicator	Data Source	Current Data	Comparators	Trend
Topic: Cultural Heritage				
Scheduled Monuments	1,5	There are 8 Scheduled Monuments within an approximate 5 km distance of the site, the closest of which is the Giants Grave standing stones which are of Neolithic or Bronze Age date. The other scheduled monuments include stone circles with associated prehistoric ritual monuments, Hodbarrow Beacon, a Medieval village with associated lynchets and Millom Castle.		
Conservation Areas	2	Millom Conservation Area is located within an approximate 5 km distance of the site.		
Listed Buildings	3	There are around 4 Grade II listed buildings within an approximate distance of 2 km of the centre of the site and around 2 Grade I and 19 Grade II listed buildings within an approximate 5 km distance.		
Archaeology	3	Neolithic axes and a Bronze Age habitation site have been found either within or very close to the site. The site of RAF Millom, a World War II airfield, also lies within close vicinity if not within the site.		
Historic Landscape	4	Within or close to the site are field boundaries which are shown on late 19 th century mapping and therefore potential elements of the historic landscape lie within. The site of RAF Millom, if any features survive, is also part of the historic landscape.		

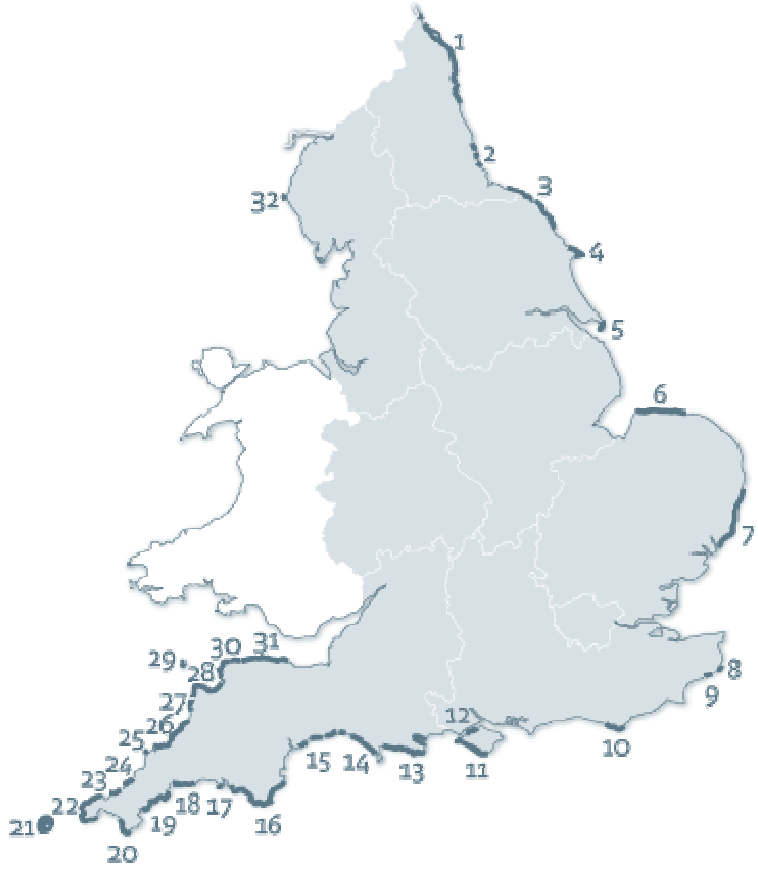
Key to Data Sources

1	MAGIC website. http://www.magic.gov.uk
2	Copeland Borough Council (2001). Copeland Local Plan. http://www.copelandbc.gov.uk/ms/www/Local-Plan/Copeland-Local-Plan-2001-2016.htm [Accessed 12 March 2009]
3	Heritage Gateway. http://www.heritagegateway.org.uk
4	First Edition Ordnance Survey. http://www.ordnancesurvey.co.uk/oswebsite/products/historicalmapdata/
5	Lake District National Park. http://www.lake-district.gov.uk/lake_district_docs95/figures_1.1_to_2.9.pdf [Accessed 12.3.2009]

