DEPARTMENT OF ENERGY & CLIMATE CHANGE

Appendices to the Appraisal of Sustainability Site Report for Heysham

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

Planning for new energy infrastructure **October 2010**

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 to the Infrastructure Planning Commission 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 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 Heysham. 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? Will it result in increased vehicular emissions (particularly carbon dioxide)?

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
	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.
Communities: Population, Employment and Viability	
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	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?
Communities: Supporting Infrastructure	
8. To avoid adverse impacts on the function and efficiency of the strategic transport infrastructure 9. To avoid disruption to basic services and infrastructure	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)?
Human Health and Well-Being	
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	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?
Cultural Heritage	
22. To avoid adverse impacts on the	Will it adversely affect historic sites of international/national importance and their setting?

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
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 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 as being of national/ international significance.	C	Construction stage
+	Minor Significant	No Sustainability constraints and development acceptable. Effect considered as being 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 as being of national/ international significance.	**Likelihood**	
--	Major Significant	Problematical because of known sustainability issues; mitigation or negotiation difficult and/ or expensive. Effect considered 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

AoS Objective:
12. To avoid adverse impacts on air quality
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?

Potential Receptors:

- Local populations and wider regional population (human health)
- Sensitive habitats, including Morecambe Bay Ramsar site, SPA, SAC and SSSI; Leighton Moss SPA and Ramsar, Shell Flats pSAC, Lune Deep pSAC, Liverpool Bay SPA, Heysham Moss SSSI and Lune Estuary SSSI.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

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 (possibly similar in nature to those the existing Heysham 1 and 2 nuclear facilities currently operate under) 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. This has potentially negative significant consequences for a wide demographic area, including coastal areas such as Blackpool, Preston and even Liverpool conurbations due to prevailing wind direction (south to south-south west). The prevailing wind direction may also lead to the dispersion of emissions away from UK populated areas and across the Irish Sea, however in extreme and severe circumstances this could lead to dispersion of emissions over Ireland. The potential effects of release of radiation are discussed in the main AoS report, however detailed modelling will be required and considered as part of the HSE and Environmental Regulators risk assessment as carried out for the consenting process. There is however an opportunity to employ any lessons learned from the decommissioning of the Heysham 1 and 2 nuclear facilities, which are both currently operational but, are anticipated to be decommissioned within the lifetime of the proposed new nuclear facility.

3. There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature

Air Quality

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.

Regional/ Local

1. 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. Two AQMAs have been declared within the Lancaster City Council boundary: one in Lancaster (approx. 7km north east of the site) and one in Carnforth (approx. 16km north-north east of the site), however the effect on air quality is not likely to be significant, provided construction and operation is in accordance with regulatory/consenting regimes.

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, or the extension of the existing AQMA and by virtue of distance.

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.

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 and sensitivity of the receiving environment.

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.

Air Quality

Summary of Significant Strategic Effects:

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

Significant Effects

- Release of non-radioactive emissions is unlikely to have a strategically significant effect on air quality
- 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.

Mitigation and Monitoring Possibilities

- Please refer to mitigation measures contained in the Biodiversity and Ecosystems Sections.
- 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[1]:

Designated Sites

- Morecambe Bay SAC – in close proximity to the site (approx 250m)[2]
- Morecambe Bay SPA – in close proximity to the site (approx 250m)[2]
- Morecambe Bay Ramsar – in close proximity to the site (approx 250m)
- Morecambe Bay SSSI – falls within Morecambe Bay SAC, SPA and Ramsar - approximately 700m from the site
- Leigton Moss SPA - falls approximately 16km from the site
- Leighton Moss SPA and Ramsar – approximately 16km from the site
- Lune Estuary SSSI – Falls within Morecambe Bay SAC, SPA and Ramsar - in close proximity to the site (approx 250m)
- Shell Falts and Lune Deep pSAC – approximately 18km from the site

[1] Please note that where SSSI's are mentioned this only refers to those within 5km of the site
[2] Collectively these sites form the Morecambe Bay European Marine Site (EMS)

Biodiversity and Ecosystems

- Liverpool Bay SPA – approximately 19km from the site
- Heysham Moss SSSI – approximately 2.2km from the site.

Habitats considered to be potential receptors are as follows:

- 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 *Ammophilia 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
- Reedbeds
- Coastal and Floodplain Grazing Marsh
- Maritime Cliff and Slope
- Lowland Raised Bog

Species which may be potential receptors

- Great Crested Newts (one of the primary reasons for selection of Morecambe Bay as an SAC)
- Passage and over-wintering waterfowl and breeding waterfowl, gulls and terns
- Wetland birds such as Bittern and Marsh Harrier
- Other breeding birds could be affected locally

Biodiversity and Ecosystems

- Rare and uncommon plants
- Nationally important invertebrate species
- Common Species of Reptile
- Otters
- Water Voles
- Bats

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 5-6 years), increased vehiclular movements, machinery, earthworks and excavations, an increase in lighting and increased personnel presence on the site. Similar impacts could also occur during decomissioning.This could have an adverse impact on fauna, particularly the important bird assemblages of the Morecambe Bay SPA and Ramsar sites (and component SSSIs). Birds may be deterred from utlisling 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) and devise appropriate mitigation to avoid or minimise such effects.

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 Morecambe Bay SAC/SSSI (for example estuarine habitats such as saltmarsh, mudflats and sandflats) 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.

3. In addition development and physical structures such as coastal defences which may be required to reduce flood risk can disrupt the natural estuarine and coastal processes resulting in loss of estuarine habitats both in the immediate locality and in a wider context.

4. Great Crested Newts are one of the primary interest features of the Morecombe Bay SAC/SSSI therefore adverse impacts will arise if any ponds/terrestrial habitats used by the species are lost.

Biodiversity and Ecosystems

5. 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 site level surveys would be required 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.

Water Resources and Quality

6. Discharge of heated water into waterbodies can impact upon aquatic ecosystems due to the temperature of the water being up to 10°C warmer. Morecambe Bay SAC/SPA and Ramsar sites (and component SSSIs) are in close proximity to the site and therefore any discharge of heated water into the estuarine system could have an adverse impact on the habitats and species for which these sites are designated for example oxygen is less soluble in water at higher temperatures and a reduction in dissolved oxygen can put aquatic life under stress. Any loss of habitats/plants or invertebrates could in turn have an impact on species such as waterfowl 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 and Ramsar sites (including component SSSIs) and their interest features.

7. 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. The Morecambe Bay SAC, SPA and Ramsar sites are in close proximity to the site, any loss of fish or invertebrate food sources could have an adverse impact on species such as the important bird assemblages for which these Europeansites are designated.

8. Groundwater abstractions may affect groundwater supply to other areas of valuable habitat including rivers and streams, this could result in habitat degradation. Heysham Moss SSSI falls approximately 2km from the site and is designated for its Lowland Raised Bog. Such habitats are particulaly vulnerable to groundwater extraction. Further hydrological studies will be required by the nominator to assess the effects of any proposed water abstraction on ecology, particularly aquatic habitats and/or areas of valuable habitat (such as Heysham Moss SSSI) which may be vulnerable to groundwater abstraction and any effects which could impact on the Morecambe Bay SAC, SPA and Ramsar sites. A suitable intake system design should be adopted to avoid any significant ecological impacts.

9. 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 and Ramsar sites (and component SSSIs) and their interest features such as the important bird assemblages. Bioaccumulation of such toxins in food chains could also have an indirect impact on Leighton Moss SPA and Ramsar sites. Despite these designations being approximately 16km from the nominated nuclear power station site, one of the key reasons for designations of these sites, the Marsh Harrier, is known to feed and forage over coastal habitats such as saltmarsh. Any potential impacts on this bird

Biodiversity and Ecosystems

for example through accumulation of toxins in the food chain would therefore have an indirect impact on these designations. 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 authorisation from the relevant environment agency under the Environmental Permitting (England and Wales) Regulations 2010 before making any discharges of radioactivity and regular water quality monitoring will be required.

10. 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 and Ramsar sites (and component SSSIs) as well as biodiversity in the area as a whole. Such an event could occur during operation, interim radioactive waste storage, during decommissioning or during final transport of waste for 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, SPA and Ramsar sites, 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. This could impact on higher predators such as waterfowl. The operation of the site 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. The designated sites and local ecological systems are currently subject to these risks from the existing nuclear power station at the site (two power stations exist; Heysham 1 and Heysham 2). Further studies are likely to be required to assess the risks and potential effects of the occurrence 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

11. The development of the site may affect air quality. In particular through construction activities (duration 5-6 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 and Ramsar sites (and component SSSIs) 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 is likely in order to predict potential impacts of changes in air quality on biodiversity.

Cumulative effects

12. The area could be a focus for a number of potential high profile projects involving both nuclear and renewable energy options, the cumulative effects of which are likely to be significant to the overall impacts on biodiversity for example the continued operation of the existing Heysham power stations and then de-commissioning (Heysham 1 proposed in 2014 and Heysham 2 proposed in 2023). Other larger proposals in the area include numerous proposals for developments within Morecambe Bay (for example onshore and offshore wind turbines and the M6 Heysham Link Road).

Biodiversity and Ecosystems

Regional/Local

Water Resources and Quality

13. New drainage systems on or within the site could result in adverse impacts on both terrestrial and aquatic habitats during both construction and operation. Installing new drainage systems could result in physical loss of habitats and new operating drainage systems 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 and could impact on aquatic flora and fauna. In addition nutrient enrichment could alter the composition of habitats within aquatic ecosystems. In particular Morecambe Bay SAC, SPA and Ramsar sites and their interest features may be affected directly or indirectly by any changes to existing drainage. Further hydrological studies will be required by the nominator to assess the effects of any drainage infrastructure required on ecology, particularly aquatic habitats and/or areas of valuable habitat such as Morecambe Bay SAC, SPA and Ramsar sites.

14. During construction, operation and decomissioning 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 and designated sites such as the Morecambe Bay SAC, SPA and Ramsar sites (and component SSSIs). 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 minimise the above risks.

Loss, damage and fragmentation of important habitats and species

15. 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 development footprint. 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 the predicting the effects of developing the site on habitats and species so that appropriate migitation measures can be implemented.

Biodiversity and Ecosystems

Summary of Significant Strategic Effects:	Timescale	C	O	D
	Significance	--?	--?	-- ?
	Likelihood	M	M	M

Significant Effects	Mitigation and Monitoring Possibilities[3]
• Noise, visual and light disturbance during construction on fauna such as legally protected species, in particular on important assemblages of birds within the Morecambe Bay SPA and Ramsar sites.	• Avoid encroachment into sensitive areas through careful site design. Construction environmental management plan to minimise disturbance for example through timing/screening.
• Loss, damage or alteration of important habitats and subsequent disturbance to protected species due to new buildings and infrastructure. Morecambe Bay SAC, SPA and Ramsar sites of particular concern.	
• Discharge of heated water into aquatic habitats could alter ecosystems. Morecambe Bay SAC, SPA and Ramsar sites of particular concern.	• Avoid and minimise loss through careful site layout and design. Habitat creation to replace lost habitats and maintain connectivity. Ecological mitigation and management plan adopted for the site.
• Abstraction of water for cooling purposes can lead to incidental mortality of fish and aquatic invertebrates. This could have knock on effects on interest features (particulaly birds) of the Morecambe Bay SAC, SPA and Ramsar sites. Groundwater abstraction can alter important habitats reliant on ground water supplies. for example lowland raised bog.	• Design should seek to minimise impacts.
• Routine releases of radiactive discharges into water could impact aquatic ecoystems either directly or indirectly for exmaple through bioaccumulation of toxins within food chains. Impacts on Morecambe Bay Natural SAC, SPA and Ramsar sites are of particular concern.	• A suitable intake system design should be adopted to minimise impacts.
• Accidental pollution for example leakage of radioactive waste or other chemical compounds. Risks present throughout construction, operation and decomissioning. Potential adverse impacts on biodiversity with Morecambe Bay Natura SAC, SPA and Ramsar sites being of	• Avoid impacts through safe site operations. Regular monitoring of water quality.

[3] Appropriate mitigation will be defined in detail during the EIA process for the site

Biodiversity and Ecosystems	
particular concern.	
• Reduction in air quality, particularly during construction due to increased dust and vehichle emissions. Potential impacts on biodiversity with Morecambe Bay SAC, SPA and Ramsar sites being of particular concern.	• Avoid through safe operation, decommissioning and waste transfer. Regular monitoring of water quality.
• Cumulative effects of other high profile developments/plans in the area for example Decomissioning of Heysham Power Stations 1 and 2, the M6-Heysham Link Road and numerous developments within Morecambe Bay.	• Construction environmental management plan to minimise impacts.
• Construction and operation of new drainage infrastructure could impact on both terrestrial and aquatic ecosystems. Hydrology and morphology of watercourses could be altered through increased sediment loading. Morecambe Bay SAC, SPA and Ramsar sites of particular concern.	• Further studies will determine levels of mitigation
• Improper management of materials during constuction, operation and decomissioning could lead to contamination of soil, water and air through leakages/spills for example concrete, oil, fuel and other contaminants. This in turn could have adverse impacts on local biodiveristy.	• Further studies will determine levels of mitigation
• Impacts of a new nuclear power plant on biodiversity at the more local level are currently unknown but any protected species/important habitats on site or close by could be impacted.	• Avoid through safe materials management practices, for example environmental Management Plans.
	• Further studies required to determine mitigation for habitats and species at the site level. Possible long term monitoring of habitats /species if adversely affected.

Climate Change

AoS Objective: 13. To minimise greenhouse gas emissions
Guide questions:
Will it result in increased vehicular emissions (particularly carbon dioxide)?

Will the development result in an overall reduction in greenhouse gas emissions over its life time resulting from changes in:

- 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
- Note: Adaptation to climate change is discussed in other relevant topic appriasals, eg. biodiversity, water, flood risk.

Potential Receptors:

Human population and environment at all geographical scales.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

1. The effects of changes in greenhouse gas emissions as a result of the proposed development have national and international effects, particularly when combined with a wider nuclear programme. The benefits of the low carbon emissions from the operation of nuclear power stations due to this technology and that are 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 those of wind power with equivalent output but with significantly less land or area coverage.

3. This consideration is independent of any life-cycle (embodied) carbon emission analysis, which is currently outside the scope of this study.

4. Although the effects of any emissions will be felt globally, the emissions during construction and decommissioning will largely be determined by

Climate Change

regional and local factors, (for example local transport infrastructure and how the location of the site will affect transport emissions) .

5. Construction and decommissioning activities will have both direct and indirect greenhouse gas emissions associated with them regardless of the location of such 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

6. The provision of a nuclear power station for energy generation at this site will make a positive contribution to the objective of the Lancashire County Council (LCC) 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 no nuclear power facility option in the region.

7. The activities involved in the construction of the plant are likely to have a negative impact on targets for reductions in carbon from transport and construction plant. 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. This will fit well with the LCC Regional Economic Strategy (RES).

8. Other considerations include the possibility of the need to expand road or rail transport in order to accommodate the construction technical and upgrade demands in a rural setting. The net cross-cutting impacts of emissions on biodiversity, land, water, population and health should be considered- opportunities of applying better transport, material and application design aspects may seek to minimise these impacts.

9. 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.

10. Carbon dioxide emissions for Lancaster County is the highest for Industry and Commerce and Road Transport within the region of North Lancashire. The development of a new nuclear power plant is likely to contribute to much less emissions from electricity generation that could replace of offset the gas consumption. Replacement of or offsetting gas consumption with nuclear power electricity generation may have positive energy security implications that will be considered at NPS level.

Climate Change

Summary of Significant Strategic Effects:	Timescale	C	O	D
	Significance	-	++	-?
	Likelihood	M	H	?

Significant Effects

- 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 program for climate change are further discussed in the main AoS report.
- The site is very susceptible to the future impacts of climate change associated with sea level rise, flooding, drought, coastal erosion and most intense events.
- Locating a nuclear power station on this site could have a positive multiplier effect on the further investment and implementation of other 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 station. This is discusssed in the main AoS Report.
- The operational phase of the power station is likely to have a much smaller carbon footprint compared to those of fossil-fuel powered stations providing similar power output.

Mitigation and Monitoring Possibilities

- 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.

Communities: Population, Employment and Viability

AoS Objective:
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

Guide questions:
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?

Potential Receptors:

- Local and regional resident workforce
- Local and regional population

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

No significant effects identified at this scale.

Regional/ Local

1. Short-medium term positive effects through creating 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 min of 30 years. The significance of the effect is greater at the local level, whereas at the regional level this is of minor significance, as jobs are absorbed into regional employment figures.

2. The existing reactors at the site is a significant local employer. A new power station may assist in offsetting job-losses from the decommissioning of the existing power stations at the site - however it is noted the time differences between decommissioning (estimated to be 2014 for Heysham 1 and

Communities: Population, Employment and Viability

2035 for Heysham 2) and construction of any new reactor may require employees to seek employment elsewhere.

3. Positive effects through the provision of training, education and upskilling for employees and contractors in the region.

4. 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.

5. Some uncertainty is identified as the construction may affect the ability of other industries/projects to source labour, for example. for house-building in region, and other major constriction projects, however, construction output is forecast to grow at a weak average annual rate of 0.2% between 2009 and 2013, slower than the national average.

6. Likely changes to the population dynamics of local communities - with potential positive and negative effects. Effects dependent on source of labour, for example from local community or outside. Possible negative effects during construction stage as a temporary new community (construction labour) may not integrate with existing community. Longer term, new employees likely to be drawn from a wide area, including local communities and the wider area generally up to 25 mile radius, with less pressure on local services. Positive economic and social benefits likely as new population will require new services and facilities and will help to support existing services.

7. 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 identified as the project may lead to a shortage of local construction workers to meet the needs of other industries and major projects.

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 local/regional construction industry.

Communities: Supporting infrastructure

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

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)?

Potential Receptors:

- Local and regional population
- Existing transportation and service infrastructure
- Existing waste management infrastructure

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

1. There is the potential for significant effects on national road infrastructure through increased congestion/disruption of traffic on the M6 motorway and on the A589 and A683.

Regional/ Local

2. 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.
3. 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.

Communities: Supporting infrastructure

4. 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.
5. 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 utilize and extend the current arrangements for the existing Heysham 1 and 2 nuclear facilities.
6. 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 Heysham 1 and 2 nuclear facilities, which are both currently operational but, are anticipated to be decommissioned within the lifetime of the proposed new nuclear facility.
7. Long term pressures and effects on the (non-radiological) waste management infrastructure are unlikely to be significant.
8. The development of a nuclear power station at Heysham 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 strategic road infrastructure through increased congestion/ disruption of traffic. This may lead to increased congestion during construction, operation and decommissioning stages.
- Potential for negative effects on local access road network due to transport of large loads during construction via minor country roads.

Mitigation and Monitoring Possibilities

- Further studies will be required to assess in detail the effects on the strategic road network as well as local access roads.
- 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 the site to travel both nationally and internationally (for example, to the Republic of Ireland). However, current radiological monitoring of the nuclear power stations that have been on the Heysham site since 1983 (see Appendix 4), suggests that the risk to the public is extremely low with total dosage from all sources (including direct radiation) estimated as being less than 4% 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 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.

Human Health and Well Being
2. Exposure Limits: The radiation to which members of the public are exposed by the operations of a nuclear power station is limited to 1mSv per year.[4] 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 Heysham 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 advice[5], 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 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.

[4] 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

[5] http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733817602

Human Health and Well Being

6. Risk of accident - transport of nuclear material: The transportation of nuclear materials to and from the Heysham 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: There is a possibility that the influx of workers required for the construction and operational phases of the proposed new power station may put a strain on local health and other services and lead to community integration and conflict issues. In order to realistically gauge whether or not this will be a problem, a review should be carried out during the planning process to determine the need for additional health service capacity and community assistance in the area.

8. Health and safety issues: The work associated with the construction and operation of a nuclear power plant at Heysham 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 Radiation 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. 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 Heysham site, people living and working nearby have had more than twenty-five years to get used to there being an adjacent nuclear plant so this is unlikely to be a problem at this location.

10. Community well-being: The Lancaster City Council area is a reasonably deprived area with income, employment, health, education and living environment deprivation, and barriers to housing and services being greater than average for England as a whole. The siting of a new nuclear power station at Heysham should help to alleviate these deprivations somewhat as more jobs will be created in the area leading to an increase in community wealth, additional housing and other associated neighbourhood infrastructure.

1. 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

Human Health and Well Being

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.

11. Employment: Whilst employment levels in the Lancaster City 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 demonstrated6, being in work can contribute to individual healthiness and, more particularly, being unemployed can be harmful to health in both a mental and physical sense. The development of a new nuclear power station at Heysham 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

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 Heysham 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 lead to unacceptable community disturbance
- It is likely that the presence of a new nuclear power station at Heysham will lead to an increase in employment, community wealth, additional housing and other associated

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

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

Human Health and Well Being	
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	decommissioning phases of the project.

Cultural Heritage

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
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?

Potential Receptors:

- Scheduled Monuments
- Listed Buildings
- Conservation Areas
- Archaeology

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

The nearest scheduled monuments are the High Cross in St. Peter's Churchyard in Heysham and St. Patrick's Early Christian Chapel which both lie within an approximate distance of 2km of the site. A potential effect on their setting may arise from the development of a nuclear power station, as for other scheduled monuments in the wider vicinity.