Landscape

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Landscape				
National Character Area (NCA)	1, 4, 5	<p>The site is situated within the West Cumbria Coastal Plain NCA. 'Its key characteristics comprise:</p> <ul style="list-style-type: none"> • <i>Strong industrial history associated formerly with the mining of coal and iron ore and, more recently the chemical industry, power generation and nuclear reprocessing.</i> • <i>Varied open coastline of mudflats, shingle and pebble beaches, with localised sections of dunes, sandy beaches and sandstone cliffs.</i> • <i>Lowland river valleys with limited semi-natural ancient woodland, lowland raised mires and expansive estuarine landscapes with a range of intertidal habitats.</i> • <i>Gently undulating or flat improved pasture with hedgerows, wind-sheared trees and wire fences, occasional woodlands and copses, wetlands and herb-rich meadows.</i> • <i>Open agricultural landscapes that have extensive views to the higher fells in the east.</i> • <i>Extensive urban fringe areas within the coastal belt with large highly visible factories and manufacturing and processing plants, particularly near Workington, Whitehaven, Sellafield and Barrow.'</i> <p>The site also includes encompasses a wind farm and the area immediately adjacent contains a large scale open prison.</p> <p>Surrounding NCA's within the North West include:</p> <ul style="list-style-type: none"> • NCA 8- Cumbria High Fells • NCA 19- South Cumbria Low Fells 		

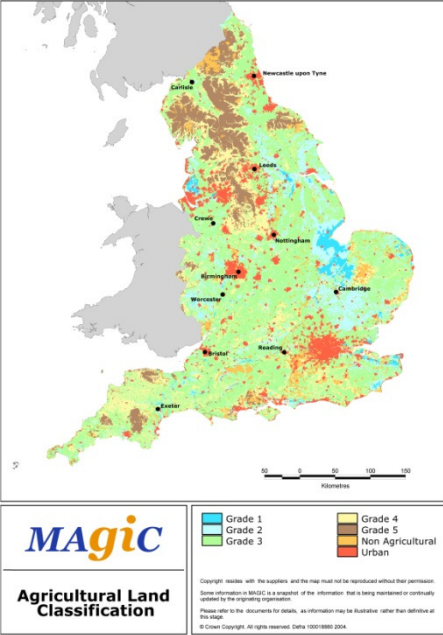
Indicator	Data Source	Current Data	Comparators	Trend
<p>National Parks</p>	<p>2, 6</p>	 <p>National Parks in England (Area 4 – The Lake District National Park is adjacent to the north of the site area. A Landscape Character Assessment has been completed for the National Park..)</p>		

Indicator	Data Source	Current Data	Comparators	Trend
Heritage Coasts	3, 7, 8	 <p data-bbox="533 1284 1742 1316">Heritage Coasts in England (Area 32- St Bees Head Heritage Coast is 30 km to the north of the site.)</p>		

Key to Data Sources

1	Natural England. Landscape Character Areas – West Cumbria Coastal Plain NCA (7). http://www.naturalengland.org.uk/Images/jca7_tcm2-21069_tcm6-5165.pdf [accessed 13 February 2009]
2	Natural England. National Parks. http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nationalparks/default.aspx
3	Natural England. Heritage Coasts. http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/heritagecoasts/default.aspx
4	Cumbria County Council. Cumbria and Lake District Joint Structure Plan 2001 - 2016: Technical Paper 5: Landscape Character 2008 Plan showing areas at: http://www.cumbriacc.gov.uk/elibrary/Content/Internet/538/755/1599/2318/2323/38520131637.pdf (Accessed March 12 2009) Landscapes of County Importance : Plan showing this: http://www.cumbriacc.gov.uk/elibrary/Content/Internet/538/755/2789/39854145824.pdf
5	Natural England. North West Character Areas. http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/northwest.aspx
6	Natural England. Lake District. http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nationalparks/lakedistrict.aspx Lake District National Park Landscape Character Assessment (LCA) http://www.lake-district.gov.uk/lake_district_docs95/landscape_character_assessment.pdf
7	Natural England. St Bees Head. http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/heritagecoasts/stbeeshead.aspx
8	English Heritage. South West. http://www.english-heritage.org.uk/hc/server/show/nav.10741 [accessed 13 February 2009]