There are also 4 Grade I and 3 Grade II* listed buildings within an approximate distance of 5km of the site and a potential effect on their settings may arise from the development. All setting issues will need to be addressed by the nominator at the project level stage.

Regional/ Local

There are 6 conservation areas within an approximate distance of 5km of the site. There is a potential effect on their setting.

There are no listed buildings within or adjacent to the site. However, there are 82 Grade II listed buildings within an approximate distance of 5km and there may be an effect on their settings.

A Neolithic flint axe has previously been found within the existing nuclear power station. However, if the site lies on reclaimed land there may not be a need for archaeological investigation prior to or during construction.

Cultural Heritage

Operational effects include potential setting impacts on historic assets in the wider vicinity.

If a buried archaeologial resource exists significant effects to this resource are possible during decommissioning as excavations are likely to be required.

Summary of Significant Strategic Effects:

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

Significant Effects

If a buried archaeological resource is present the main effects would be at a local scale, within the footprint of the proposed 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

If the site does not lie within reclaimed land 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.

It may be possible to mitigate against potential adverse setting effects on heritage assets through appropriate landscaping/planting schemes.

Landscape

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.

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 or NSA?
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?

Potential Receptors:

- The landscape character of the Morecombe Coast and Lune Estuary (No 31) National Character Area, the Lake District National Park and the Arnside and Silverdale AONB to the north and Forest of Bowland to the east.
- The landscape character of neighbouring National Character Areas including: No 32- Lancashire and Amounderness Plain, No 33- Bowland Fringe and Pendle Hill, No 20- Morecombe Bay Limestones, No 7- West Cumbria Coastal Plain, No19-South Cumbria Low Fells, No8- Cumbria High Fells.
- The landscape character and features within' The Landscape Strategy for Lancashire' landscape type described as 'the suburban area' and the character of adjoining landscape types including the Heysham to Overton, the Lune Marshes and potentially Heysham Moss and Amside and Silverdale.
- The visual amenity of local residents in surrounding urban areas including two conservation areas, surrounding recreational areas, walkers on public footpaths (some within nationally designated landscapes), local road and rail users, users of the neighbouring industrial estates.
- The site is defined as moderate to least tranquil part of the county of Lancashire.

Note: Refer Cultural Heritage assessment for consideration of the potentilal effects of the development on scheduled ancient monuments, listed buildings, the Historic Park and Gardens and Conservation Areas that may fall within 5km from the site.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

1. There are no anticipated international effects likely to arise from the site, given distances across the Irish Sea.

2. There are likely to be distant indirect landscape and visual impacts on the High and Low Fell areas within the Lake District National Park, the Arnside and Silverdale and the Forest of Bowland Areas of Outstanding Natural Beauty. The operation of a new nuclear power station on this site may add significantly to the existing building visual mass. This will potentially give rise to significant adverse effects beyond those that are already recognised as

Landscape
arising from the existing power stations. However, indirect and visual effects are likely to be distant, would most likely form only part of a wider view and the site is already within a built up area. The visual impact will not be able to be fully mitigated until after decommissioning, which is likely to be after a period of up to 100 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 3. The effects of the new power station at Heysham on the landscape character of neighbouring National Landscape Character Areas and Local Landscape Character Areas including Heysham- Overton, the Lune Marshes and potentially Heysham Moss and Amside and Silverdale are likely to be as described for the designated landscpape areas, above. However, from many of these areas the impact will be experienced in closer proximity. The appearance of some of the local landscape character areas may also be impacted through potential in combination effects from associated new electricity pylons, if required, by the National Grid. 4. The site falls within the Lancashire Suburban Landscape Type and could potentially have associated works that may directly effect the adjoining coastline. The Heysham Peninsula area currently has numerous detracting features including old industrial estates, a busy port, caravan park and sprawling 1970's housing areas. Despite this, there are some landscape assets that are worthy of protection and opportunities for local landscape enhancement. There would potentially be some direct adverse landscape and visual impacts resulting in removal or effects upon some former car park areas, former industrial estate land, existing grassland, low sandstone cliffs and the adjacent beach. These impacts could potentially arise from the creation of temporary construction areas, new power station buildings, ancilliary buildings, a new road, new pylons, ancilliary facilities, enhanced sea defences, a marine landing platform and water cooling culverts. The visual effects of construction and the operational of a new power station on neighbouring residents (including Heysham and Overton), walkers, holiday makers and local road users, including effects associated with lighting and traffic, may also be significantly adverse at local level but in an area of existing moderate to low tranquillity. 5. Mitigation potential includes: Protective fencing and buffer areas incorporated during construction to protect areas of adjoining woodland and beaches, avoidance of temporary laydown areas on the foreshore. Siting of the new power station building in close proximity to the existing power station buildings to avoid a significant broadening of visual impact. The potential scale of impacts on landscape features associated with ancillary buildings could be reduced if alternative locations for some non essential site buildings were sort on brownfield land in the vicinity. Construction of any sea defences, if required, should be in a position that avoids direct impact on the low sandstone cliffs and the beaches and in a form that respects local distinctiveness and materials. Sensitive design and or alignment of the water cooling facility and a low impact design for the marine landing platform may reduce adverse impacts on the beaches and sandstone cliffs. Other measures might include : delivery of construction materials by sea to reduce road use and the use directional, cut off, low level lighting and restricted working hours ,to limit further potential light pollution. Key positive opportunities include landscape restoration and off set enhancement measures. These measures could include: some woodland planting and grassland restoration to the decomissioned site, the temporary construction areas and the surrounding landscape. There is potential to target landscape mitigation measures to further the objectives of 'The Landscape Strategy for Lancashire 2002' and the emerging Local Area Action Plan for

Landscape

Heysham and Morecombe, 2008.

6. With this potential site design and mitigation in place, local site 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, as there is likely to be some uncertainty over future land use requirements given the timescales involved.

Summary of Significant Strategic Effects:

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

Significant Effects

During construction and operation the main strategic effects relate to indirect and visual impacts of a new power station building on the surrounding area including potentially parts of the National Park to the north and two Areas of Outstanding Natural Beauty to the north and east. The existing power stations alongside the site are already visually dominant in the landscape and can be seen over a wide area. Further development is highly likely to lead to a noticeable deterioration in views from these nationally designated landscapes as well being experienced more markedly at a more local level. Overall, the potential indirect effects of a new power station during construction and in operation, despite mitigation, are highly likely to be adverse on the surrounding landscape character and views. There will be no direct landcape impacts on designated landscape.

- Direct impacts on landscape character within the site during constuction and operation would appear to potentially be limited and potential for mitigation high, given the potential use of largely brownfield land. Visual impacts on the local area are likely to be noticeable and adverse until other power station or all power station sites can be fully decommisioned.
- The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long term, however, long term land uses for the restored areas are difficult to predict.

Mitigation and Monitoring Possibilities

- Given the potential scale and extent of the new power station facilities, effective visual impact mitigation of adverse effects during the construction and operational phases, is unlikely.
- Opportunities for site level landscape mitigation appear favourable with the potential for use of predominantly brownfield land for the site and construction areas.
- There appear to be opportunities for landscape enhancement given the run down nature of the surrounding area and emerging Heysham Local Area Action Plan initiatives that could be supported. Enhancements could be delivered through an Integrated Land Management Plan for the Estate.
- The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long term, however, long term land uses for the restored areas are difficult to predict.

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 the confines of Heysham Banks and Heysham Harbour. No significant geological designated site lies within the local vicinity.

The area is mainly urban in nature and no significant mineral abstraction is noted the area.

The site lies within/adjacent to Lune Estuary and Morecombe Bay SSSI, Morecombe Bay SPA, SAC and RAMSAR (to be confirmed by nomination)

No significant agricultural land (to be confirmed by nomination) lies within the site.
Minimal loss of Greenfield area (to be confirmed by nomination) within the nominated area as the area appears to be predominately made/reclaimed ground.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

1. The site potentially lies within the area of Lune Estuary and Morecombe Bay SSSI, Morecombe Bay SPA, SAC and RAMSAR. Construction activities and operational activities are likely to have a detrimental effect to the long term soil/gravel quality within the area of the proposed development. Compaction/removal of soils/gravels is likely to affect the soil/gravel quality within these designated sites, which may also affect biodiversity; however

Soils, Geology and Land use

this is addressed in the appraisal of Biodiversity.

2. There are no geological designations of note within the local vicinity.

3. The loss of Greenfield land is not considered to be significant on a National level.

Regional/ Local

4. Construction of new plant upon Greenfield sites. The loss of any Greenfield land is likely to be of local significance and may be of national significance given the areas utilisation.

5. No mineral abstraction has been noted in the area.

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 site would fall within National Permitting requirements and therefore management of the site in order to prevent the contamination of soils would be covered by these legislative requirements. Contamination and effects to Human Health would also be covered by this investigation.

Summary of Significant Strategic Effects:

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

Significant Effects

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; Lune Estuary and Morecombe Bay SSSI, Morecombe Bay SPA, SAC and RAMSAR. This is considered further in the biodiversity appraisal.

Mitigation and Monitoring Possibilities

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:
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?

Potential Receptors:

Local and district resident population and tourists, local and district ecosystems in coastal and estuarial 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 Morecambe Bay and the coastline within approximately 10-20km of the site. It would be necessary for the nominator to undertake a data collection and modelling exercise to confirm the spatial extent of this impact at the EIA stage.

Regional/ Local

1. Certain parts of the site are at risk of flooding in a 1/100 or 1/200 year flood event, although they are protected by formal sea defences. However, climate change driven rises in sea-level rise may increase flood risk over the coming decades. Further details are provided in the appraisal of flood risk issues.

2. The provision of cooling water for a new power station at the site 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 the cooling water. Construction disturbance associated with these works may have the short-term effect of accelerated delivery of sediment to water bodies during construction. Over the longer-term, during operation, there is the possibility that the discharge of cooling water may affect local estuarine hydrodynamics and sedimentation processes. The effects of construction and operation of the cooling water system on coastal processes, estuarine hydrodynamics and sediment transport within Morecambe Bay could be reduced or potentially eliminated by suitable design and construction methods.

3. The potential effects of the development on the local river network includes the modification of the local drainage network through local diversion of

Water - Hydrology and Geomorphology

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 surface of 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	-	-	-
Likelihood	M	M	M

Significant Effects

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

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?
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?

Potential Receptors:

Local and district resident population and tourists, local and district ecosystems in coastal and estuarial waters and on 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 nominated power station during routine operation will be treated effluent from the wastewater treatment plant and the return of cooling water to the estuary 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).

2. In the case of the discharge of cooling water it is unlikely to be feasible to eliminate some changes in thermal conditions locally, particularly at times of

Water - Water Quality (including surface, coastal and marine)

low tide when the volume of water in the estuary is at a minimum. Detailed appraisal of the proposals for disposal of cooling water will be required to assess the acceptability of this effect. Existing power stations with cooling water discharges are already operating at the site.

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.

Summary of Significant Strategic Effects:

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

Significant Effects

- Thermal impact of cooling water discharges (if this mode of cooling were to be adopted). However, this effect is of local and regional significance, particularly because of the potential impacts on the local Shellfish Waters and Ramsar site at Morecambe Bay.

Mitigation and Monitoring Possibilities

- 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

1. The site lies within the River Lune catchment. The site is not located in one of the Catchment Abstraction Management Strategy (CAMS) Water Resource Management Units (WRMUs). Accordingly surface and groundwater in the vicinity of the site is not currently used for water supply. As the site is coastal and lies on a minor aquifer, the proposed development is not expected to have any significant impact on water resources in the area.

2. The construction and operation of the proposed nuclear power station may, however, 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.

3. Increased water supply would probably be derived from multiple sources within United Utilities' Integrated Resource Zone, hence additional water supply could impact District aquatic ecosystems within and downstream of catchments used to provide additional water.

Water – Water supply and demand

Summary of Significant Strategic Effects:

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

Significant Effects

- Increased demand during the construction phase. The potential magnitude and duration of increased water demand will depend on the timing of the site development in relation to the activities (operation or decommissioning) of the existing site. Similar Significant effects are likely to apply to wastewater production from the site.

Mitigation and Monitoring Possibilities

- 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

1. The site is located on a minor millstone grit aquifer; there are no Groundwater Protection Zones in close vicinity of the site. The geology and hydrogeology at the site do not appear to provide any connectivity between activities at the site and major aquifers in the locality. There is a more significant sandstone aquifer underlying the area at the mouth of the River Lune and the region to the south of the Lune Estuary. This aquifer does not appear to extend as far north as the site. The minor aquifer present could be used locally for private water supplies, and discharges from these groundwater bodies 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 local minor aquifers.

2. Increased water supply would probably be derived from other sources within the United Utilities' Integrated Resource Zone. Additional water supply could impact groundwater bodies used to provide additional water. Increased groundwater abstraction could lead to impacts on groundwater dependent surface water features and aquatic ecosystems.

Water - Groundwater Quality and Flow

Summary of Significant Strategic Effects:

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

Significant Effects

- Potential impacts on local groundwater bodies.

Mitigation and Monitoring Possibilities

- 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 riverine, coastal and estuarial waters and on foreshore.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

The potential effects
The potential effects on channel geomorphology are likely to be limited to the local area, the impact of construction of improved defences (if these are required) may impact on coastal processes, the geographic spread of this impact is unknown without further investigation.

Regional/ Local

Part of the site are located within Flood Zone 1, and is therefore not at risk from coastal or fluvial flooding.

The majority of Heysham is protected by coastal defences which afford a standard of protection of 1/200 years. Over the lifetime of the development and taking into consideration the impacts of sea level rise it is likely that if the existing crest level of the defences is not raised then flood risk could be increased to the site. However it must be remembered that flood risk is not likely to increase as a direct result of the development but the flood risk to the development is likely to increase as a result of sea level rise.

Therefore, it is likely that development of the area which is not in Flood Zone 1 will require construction of new or upgraded coastal defences. Without further investigation the impact of raising the existing coastal defences on coastal processes is unknown. 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.

The Eastern part of Heysham is at risk of flooding from the River Lune at the 1/100 year event, however most of this area is protected by formal flood defences. With the impacts of climate change flood levels on the River Lune may increase and therefore existing defences may require improvement, the effects of this on the local ecoystem are unknown without further investigation.

Flood Risk

If the new nuclear power station is located in Flood Zone 1, i.e. where land is raised and the existing power stations are located , this will miminmise the potential effects caused as a result of mitigation

If the site is located outside of this raised area, though currently protected by both coastal defences to the West and fluvial defences to the east, the impacts of climate change may require improvement to these existing defences which could effect coastal and fluvial processes repsectively.

Summary of Significant Strategic Effects:

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

Significant Effects

- Main effects are through interference of any new/ improved coastal defence works on coastal processes and /or the improvment of existing fluvial defences on the River Lune on fluvial processes.

Mitigation and Monitoring Possibilities

- 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 Spatial Strategy for the North West 2008-2021 (September 2008) (North West Regional Development Agency) Revoked, July 2010.[7]

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

[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.

by 2010 from 866 MWe to 1.5 GW.

Historic Environment:

- The historic environment of the North West will be protected an 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 draft 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.gos.gov.uk/gonw/Planning/RegionalPlanning/

Regional Economic Strategy for North West England 2006-2026 (May 2006) (North West Regional Development Agency)[8]

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://download.southwestrda.org.uk/file.asp?File=/res/general/RES2006-2015.pdf

North West Climate Change Action Plan 2007-2009 (November 2006) (North West Climate Change Partnership)[8]

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.nwda.co.uk/PDF/climatechange.pdf

[8] 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.

Lancashire Biodiversity Action plan (2008) (Lancashire Biodiversity Partnership)

The Lancashire Biodiversity Action Plan was produced in 2001 and identifies 39 species and 11 habitats as well as a people plan for which specific action plan targets have been produced. 100,000 jobs are related to the environment in the North West of England which accounts for 2.1% (£3 billion) of the regions GDP.

The action plan targets are;

- To maintain all areas of moor land, moss land, sand dunes, woodland and estuarine river and salt marsh habitats
- To maintain and expand reed bed, grassland and heath land areas by 2015.
- To allow the full reestablishment of salt marshes to compensate for past loss and to mitigate against sea level rise.

LINK: http://www.lancspartners.org/lbap/

River Wyre to Walney Island Shoreline Management Plan (2008) (Wyre Borough council)

The Shoreline Management Plan (SMP) enables local authorities to identify long term, sustainable policies for coastal defence as part of Defra's 'Making Space for Water strategy.

The two main areas the plan addresses are;

- Sediment movement and coastline change - this area of coastline is always changing and natural defences of shingle, sand and salt march are very important for coastal protection.
- Coastal defences – the land along this coastline is in places lower than the highest recorded tide therefore, this area is dependant on natural or man made flood defence.

The SMP identifies the areas which are at risk and describes existing flood defences which need to be maintain or upgraded. The SMP for Heysham is to "Hold the line" meaning that existing defences need to be maintained, improved or rebuilt.

LINK: http://www.wyrebc.gov.uk/Page.aspx?PvnID=58203&PgeID=191&BrdCb=1-24-132-188

Sustainable communities in the North West) (2003) (Office of the Deputy Prime Minister)[9]

The report describes the actions and strategies for sustainable communities until 2020 with emphasis on 5 main areas;

- Housing – making it more affordable and create a better balance between supply and demand.
- Better living/working environment – focusing on health, safety, crime, poverty and water quality.
- Improving economic prosperity – as outlined in the RES for the North West.
- Safeguarding the countryside – focusing on rural recovery.
- Planning – avoiding further development on "green belt" areas.

LINK: http://www.communities.gov.uk/documents/communities/pdf/143606.pdf

Lancashire's Municipal Waste Management Strategy 2001-2020 (April 2001) (Lancashire County Council)

The Municipal Waste Management Strategy is designed to manage1 million tonnes of waste by 2020, to recycle and compost 56% of all waste by 2015 and to reduce the total quantity of biodegradable municipal waste going to landfill from, the current, 85% to 20% by 2010.
The report focuses on :

- promote and enable waste reduction and re-use and maximise recycling and composting whilst minimise landfill disposal as far as practicable;
- manage the waste which is left over by Energy-from-Waste incineration;
- 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 Lancashire at an acceptable cost

LINK: www.lancashire.gov.uk/corporate/web/viewdoc.asp?id=20202

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.

[9] 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.

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	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. In 2006, only 4% of air pollution incidents were classed as major or significant (Category 1 and 2). 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. Two AQMAs have been declared within the Lancaster City Council boundary: one in Lancaster (approx. 7km north east of the proposed site) and one in Carnforth (approx. 16km north-north east of the site)		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. 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. 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.

Key to Data Sources

1	Environment Agency: State of the Environment – North West http://www.environment-agency.gov.uk/research/library/publications/34061.aspx [accessed 04 March 2009]
2	UK Air Quality Archive. http://www.airquality.co.uk/archive/laqm/laqm.php [accessed 03 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 Lancashire 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 Lancashire Biodiversity Action Plan is most relevant to the site.		
The Lancashire Biodiversity Action Plan **Habitats**	2,3	A total of 25 habitat types are recognised within the Lancashire Biodiversity Action Plan. These are split into 'Habitat' Action Plans of which there are 11 and 'Urban' Habitat Action Plans of which there are 14. The habitats which are considered to be the most relevant to the nominated the Site are Reedbed, Saltmarsh and Estuarine rivers and Sand dunes.		
The Lancashire Biodiversity Action Plan Species	2,3	A total of 39 species action plans are included within the Lancashire Biodiversity Action Plan. Of these 24 are for UK BAP Priority species[10] with the remainder either being grouped species action plans (for example. bats/farmland birds) or action plans for species which are of local importance within Lancashire.		

[10] According to the new list of Priority Habitats and Species which was produced in 2008. See www.ukbap.org.uk

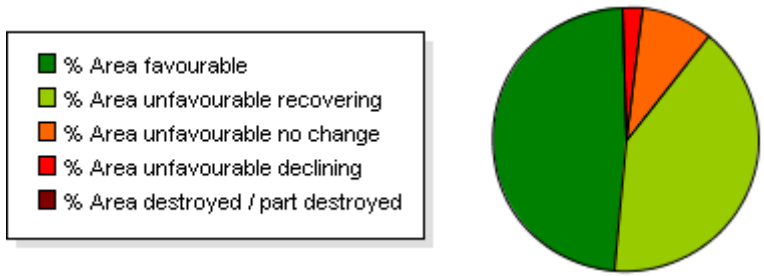
Indicator	Data Source	Current Data	Comparators	Trend
Natura 2000 sites (N2K)	4	Natural England records show there are 19 designated sites within 20km of the proposed siute: Lune Estuary, Morecambe Bay, Heysham Moss, Cockerham Marsh, Winmarleigh Moss, Wyre Estuary, Calf Hill and Crag Woods, Thwaite house Moss, Crag Bank, Artle Dales, Burton Wood, Bowland Fells, Warton Crag, Jack Scout, Leighton Moss, Far Arnside, Humphrey Head, Wart Barrow, South Walney and Piel Channel Flats. Collectively the Morecambe Bay SAC and SPA form the Morecambe Bay European Marine Site (EMS). This 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. The site boundary includes approximately 5.5Ha of land that falls within the boundary of the Lune Estuary SSSI, Morecambe Bay Ramsar, SPA and SAC, within the vicinity of Ocean Edge Caravan Park. N2K Sites considered to be most relevant in relation to any development of the site are described in more detail below:		
Morecambe Bay SAC	5	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. The Morecambe Bay area qualifies as an SAC for the following Annex I Habitats: • 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 *Ammophilia arenaria* ('white dunes')		The draft Marine Bill was published by Defra on 3 April 2008 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 importance. MCZ's would replace the exisitng Marine Nature Reserves and form a new type of Marine Protected Area. Four regional projects are currently being developed the Moorecombe Bay area falls within the Irish Sea MCZ.