Soils, Geology and Land Use

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Soils				
Agricultural Land Classification	1	<p>Please refer to the map. The Magic map produced by DEFRA in 2004 indicates the current agricultural grade of lands in England and Wales. These grades are Agricultural land classification Grades 1-5, non-agricultural and Urban.</p>		
Soils		<p>The soils are noted to be either deep stoneless silty and fine sandy soils or reddish fine and coarse loamy soils.</p> <p>No mineral abstractions have been identified locally.</p> <p>British Geological Society (BGS) has assessed geological risks in the local area, which include:</p> <ul style="list-style-type: none"> • Potential for shrinking or swelling clay ground stability hazard - low risk • Potential for compressible ground stability hazards - moderate risk • Potential for landslide ground stability hazards - very low risk • Potential for running sand ground stability hazards - very low to low risk 		
				

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Geology				
Geological SSSIs	2	<p>There are no geological SSSIs in the immediate area of the site. There are nine within a 4 km radius.</p> <p>These are as follows:</p> <ul style="list-style-type: none"> • Florence Mine • Nab Gill Mine • Ray and Crinkle Craggs • River Calder Section • St Bees Head • Waberthwaite Quarry • Wasdale Screes • Wast Water • Yeathouse Quarry 		
Geology and Land Quality	2	<p>The local geology is Permian and Triassic sandstones, undifferentiated, including Bunter and Keuper.</p> <p>Apart from the disused airfield, which has wind turbines currently, there is no other industrial land use in the area. HMP Haverigg is located 600 m to the east of the site.</p>		

Key to Data Sources

1	National Soil Resources Institute (2009). Soils Site Report, Full Soil Report, Ref. 27560642, National Grid Ref. SDI 380979717, Landmark Information Group.
2	Envirocheck Report (2009). Envirocheck report for National Grid Reference 313810-479920, Landmark Information Group

Water Quality and Resources

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Water Quality and Resources				
Current State of the Waters in the North West River Basin District	1, 2, 3	<p>In the North West (NW) River Basin District (RBD), 20 % of rivers (by length) meet the requirements for good ecological status or good ecological potential; the NW draft River Basin Management Plan (dRBMP) states that the target for 2015 will remain at 20 %. The majority of water bodies which fail do so because of pressures on fish populations. A greater number of ground water bodies (44 %) meet the requirements for good status. The NW RBD contains 18 % of England's derelict land and a third of the poorest quality rivers in England and Wales. 25 Special Areas of Conservation (SAC) and 7 Special Protection Areas (SPA) with features that depend on water occur in the RBD.</p> <p>Of the 477 river water bodies in the RBD, 42 % are candidate heavily modified or artificial water bodies. Of the 157 lakes and reservoirs, 40 % are candidate heavily modified or artificial water bodies; 50 % of these water bodies have not been assessed. Of the 12 identified transitional (estuary) water bodies, 9 are candidate heavily modified bodies, while for the 8 identified coastal waters, 6 are considered to be candidate artificial or candidate heavily modified bodies.</p> <p>There are 18 groundwater bodies in the NW RBD. The existing pressures and significant risks to these groundwater bodies have been identified as being from nutrient loading (nitrate and phosphate), hazardous substances (List 1 and chlorinated solvents), and abstraction and low flows (saline intrusion). Of the 18 groundwater bodies, 4 have been classified as good status, and the remaining 14 as poor.</p> <p>The groundwater body over which the site is located is the West Cumbria Permo-Triassic sandstone aquifer. This is classified as good status for both quantity and quality. However, there are nutrient pressures on the water body.</p> <p>The site is located within the South West Lakes catchment which is nested in the NW RBD. This is a mainly rural catchment, lying within the Lake District National Park. Much of the catchment consists of designated SAC and Sites of Special Scientific Interest (SSSI). Most water bodies support good populations of migratory salmon and other coarse fish. Otters and native crayfish are also present in good numbers.</p> <p>Catchment pressures come predominantly from diffuse pollution from rural sources. There are also localised pressures as a result of historic mining and isolated landfill sites. Non-native invasive species are an increasing problem. Currently 26 % of</p>		

Indicator	Data Source	Current Data	Comparators	Trend																																		
		<p>surface water bodies in this catchment achieve either good status or good potential. The NW dRBMP has set a target of 32 % of surface water bodies achieving good status or good potential by 2015.</p> <p>The site is south of the small village of Kirksanton and is situated between Haverigg Pool, which flows in a south-easterly direction, and the coast.</p> <p>Local information for the area around the site at Kirksanton from the Environment Agency (EA) web site relevant to Water Framework Directive (WFD) is summarised in the table below:</p> <table border="1"> <thead> <tr> <th rowspan="2">Sector</th> <th colspan="2">Ecological / Quantitative (GW) Quality</th> <th colspan="2">Chemical Quality</th> </tr> <tr> <th>Current</th> <th>Predicted 2015</th> <th>Current</th> <th>Predicted 2015</th> </tr> </thead> <tbody> <tr> <td>Rivers (Haverigg Pool)</td> <td>Moderate</td> <td>Not yet assessed</td> <td>Moderate</td> <td>Not yet assessed</td> </tr> <tr> <td>Groundwater (South Cumbria Lower Palaeozoic and Carboniferous Aquifer)</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Good</td> </tr> <tr> <td>Groundwater (West Cumbria Permo-Triassic sandstone aquifers)</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Good</td> </tr> <tr> <td>Coastal (Morecambe Bay and Duddon Sands) cHMWB¹²</td> <td>Not yet assessed potential</td> <td>Not yet assessed potential</td> <td>Fail</td> <td>Fail</td> </tr> <tr> <td>Coastal (Cumbria Coastline)</td> <td>Moderate</td> <td>Moderate</td> <td>Pass</td> <td>Pass</td> </tr> </tbody> </table>			Sector	Ecological / Quantitative (GW) Quality		Chemical Quality		Current	Predicted 2015	Current	Predicted 2015	Rivers (Haverigg Pool)	Moderate	Not yet assessed	Moderate	Not yet assessed	Groundwater (South Cumbria Lower Palaeozoic and Carboniferous Aquifer)	Good	Good	Good	Good	Groundwater (West Cumbria Permo-Triassic sandstone aquifers)	Good	Good	Good	Good	Coastal (Morecambe Bay and Duddon Sands) cHMWB ¹²	Not yet assessed potential	Not yet assessed potential	Fail	Fail	Coastal (Cumbria Coastline)	Moderate	Moderate	Pass	Pass
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Coastal (Cumbria Coastline)	Moderate	Moderate	Pass	Pass																																		
		<p>Many of the rivers are protected under the Freshwater Fisheries Directive, for example Haverigg Pool from Silecroft to its tidal</p>																																				

¹² Candidate Heavily Modified Water Body

Indicator	Data Source	Current Data	Comparators	Trend
		<p>limit is classified as a Salmonid Fishery while sensitive bathing waters under the EC Urban Waste Water Directive are located at Haverigg. Bathing waters to the north of the site at Silecroft were “Excellent” in 2008 (“Excellent” means the bathing water meets the strict guideline standards from the EC Bathing Water Directive) and to the south at Haverigg were “Good” (“Excellent” means the bathing water meets the mandatory standards from the EC Bathing Water Directive).</p>		
<p>Current State of the Waters in the Derwent, West Cumbria and Duddon CAMS</p>	<p>4</p>	<p>The groundwater source areas are within Drinking Water Protected Areas, but there are no groundwater protection zones.</p>	<p>The site is located within the Derwent, West Cumbria and Duddon Catchment Abstraction Management Strategy (CAMS) area.</p> <p>This CAMS area is largely rural, but there are significant industrial water abstractors along the coast. Throughout the area small-scale water abstraction is important for a range of uses including agriculture, hydropower, campsites and private water supply.</p> <p>The largest water abstractions within this CAMS area are from lakes and reservoirs. Water from Waste Water is used at the Sellafeld site to the north of the site at Kirksanton. Public water supply for the area is mainly from Crummock Water and Ennerdale, along with a number of smaller reservoirs. Thirlmere is used to supply water locally and elsewhere in the North-West.</p> <p>There are a large number of sites designated for their environmental importance within this CAMS area. The Duddon Estuary, which is immediately adjacent to the site (0.5km), is designated a water related Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar site, it also falls in the boundary of the Lake District National Park..</p> <p>The River Duddon rises in the southern Lake District fells and flows southwards to the sea, the site falls outside of the Rivers Duddon and Esk Water Resource Management Unit (WRMU) 9. However, this WRMU has a ‘Water Available’ status at present and is forecast to remain the same until 2013, but is expected to have ‘No Water Available’ by 2019.</p> <p>The site is not also located on any Groundwater Management Units.</p>	
<p>Water Demand and Availability Projected to 2035</p>	<p>5</p>			