Indicator	Data Source	Current Data	Comparators	Trend
		• Fixed dunes with herbaceous vegetation ('grey dunes') • Humid dune slacks Annex I Habitats present as a qualifying feature but not a primary reason for selection of the site • 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 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 previously been absent for 30 years[2]. [2]See UK Biodiversity Action Plan. Priority Habitat Description at http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf#SAR Annex II species that are a primary reason for selection of this site • Great Crested Newt		
Morecambe Bay SPA	6	The site is of European importance throughout the year for a wide range of bird species. In summer, areas of shingle and sand hold breeding populations of terns, whilst very large numbers of geese, ducks and waders not only overwinter, but (especially for waders) also use the site in spring and autumn migration periods. The bay is of particular importance during migration periods for waders moving up the west coast of Britain.		

Indicator	Data Source	Current Data	Comparators	Trend
		Morecambe Bay SPA supports the following: • Internationally important assemblages of waterfowl and seabirds • Internationally important populations of regularly occurring migratory species • Internationally important populations of regularly occurring Annex I species		
Leighton Moss SPA	7	Leighton Moss is situated on the eastern edge of Morecambe Bay in Lancashire in north-west England. It contains the largest reedbed area in the region and the site is of importance for a number of wetland birds, especially Bittern *Botaurus stellaris* and Marsh Harrier *Circus aeruginosus.* Leighton Moss supports the following: • Internationally important populations of regularly occurring Annex I species.		
Shell Flats and Lune Deep pSAC		The Lune Deep and Shell Flats pSAC is composed of two elements: a reef enclosed in a deep water channel (Lune Deep) and a sandbank feature (Shell Falts) at the mouth of Morecambe Bay. Shell Flats and Lune Deep supports the following: • Reefs (Annex 1 resource) • Sandbanks lightly covered by seawater all the time (Annex 1 resource)		
Ramsar sites	4	There are 2 Ramsar sites within 20 km of the site: • Leighton Moss • Morecambe Bay		
Morecambe Bay Ramsar	8	The site is designated for its important bird assemblages including migratory waterfowl and species occurring at levels of international importance.		

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Leighton Moss Ramsar</td><td>9</td><td colspan="2">The site is designated primarily for its reedbed habitat and its importance as a northern outpost for breeding populations of great bittern Botaurus stellaris, Eurasian marsh harrier Circus aeruginosus and bearded tit Panurus biarmicus.</td><td></td></tr>
<tr><td>Sites of Special Scientific Interest (SSSI)</td><td>10</td><td colspan="3">There are 445 SSSI’s in the north west of England with 69 located in Lancashire. * 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

Condition Summary of SSSI’s in the North West Region (445 SSSI’s)

<table>
<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>
<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>
</table>


Condition Summary of SSSI’s in Lancashire (69 SSSI’s)</td></tr>
</table>

<table>
<tr><th>Indicator</th><th>Data Source</th><th colspan="2">Current Data</th><th colspan="2">Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td colspan="5">
<table>
<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>
<tr><td>96.58%</td><td>70.86%</td><td>25.72%</td><td>2.88%</td><td>0.53%</td><td>0.00%</td></tr>
</table>


There are 35 SSSI's within 20km of the site, of these 3 fall within 5km and are considered to be particularly relevant to any development of the site. These are:

• Lune Estuary SSSI – in close proximity to the site (approx 250m)
• Morecambe Bay SSSI – approx 400m from the Site
• Heysham Moss SSSI – approx 2.2km from the Site
</td></tr>
<tr><td>Lune Estuary SSSI (forms a component part of Morecambe Bay SAC, Morecambe Bay SPA and Morecambe Bay Ramsar)</td><td>6</td><td colspan="5">
The Lune Estuary forms part of the Morecambe Bay intertidal system and includes extensive sand/silt flats together with saltmarsh in the form of a number of discontinuous saltings fringing the estuary. As part of Morecambe Bay the site forms a major link in the chain of estuaries along the west coast of Britain used by birds on migration between the breeding grounds in the far north and the wintering grounds further south and is of international importance for the passage and wintering waterfowl it supports.

Condition Summary: Lune Estuary SSSI

<table>
<tr><th>% Area meeting</th><th>% Area favourable</th><th>% Area unfavourable</th><th>% Area unfavourable no</th><th>% Area unfavourable</th><th>% Area destroyed /</th></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>PSA target</th><th></th><th>recovering</th><th>change</th><th>declining</th><th>part destroyed</th></tr>
<tr><td>100.00%</td><td>98.29%</td><td>1.71%</td><td>0.00%</td><td>0.00%</td><td>0.00%</td></tr>
</table>


</td><td></td><td></td></tr>
<tr><td>Morecambe Bay SSSI (forms a component part of Morecambe Bay SAC, Morecambe Bay SPA and Morecambe Bay Ramsar)</td><td>7</td><td colspan="3">Morecambe Bay, lying between the coasts of South Cumbria and North Lancashire forms one of the two largest intertidal estuarine flats in Britain. The whole estuarine complex is of international significance for wintering wading birds and of national significance for wintering wildfowl. The saltmarshes are particularly important for their vegetation which is diverse supporting a number of rare and uncommon plants as well as a variety of nationally scarce invertebrate species.

Condition Summary: Morecambe Bay SSSI

<table>
<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>
<tr><td>99.03%</td><td>94.35%</td><td>4.68%</td><td>0.97%</td><td>0.00%</td><td>0.00%</td></tr>
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<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td colspan="3"> 
</td></tr>
<tr><td>Heysham Moss SSSI</td><td>8</td><td colspan="3">Heysham Moss is a small lowland raised bog which occupies a natural depression on the coastal plain of the Lune Estuary and is the remains of a once larger area of peat.

Condition Summary: Heysham Moss SSSI

<table>
<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>
<tr><td>100.00%</td><td>0.00%</td><td>100.00%</td><td>0.00%</td><td>0.00%</td><td>0.00%</td></tr>
</table>

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

Indicator	Data Source	Current Data	Comparators	Trend
National Parks	9	• The Lake District National Park falls approximately 18.45km from the site.		
National Nature Reserves (NNR)	10	There are 32 NNR within the North West Region with 2 occurring in Lancashire. Only I LNR falls within 20km of the site. • Gait Barrows NNR - The site is a rich mosaic of limestone habitats including unique limestone pavement, yew woodland, fen and reedbed and falls approximately 17.65km from the site. Is also a component part of the larger Morecambe Bay Pavements SAC.		
Local Nature Reserves (LNR)	11	There are 122 LNRs within the North West Region with 29 occurring in Lancashire. Three LNR's fall within 20km of the site. • Trowbarrow Quarry LNR – approximately 17.66km from the site • Warton Crag LNR – approximately 15.83km from the site • Warton Crag Quarry LNR – approximately 15.52km from the site		
RSPB Reserves	12	• Leighton Moss RSPB Reserve – The largest reedbed in North West England and home to important birds such as breeding bitterns, bearded tits and marsh harriers. Located approximately 16km from the site. The site is also designated as an SPA, Ramsar and SSSI.		
Areas of Outstanding Natural Beauty (AONB)	13, 14	The site does not fall within any AONB's, however two AONB's fall within 20km. • Arnsdale and Silverdale AONB – approximately 10.7km from the site. • Bowland Forest AONB – approximately 10km from the site.		
Local Wildlife Sites	N/A	Information to be obtained from a Local Records Centre at the appropriate time.		
Legally protected Species	20	The following legally protected species have been recorded within 10km of the site (please note this excludes birds for which there are a vast number of different species)		

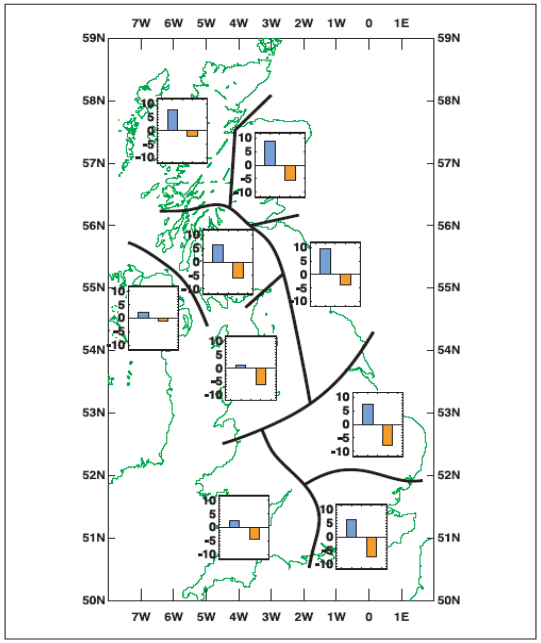
Indicator	Data Source	Current Data	Comparators	Trend
***EPS = European Protected Species**		• Great Crested Newts (EPS) • Otters (EPS) • Water Voles • Bats (EPS) • Common Species of Reptile (Adder, Slow Worm, Common Lizard and Grass Snake) • Natterjack Toads (EPS) Please note that further information on species records within the area is to be obtained from a Local Records Centre at the appropriate time. 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.		

Key to Data Sources

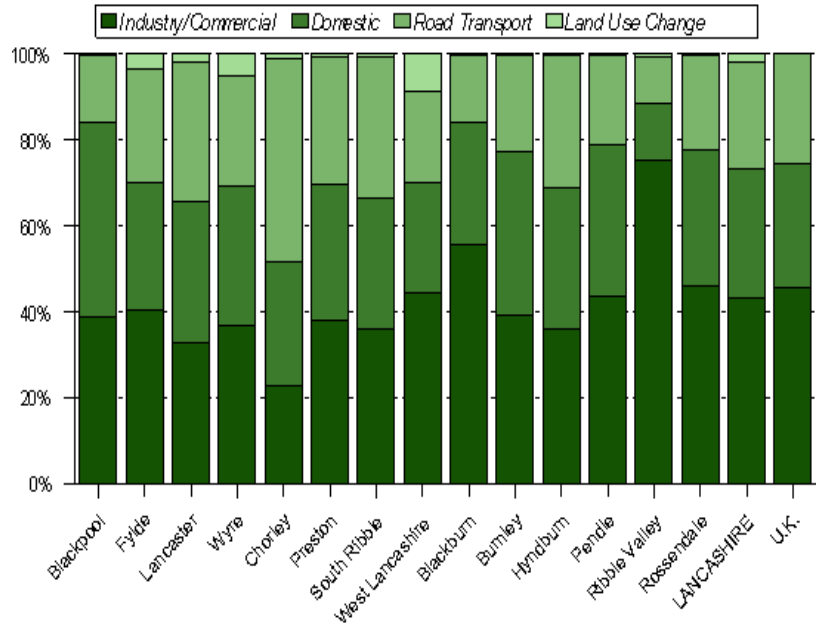
1	North West Biodiversity [2008]. A partnership of public, private and voluntary organisations working together at the regional level to conserve and enhance the biodiversity of the North west for people and wildlife. http://www.biodiversitynw.org.uk/default.asp
2	The Lancashire Biodiversity Action Plan [2008].Lancashire Biodiversity Action Plan Habitat Targets. http://www.lancspartners.org/lbap/
3	The UK Biodiversity Action Plan available online at [2002]. Lancashire Biodiversity Plan. http://www.ukbap.org.uk/lbap.aspx?ID=439
4	Joint Nature Conservation Committee (JNCC). http://www.jncc.gov.uk/
5	JNCC. Morecambe Bay SAC information.http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013027
6	JNCC [May 2006] Morecambe Bay SPA information. http://www.jncc.gov.uk/pdf/SPA/UK9005081.pdf
7	JNCC [May 2006] Leighton Moss SPA Information. http://www.jncc.gov.uk/pdf/SPA/UK9005091.pdf
8	JNCC [May 1996] Morecambe Bay Ramsar information. http://www.jncc.gov.uk/pdf/RIS/UK11045.pdf
9	JNCC [November1985] Leighton Moss Ramsar Information. http://www.jncc.gov.uk/pdf/RIS/UK11035.pdf
10	Natural England, Site of Special Scientific Interest condition summary information [online] available: http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?Report=sdrt18&Category=R&Reference=North+West http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?Report=sdrt18&Category=C&Reference=1024
11	Natural England Lune Estuary SSSI Citation. http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1001709 Condition summary information http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1001709
12	Natural England Morecambe Bay SSSI Citation http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1001807 Condition summary information http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1001807
13	*Natural England* *Heysham Moss SSSI Citation.* http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1006295 *Condition summary information* http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1006295

14	*Natural England [2008]. Information on the Lake District National Park.* http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nationalparks/lakedistrict.aspx *Lake District. Information about National* http://www.lake-district.gov.uk
15	*Natural England. Information on Gait Barrows NNR.* http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nnr/1006058.aspx
16	*Natural England. Information on Local Nature Reserves within Lancashire. http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_results.asp?C=24*
17	*RSPB [October 2008] Information on Leighton Moss RSPB Reserve.http://www.rspb.org.uk/reserves/guide/l/leightonmoss/about.asp*
18	*Natural England [2008]. Information on Arnsdale and Silverdale AONB* http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/aonb/arnside.aspx Arnside/Silverdale Landscape Trust [March 2008] Arnside/Silverdale Area of Outstanding Natural Beauty http://www.arnsidesilverdaleaonb.org.uk/
19	*Natural England [March 2008]. Information on the Forest of Bowland AONB* http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/aonb/bowland.aspx Lancashire County Council. [March 2009]. Information on Forest of Bowland AONB http://www.forestofbowland.com/
20	*National Biodiversity Network. [2009].*http://www.nbn.org.uk/

Climate Change

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Climate Change				
North West England, Region (Precipitation and Temperature)	1,2,3	The following trends have been observed in the North West Region: • 0.4℃ 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 decades • Evidence of coastal erosion with potential serious consequences for this region (1909-2055 in the Merseyside region) 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 Lancashire. The consequences predicated for the North West are: • The frequency of extreme weather events such as floods, droughts, and storms is likely to increase in Lancashire, causing disruption to services, and affecting people's health and wellbeing. • A rise in temperature would put areas such as the Forest of Bowland at risk. The forest contains species that are highly specialised to the present cold climate and these are under threat from changes to the climate. • It is possible that climate change could bring some benefits to Lancashire. An increase in temperature and hours of sunshine could help bring an increase in investment and spending to Lancashire's coastal resorts.		 *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]*

Indicator	Data Source	Current Data	Comparators	Trend
Greenhouse Gas Emissions	1	The total carbon dioxide emissions in the Lancashire sub-region in 2006 were estimated at 12.2 million tonnes. This represented just over a fifth of the North West total of 59.5 million tonnes or 2.3% of the UK total (excluding unallocated emissions). Overall, 43% of Lancashire emissions are attributable to industrial, commercial and public sector sources, 30% to the domestic sector, 25% to road transport and less than 2% to land use, land use change and forestry. Relative to the UK as a whole, Lancashire has lower CO_2 emissions from both industrial and commercial and road transport sources but fractionally more from the domestic sector.		• There has been an overall increase in emissions from 2004 to 2006. • There is a large variation in emissions per capita across Lancashire, ranging from a low of 5 tonnes in Blackpool, to as much as 32 tonnes in Ribble Valley. • The presence of certain industries which use a lot of energy, like refineries, glass and other non-metallic mineral sectors, and which are concentrated in a few areas can have a very large local impact. For example, in Ribble Valley, 80% of emissions are from industrial sources. The Council reports that the County emissions were 13 million tonnes of carbon dioxide in 2004. Despite the increase in emissions from its 3 major sectors, they have reported a reduction in overall carbon dioxide emission for 2006.
Lancashire County Council Greenhouse Gas Emissions	1	Accounting for about 43% of Lancashire's total carbon dioxide emissions (compared to 46% in the UK) the local industrial and commercial sector produces the equivalent of 3.6 tonnes per head, slightly lower than the 4.0 tonnes in the UK. However, it is important to recognise that the presence of certain high-energy using industries like refineries, metal production, glass and other non-metallic mineral sectors, which are concentrated in a few areas, can have a very large local impact. The graph below illustrates the County Council's 2006 emission (source: Defra)		

Indicator	Data Source	Current Data	Comparators	Trend
				
Local Authorities Greenhouse Gas Emissions	2,3	Lancashire County Council has reported the following targets to tackle greenhouse gas emissions:		

Indicator	Data Source	Current Data	Comparators	Trend

Ref.	Main Indicator	Activity to measure	2010 Targets
M1	Greenhouse gases emitted (tonnes CO2 equivalent)	Reduction in Greenhouse gases emitted (%)	To be completed by Summer 2007
M2	Number of microgeneration installations	Uptake of Low Carbon Building Project grants (%) (2005 baseline: 136 grants)	272 grants taken up
M3	Low carbon heat & electricity generation (GWh)	i) Increase in Combined Heat and Power capacity installed (2005 baseline: 866 MWe) ii) Monitoring of installation and Renewable Obligation Certificate data (2005 baseline: Installed capacity: 321 MW; Electricity generated: 1049 GWh)	1.5 GW installed capacity Installed capacity: 1,231 MW Electricity generated: 3,500 GWh
M4	Number of integrated transport or sustainable travel schemes deployed in the region	i) Number of integrated transport or sustainable travel schemes deployed in the region ii) Trips per annum by private car iii) Number of workplace travel plans deployed in the region	To be completed by Summer 2007 Reduce growth rate to zero To be completed by Summer 2007
M5	Total journeys per annum by bus and rail	i) Non-car-based travel to school (%) ii) Total journeys per annum by bus and rail	Reduction in total journeys to school by car Halt decline in total bu patronage; continued growth of rail patronag
M6	Public sector bodies with carbon reduction management plans in place (%)	Percentage plans in place (%) - Local Authorities (2005 baseline: 20%) - Businesses	80% To be completed by Summer 2007
M7	Research effort for low-carbon technologies, carbon capture and climate-change mitigation and adaptation	Investment in research for: - Low carbon technologies (£, spend) - Climate change adaptation (£, spend)	To be completed by Summer 2007
M8	Coverage of flood risk and shoreline management plans	Plans prepared and action being taken (2006 baseline: zero)	100%
M9	People taking action on climate change	Percentage of population taking action (2006 baseline: 58%)	75%

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Energy				
Energy	4,5,6	Electricity Consumption 2007 (Lancaster) Overall: 566.2 GWh (0.2% of UK) Average Domestic Consumption: 4,263 kWh Average Industrial Consumption: 53,897 kWh Total Energy Consumption 2006 (Lancaster) 3,491.6 GWh	Electricity Consumption 2007 (North West England) Overall: 35,352.7 GWh Average Domestic Consumption: 4,226 kWh Average Industrial Consumption: 91,275 kWh Electricity Consumption 2007 (Great Britain) Overall: 309,669.5 GWh Average Domestic Consumption: 4,392 kWh Average Industrial Consumption: 79,077 kWh Total Energy Consumption 2006 North England: 200,208.9 GWh UK: 2,120,261.5 GWh	The Lancaster region accounts for up to 0.2% of Britain's total electricity consumption. 16% of all energy consumed in the Lancaster region comes from electricity. The Regional Spatial Strategy (RSS) for North West England seeks to: • Promote and exploit low carbon and renewable energy technologies and increase the amount of electricity and energy for heating from renewable sources supplied and consumed within the Region. • 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	4,6	Energy Consumption from Renewable Sources 2006 (Lancaster) 4.6 GWh (0.1%)	Total Energy Consumption from Renewable Sources 2006 North West England: 701.4 GWh (%) UK: 6,939.5 GWh (0.3%)	The Regional Spatial Strategy for North West England states: • 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). The North West Sustainable Energy Strategy states:

Indicator	Data Source	Current Data	Comparators	Trend
				• The North West possesses some of the best renewable energy resources in the UK. 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	**7**	Heysham 1 nuclear power station has a capacity of 1,150 MW and is expected to operate until 2014. Heysham 2 nuclear power station has a capacity of 1,250 MW and is expected to operate until 2023. Additional power stations in the vicinity of the site are: • Roosecote Power Station: gas and coal, 230 MW and 120 MW, 24 km • Scout Moor Wind Farm: wind, 65 MW, 72 km • Fiddlers Ferry Power Station: coal, 1,989 MW, 104 km • Rocksavage Power Station: gas, 748 MW, 112 km		