Indicator	Data Source	Current Data	Comparators	Trend
		<p>The dWRMP forecast for the UU supply area shows household demand per capita consumption is expected to fall from 139 lites per head per day (l/h/d) in a normal year to 124 l/h/d in 2035. The dry year forecast is for demand to drop from the current 149 l/h/d to 138 l/h/d in 2035.</p> <p>UU estimate the average sustained effect of household metering on demand for water is a reduction of 8.3 % in a normal weather year. Non-household consumption of potable water across the UU region has reduced substantially in recent decades. UU forecast that metered non-household water demand will fall by 37 % between 2006/07 and 2034/35. The continuing decline in non-household water demand is expected as a result of continuing water efficiency measures and reduction in water-intensive industry in North West England, although there will be local variations.</p> <p>The number of households served by UU is expected to increase significantly from the 2006/07 level of 2.94 million to 3.57 million by 2034/35.</p> <p>The Government is proposing major house building programmes across the country. One of the reasons for needing more houses is that average occupancy in dwellings is reducing with changing social patterns. This has the potential to impact significantly on the demand for water as average per capita consumption is much higher in low occupancy dwellings than in homes with higher occupancy.</p> <p>The water supply in the Integrated Resource Zone comes primarily from upland reservoirs and lowland rivers. There are over 200 water sources. 80 % of the water supply comes from surface water sources. These sources are supported by supplies from groundwater and upland streams. Across the whole United Utilities region, groundwater accounts for 15 % of water used for supply.</p> <p>The expected yield from the Integrated Resource Zone is estimated at 1857.7 Ml/d for 2024/25. The dry weather demand is expected to be 1767.7 Ml/d. United Utilities intend to have +178.7 Ml/d headroom between demand and yield. Therefore, the Integrated Resource Zone is expected to have a deficit of 88.8 Ml/d in 2024/2025. No deficit is forecast until 2010/2011, with a maximum deficit of 106.8 Ml/d expected in 2020/2021. After this, the magnitude of the deficit begins to decline.</p> <p>The dWRMP proposes a range of measures to address this deficit. Included within this programme are measures to improve water efficiency, leakage detection, promotion of new groundwater sources (Southport, Widnes and Warrington) and upgrade an existing WTW at Huntington.</p>		

Indicator	Data Source	Current Data	Comparators	Trend
Sensitive Areas – Urban Waste Water Directive	6	<p>The coastal areas around Haverigg and Duddon estuary are protected under the Bathing Water Directive.</p> <p>Black Beck, Haverigg Pool, and Duddon are protected under the Freshwater Fisheries Directive.</p> <p>Approximately 30 km further down the coastline, Morecambe Bay is protected under the Shellfish Directive.</p>		
Coastal Processes and Sediments		<p>The site falls within the coastal cell which extends from St Bees Head in the north to Morecambe Bay just south of the site.</p> <p>Suspended sediment transport along this stretch of coastline in the nearshore is dominant towards the south. The Duddon Estuary and Morecambe Bay are both believed to be sinks/stores of sediment and so exert an influence on the adjacent shoreline. Within the estuaries themselves, the configuration of the low water channels is a key control on local patterns of accretion and erosion and the proximity of these channels to the shoreline controls the degree of exposure and tidal scour along the coastline.</p>		