Key to Data Sources

1	Lancashire County Council [2009]. Background on Climate change. http://www.lancashire.gov.uk/corporate/web/view.asp?siteid=3945&pageid=15047&e=e
2	DEFRA [April 2002] United Kingdom Climate Impact Programme UKCIP02. http://www.ukcip.org.uk/images/stories/Pub_pdfs/UKCIP02_tech.pdf
3	NWDA [November 2006]. Climate Change Action Plan for England's Northwest 2007-09 http://www.nwda.co.uk/PDF/climatechange.pdf
4	Lancashire County Council [2009] Lancashire's Local Transport Plan 2006 – 2010 http://www.lancashire.gov.uk/environment/ltp/ltp_web/index.asp
5	Edie [September 2001]. Lancashire adopts UK's largest free home composting scheme 2001 http://www.edie.net/news/news_story.asp?id=4736&channel=0 [accessed 04 March 2009]
6	Department for Environment, Food and Rural Affairs [November 2007]. Municipal Waste Management Statistics http://www.defra.gov.uk/environment/statistics/wastats/bulletin07.htm [accessed 03 March 2009]
7	Urban Mines Municipal Waste Procurement webpage: http://www.urbanmines.org.uk/?i=1459&s=1111 [accessed 11 March 09]

Communities: Population and Economy

Indicator	Data Source	Current Data			Comparators		Trend
Topic: Population							
Age of population	1, 2		**Popn.**	**Lancaster (Non-Metropolitan District)**	**North West of England**	**England**	The North West had a population of 6.9 million in 2006. This was 80,000 more compared with mid-2001 and a decrease of 1.3% since 1981. The largest percentage change was a 20% increase in Eden.
		All People (Count)	7,868	133,914	6,729,764	49,138,831	
		People aged 0-4 (%)	6.90	5.45	5.88	5.96	
		People aged 5-7 (%)	3.81	3.34	3.78	3.74	
		People aged 8-9 (%)	2.67	2.40	2.74	2.61	
		People aged 10-14 (%)	7.69	6.22	6.93	6.57	
		People aged 15 (%)	1.41	1.20	1.37	1.27	
		People aged 16-17 (%)	2.97	2.50	2.66	2.51	
		People aged 18-19 (%)	2.68	4.01	2.47	2.40	

Indicator	Data Source	Current Data			Comparators		Trend
		People aged 20-24 (%)	5.74	8.29	5.79	6.01	
		People aged 25-29 (%)	5.83	5.60	6.18	6.65	
		People aged 30-44 (%)	20.92	20.18	22.09	22.65	
		People aged 45-59 (%)	16.33	18.09	19.06	18.88	
		People aged 60-64 (%)	4.38	4.92	5.09	4.87	
		People aged 65-74 (%)	8.71	9.12	8.59	8.35	
		People aged 75-84 (%)	6.28	6.25	5.55	5.60	
		People aged 85-89 (%)	2.20	1.58	1.24	1.30	
		People aged 90 and over (%)	1.46	0.85	0.61	0.64	
		Mean age of population in the area	38.66	39.21	38.61	38.60	

Indicator	Data Source	Current Data			Comparators		Trend
		Median age of population in the area	37.00	38.00	38.00	37.00	
		The population of Poulton and Lancaster are similar to the national and regional average. People aged 65 and older make up approximately 18% of the Lancaster Population. This is slightly above both the regional and national average.					
Topic: Employment							
Percentage Economically Active – Employed %	1	**Poulton**	**Lancaster (Non-Metropolitan District)**		**North West of England**	**England**	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%. Full time employment at a ward and district levels are below the regional and national level. Part time employment levels are above the regional and national levels.
		Full Time 33.35	33.49		38.77	40.81	
		Part Time 12.85	12.70		11.87	11.81	
Percentage Economically Active – unemployed %		5.72	3.57		3.63	3.35	Unemployment levels are higher at ward level than the regional and national level. At district level they are similar to the regional and national level.
Industry of employment **All persons**		**Poulton 100%** **(2,984)**	**Lancaster (Non-Metroplotian District 100% (55,906)**		**North West of England 100% (2,900,020)**	**England** **100% (22,441,498)**	
Agriculture/ Forestry (%)		0.70	2.17		1.22	1.45	

Indicator	Data Source	Current Data		Comparators		Trend
Fishing (%)		0.10	0.03	0.01	0.02	
Mining (%)		0.17	0.38	0.16	0.25	
Manufacturing (%)		12.16	11.29	16.89	14.83	
Electricity/Gas/Water Supply (%)		2.82	2.45	0.77	0.71	
Construction (%)		6.87	6.71	6.49	6.76	
Wholesale/ Retail Trade (%)		20.38	16.75	17.82	16.85	
Hotels/ Restaurant (%)		8.58	6.72	5.13	4.73	
Transport/ Communications (%)		6.90	6.53	6.79	7.09	
Financial (%)		2.95	2.52	3.77	4.80	
Real Estate (%)		7.17	7.78	10.80	13.21	
Public Admin (%)		4.05	5.69	5.68	5.66	
Education (%)		7.61	11.44	7.95	7.74	
Health and Social Work(%)		13.51	14.20	11.97	10.70	
Other (%)		6.03	5.35	4.54	5.20	
Self Employed (%)		7.75	7.80	7.10	8.32	
Socio-Economic Classifications 2001 (% Persons aged 16-74)		**Poulton**	**Lancaster (Non-Metropolitan District)**	**North West of England**	**England**	
Large employers and higher managerial occupations		1.15	1.97	2.86	3.50	
Higher professional occupations		1.75	4.18	4.17	5.11	
Lower managerial and professional occupations		13.41	15.81	16.78	18.73	
Semi-routine		15.89	11.66	12.17	11.65	

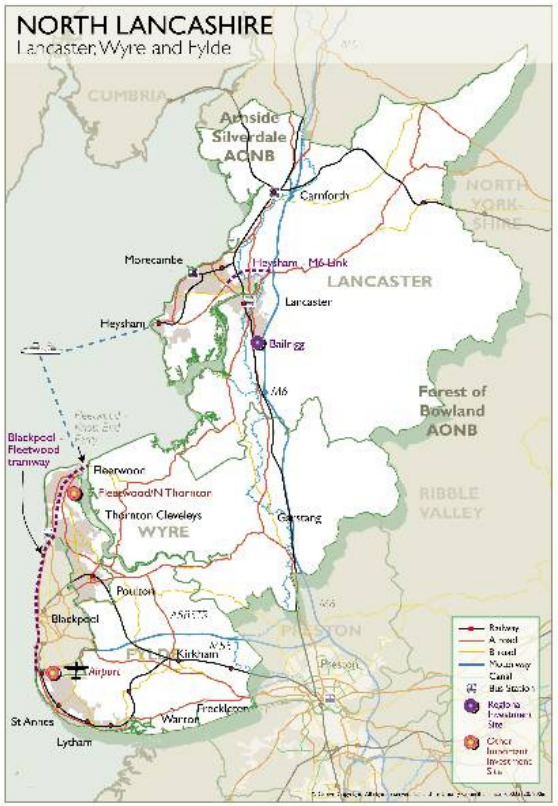
Indicator	Data Source	Current Data		Comparators		Trend
occupations						
Routine occupations		11.17	8.88	9.82	9.02	
Never Worked		2.93	2.11	3.13	2.72	
Full-time students		6.66	13.41	6.97	7.03	

Key to Data Sources

1	National Statistics [2001]. Neighbourhood Statistics: Quantock Vale http://neighbourhood.statistics.gov.uk/dissemination/LeadDatasetList.do?a=7&b=6099160&c=LA3+2XQ&d=14&g=462595&i=1001x1003&m=0&r=0&s=1236094719898&enc=1&domainId=15
2	National Statistics [May 2008]. National Statistics: North West http://www.statistics.gov.uk/cci/nugget.asp?id=1127

Communities: Supporting Infrastructure

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Transport				
Regional Freight Routes	1	**Regional Roads** A6 running north south through Lancaster City A589 linking Lancaster to Heysham via Morecambe A5105 linking Morecambe to Bolton-le-Sands, and A683 linking Lancaster to the M6 at Junction 34. Roads linking ports of Heysham and Fleetwood with the region are operating close to capacity, congestion has significant impact on these routes. A new major transport scheme "Heysham to M6" connection has recently been granted planning permission and aims to alleviate identified congestion. **Rail** Lancaster is served by West Coast Main Line services with a local service to Bare Lane, Morecambe and Heysham Harbour. Mainline services run north south between Camforth, Lancaster Preston and on to Manchester. From Carnforth, trains go west to Silverdale and Barrow and east to Wennington and Leeds. Lancaster has slightly higher patronage levels than Lancashire as a whole and this may be due to the number of stations in the District. **Air** The region is served by Blackpool and Manchester Airports, both to the south. **Port** The region is served by the Morecambe and Heysham Harbours, **The Country Road Network** Many roads in the District, particularly those in and surrounding Lancaster City, have high levels of traffic. The highway network in Lancaster City is made up of three linked gyratory systems. This arrangement		



Indicator	Data Source	Current Data	Comparators	Trend
		suffers from congestion over an extended peak period. Traffic movement on the highway network near the port is influenced by sailing times and by the nuclear power station. Private cars are the predominant mode of transport accounting for approximately 93% of vehicles on the highway network. They make the greatest contribution to existing congestion levels and poor air quality in the declared AQMA.		
Topic: Waste				
Municipal Waste	2,3,4	Lancashire County Council was ranked 73rd for the highest waste residual waste per head among the 394 disposal or unitary authorities. In 2006/2007 Lancashire County Council attained a recycling and compost rate of 41.2% which is higher than the average (34.5%) for England. Landfill remains the principal method of waste disposal in Lancashire County. In total, 396,527 tonnes (59%) of municipal waste was sent to landfill in the region in 2006/2007, this equates to the English average of 58%. Lancashire County Council has contracts with several landfill operators in Lancashire and currently utilise 8 landfill sites and 5 waste transfer stations that are strategically located across the County. No information regarding capacity of these sites could be determined. Two Mechanical Biological Treatment (MBT) units, capable of treating 600,000 tonnes p.a and an In-Vessel Composting unit are operated by a private waste management contracting authority and serve the region.		Total municipal waste in the region has increased by just under 25% since 2000/2001, from 540,169 to 675,586 tonnes in 2006/2007. There has been an overall decrease in the proportion of total waste sent to landfill in Lancashire, from 88.1% in 2000/2001 to 73.9% in 2003/2004 due to increased recycling efforts. Total household waste continues to decrease in the region and was almost 54% higher in 2000/2001 than in 2006/2007, decreasing from 786,000 to 358,271 tonnes.
Radioactive and Hazardous Waste		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 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 resources