Key to Data Sources

1	Environment Agency (December 2008). Draft River Basin Management Plans: North West River Basin District. http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/northwest/Intro.aspx/ [accessed March 2009] ¹³
2	Environment Agency (December 2008) Draft River Basin Management Plans: Current State of Waters. http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/northwest/Intro.aspx [accessed March 2009] ¹⁴
3	Environment Agency (2009) What's In Your Backyard http://maps.environment-agency.gov.uk/wiyby/ [accessed March 2009]
4	Environment Agency (April 2007). Derwent, West Cumbria and Duddon CAMS. http://publications.environment-agency.gov.uk/pdf/GENW0407BLXI-E-E.pdf
5	United Utilities (April 2008). Draft Water Resources Management Plan. ¹⁵ http://www.unitedutilities.com/Draft_Water_Resources_Management_Plan_-_Main_Report.pdf [accessed March 2009]
6	Defra [2007]. Urban waste water treatment directive sensitive areas for the north west region. http://webarchive.nationalarchives.gov.uk/20080305115859/http://www.defra.gov.uk/environment/water/quality/uwwtd/sensarea/pdf/sensarea-nwest.pdf

¹³ The data used in this assessment are taken from the Draft River Basin Management Plan, which was the most up to date plan available at the time of writing. Draft plans were presented to the Government for approval in September 2009 and were subsequently published in December 2009.

¹⁴ The data used in this assessment are taken from the Draft River Basin Management Plan, which was the most up to date plan available at the time of writing. Draft plans were presented to the Government for approval in September 2009 and were subsequently published in December 2009.

¹⁵ The data used in this assessment are taken from the Draft Water Resources Management Plan, which was the most up to date plan available at the time of writing. Subsequently, on 3rd August 2009, the Secretary of State for Environment, Food and Rural Affairs gave UU permission to prepare and publish its final plan

Flood Risk

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Flood Risk				
Flood Risk	1, 2, 3	<p>The site is located in Flood Zone 1 (low probability) but surrounded by Flood Zone 3 (high probability), as indicated on the Environment Agency's Floodmap.</p> <p>The Flood Zone 3 areas surrounding site are at risk of flooding from both tidal and fluvial sources.</p> <p>Map available separately.</p> <p>The only formal flood defences in the vicinity of the site are at Haverigg, to the south, which is defended by a coastal defence scheme comprising of armoured protection constructed in 1993. There is also a natural defence consisting of a sand and shingle beach backed by dunes.</p> <p>The Standard of Protection and condition grade of these defences is unknown.</p>		<p>Flood risk is expected to increase in the UK due to the predicted changes in climate leading to more intense rainfall events, wetter winters, rising sea levels and coastal erosion. Scenarios of climate change for the UK were published by the United Kingdom Climate Impacts Programme (UKCIP) in 1998 and 2002.</p> <p>'The Climate of the UK and Recent Trends 2008' by the Met Office, provided the following general comments in relation to trends in climate change and how this might affect flood risk:</p> <ul style="list-style-type: none"> • Global sea level rise has accelerated between mid 19th century and mid 20th century and is now about 3mm per year • All regions in the UK have experienced an increase over the past 45 years in the contribution to winter rainfall from heavy precipitation events; in summer all regions except North East England and North Scotland show decreases • Sea level rise around the UK rose by about 1mm/per year in the 20th century, corrected for land movement. The rate for the 1990s and 2000s has been higher than this <p>Most recently in June 2009, UKCIP launched the</p>

Indicator	Data Source	Current Data	Comparators	Trend
				<p>latest UK Climate Change Predictions 2009 (UKCP09). These give information about climate change but not directly about flood risk. The key findings on climate change confirm the trends highlighted in the 2008 report and suggest:</p> <ul style="list-style-type: none"> • All areas of the UK get warmer, and the warming is greater in summer than in winter. • There is little change in the amount of precipitation that falls annually, but it is likely that more of it will fall in the winter, with drier summers for much of the UK. • Sea levels rise and the rise is greater in the south of the UK than in the north.

Key to Data Sources

1	Environment Agency (January 2009). Flood Map – Haverigg, Cumbria. http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=315500.0&y=478500.0&topic=floodmap&ep=map&scale=4&location=Haverigg,%20Cumbria&lang=_e&layerGroups=default&textonly=off#x=316585&y=479479&lg=1,&scale=4 [accessed 13 March 2009]
2	Jacobs (August 2007). Copeland Borough Council, Strategic Flood Risk Assessment. http://www.copeland.gov.uk/ms/www/Local-Plan/PDF/flood-assessment/Copeland-SFRA-Final.pdf
3	North West & North Wales Coastal Group. Regional Monitoring Programme. http://mycoastline.org/index.php?option=com_content&task=view&id=158&Itemid=142

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