1	Government Office for the North West [September 2008]. North West of England Plan Regional Spatial Strategy to 2021 http://www.gos.gov.uk/497468/docs/248821/457370/NorthWestEnglandRSS
2	Department of Business Enterprise and Regulatory Reform [2009]. Electricity Consumption Data at Regional and Local Authority Level [online] available: http://www.berr.gov.uk/energy/statistics/regional/regional-local-electricity/page36213.html
3	Department of Business Enterprise and Regulatory Reform [2009]. Total final energy consumption at regional and local authority level [online] available: http://www.berr.gov.uk/energy/statistics/regional/total-final/page36187.html
4	Department of Business Enterprise and Regulatory Reform [2009]. Nuclear Power Stations http://www.berr.gov.uk/energy/sources/nuclear/key-issues/power-stations/page47765.html/sources/nuclear/key-issues/power-stations/page47765.html
5	Wikipedia [July 2008]. Power Stations in North West England http://en.wikipedia.org/wiki/Category:Power_stations_in_North_West_England
6	North West Regional Assembly [July 2006]. North West Sustainable Energy Strategy http://www.climatechangenorthwest.co.uk/assets/_files/documents/jun_07/cli__1181140886_North_West_Sustainable_Energy_.pdf

Human Health and Well-Being

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Human Health and Well-being				
Community well-being	1	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. This data compares the Super Output Area, Lancaster 016G to England as a whole as follows: • Income deprivation greater than average • Employment deprivation greater than average • Health deprivation greater than average • Education deprivation greater than average • Barriers to housing and services are much greater than average • Crime is 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 Lancaster City Council's area ranked as 117 out of 354 (where 1 is most deprived). This ranking shows that Lancaster is a reasonably deprived area.	Other city and metropolitan councils in Lancashire are ranked as follows: • Bolton is 51 • Preston is 48 • Rochdale is 25 • Wigan is 67 As can be seen from the above many of the city and metropolitan councils in Lancashire	

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td></td><td>are considered to be deprived areas although Lancaster is the least deprived of the five examples.</td><td></td></tr>
<tr><td>Age profile (mid 2006)</td><td>1</td><td>In the Super Output Area, Lancaster 016G the age profile of the population is as follows:

<table><tr><th>Age Band (years)</th><th>Percentage</th></tr><tr><td>0 – 15</td><td>15.7</td></tr><tr><td>16 – 64 (males)
16 – 59 (females)</td><td>54.9</td></tr><tr><td>65+ (males)
60+ (females)</td><td>29.4</td></tr></table></td><td>These figures compare to the age profile for the UK as a whole in 2006 as follows:

<table><tr><th>Age Band (years)</th><th>Percentage</th></tr><tr><td>0 – 15</td><td>20.1</td></tr><tr><td>16 – 64 (males)
16 – 59 (females)</td><td>61.6</td></tr><tr><td>65+ (males)
60+ (females)</td><td>18.3</td></tr></table>
As can be seen from the tables, there is a much higher proportion of people in the upper age bracket (retired or approaching retirement) in the Super Output Area, Lancaster 016G than in the UK as a whole. There are also proportionately fewer children and people of working age in the area, therefore.</td><td></td></tr>
<tr><td>General health (2001)</td><td>1</td><td>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, Lancaster 016G were as follows:
Good – 62.1%
Fairly good – 26.9%
Not good – 11.0%</td><td>For comparison purposes, the same data for the overall Lancaster area and England are as below:
<table><tr><th></th><th>Lancaster</th><th>England</th></tr><tr><td>Good</td><td>67.4</td><td>68.8</td></tr><tr><td>Fairly good</td><td>22.7</td><td>22.2</td></tr><tr><td>Not good</td><td>9.9</td><td>9.0</td></tr></table>
There are clearly less people reporting good health and more people reporting poor health in the Super Output Area, Lancaster 016G than in both the rest of the Lancaster area and</td><td></td></tr>
</table>

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td></td><td>England as a whole.</td><td></td></tr>
<tr><td>Life expectancy at birth (Jan 04 – Dec 06)</td><td>1</td><td><table><tr><th></th><th>Lancaster</th></tr><tr><td>Males</td><td>76.40</td></tr><tr><td>Females</td><td>81.20</td></tr></table></td><td><table><tr><th>NW of England</th><th>England</th></tr><tr><td>75.80</td><td>77.32</td></tr><tr><td>80.30</td><td>81.55</td></tr></table>
As can be seen from above, the life expectancy in the Lancaster City Council area is comparable to the national average for England.</td><td></td></tr>
<tr><td>Infant mortality (Jan 03 – Dec 05)</td><td>1</td><td>Infant mortality in the Lancaster City Council area for the years in question was 6.4 persons in every 1000.</td><td>This shows that infant mortality in Lancaster is relatively high compared to the figures of 5.7 persons per thousand for the North-west of England region and 5.1 persons per thousand in England as a whole.</td><td></td></tr>
<tr><td>Proximity to medical services</td><td>3</td><td>Medical services in the area of the Heysham site are as follows:
There are two General Practitioner (GP) practices (Dr A S Forsyth and Partner and Coastal Medical Group) within 5 km of the site. Twelve other GP practices are within 10 km of the site
Closest hospital is the Queen Victoria Hospital (6.3 km) but this has no Accident and Emergency department
Nearest hospital with an Accident & Emergency department is The Royal Lancaster Infirmary in Ashton Road, Lancaster which is 8.0 km away
The nearest hospital providing mental health services is Parkwood which is 24.3 km away</td><td></td><td></td></tr>
</table>

Indicator	Data Source	Current Data	Comparators	Trend
Education - examination results for young people (2006 – 07)	1	No published data could be found for this parameter for the Super Output Area, Lancaster 016G, however, 61% of pupils achieved 5 or more A*- C grade passes including English and Mathematics at GCSE or equivalent in the Lancaster City Council area.	This compares to a figure of 46% of students for England as a whole.	
Housing – total unfit dwellings (Apr 06)	1	The total percentage of unfit dwellings in the Lancaster City Council area for the year in question was 4.6%.	This compares to a percentage of 5.2% for the North-west of England region and 4.2%for England as a whole.	
Radioactivity monitoring	4	The Food Standards Agency's annual RIFE (Radioactivity In Food and the Environment) report details the results of regular radiological monitoring carried out to ensure that discharges of radioactivity do not result in unacceptable doses to the public. RIFE 13 relates to monitoring carried out in 2007. From this report it is possible to extract the following conclusions: • water, sediment, beach and terrestrial and marine food and animal samples were collected from around the Heysham site in 2007 • analysis of tritium, carbon-14 and sulphur-35 in milk, crops and fruit all showed low concentrations of artificial radionuclides although some slightly enhanced carbon-14 levels were found in some samples • concentrations of certain artificial radionuclides in seafood, sediment, sand and seawater were elevated but considered to be due to discharges from the reprocessing and	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. Estimations of dosage levels to the public from the Heysham sampling were as follows: • estimated dose from locally grown foodstuffs was 0.006 mSv • estimated dose to local fish and shellfish consumers was 0.037 mSv • the total dose from all sources, including direct radiation, was assessed as being 0.038 mSv	Trends in the data noted from sampling in previous years are as follows: • a slight increase in estimated dose from locally grown foodstuffs was observed from the less than 0.005 mSv value recorded in 2006 • a small decrease in estimated dose to local fish and shellfish consumers was observed from the 0.38 mSv value recorded in 2006 a slight increase in estimated dose from all sources,

Indicator	Data Source	Current Data	Comparators	Trend
		decommissioning operations at Sellafield		including direct radiation, was observed from the 0.37 mSv value recorded in 2006
Health related to nuclear installations	5	There has been, since 1965, a nuclear power station operating on the Sizewell site. There are, therefore, historical data which can be analysed to correlate the incidence of disease reported around this site so that it can be compared to the average prevalence of the same disease in the British population as a whole. Such a comparison for childhood leukaemia, non-Hodgkin lymphoma and other malignant tumours was undertaken by the Committee on Medical Aspects of Radiation in the Environment (COMARE) in 2005. The results of this study for Sizewell are as below: • actual cases of childhood leukaemia and non-Hodgkin lymphoma between 1969 and 1993 in a 25km area around the plant were 26 • actual cases of childhood solid tumours between 1969 and 1993 in a 25km area around the plant were 55	For comparison purposes, the figures derived using statistics for Britain as a whole are as follows: • the expected number of cases of childhood leukaemia and non-Hodgkin lymphoma between 1969 and 1993 in a 25km area around the plant should have been 32.08 • the expected number of cases of childhood tumours between 1969 and 1993 in a 25km area around the plant should have been 60.00 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.	

Key to Data Sources

1	Office of National Statistics on the web at: 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 on the web at: 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 (2007). Radioactivity In Food and the Environment (RIFE 13) 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

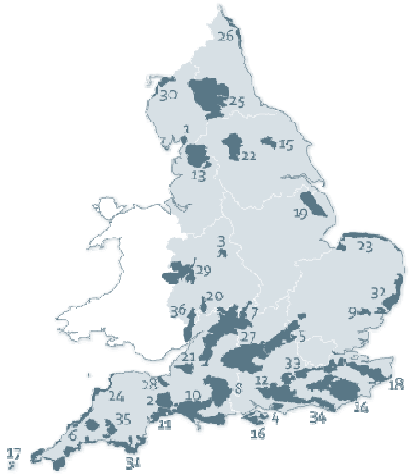
Indicator	Data Source	Current Data	Comparators	Trend
Topic: Cultural Heritage				
Scheduled Monuments	1	There are 3 Scheduled Monuments within an approximate 5km distance of the site, the nearest of which are High Cross in St. Peter's Churchyard in Heysham and St. Patrick's Early Christian Chapel which both lie within 2km.		
Conservation Areas	2	There are 6 Conservation Areas within an approximate 5km distance of the site, the nearest of which is in Heysham within 2km.		
Listed Buildings	3	There are 21 Grade II and 1 Grade II* listed buildings within an approximate distance of 2km of the site although none are directly adjacent. There are 89 listed buildings within an approximate 5km distance.		
Archaeolog-ical sites	3	A Neolithic flint axe has been found within the existing nuclear power station, although the full significance of this discovery is not known.		

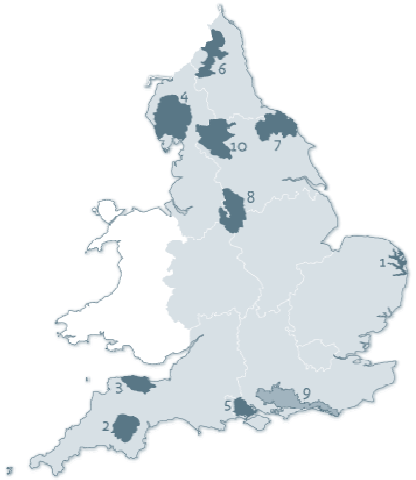
Key to Data Sources

1	MAGIC http://www.magic.gov.uk [accessed on 4 March 2009]
2	Lancaster District Council Local Plan. http://www.cartoplus.co.uk/lancaster/ [accessed on 4 March 2009]
3	Heritage gateway. http://www.heritagegateway.org.uk [accessed on 4 March 2009]

Landscape

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Landscape				
National Character Area (NCA)	1	The site at Heysham is situated within the Morecombe Coast and Lune Estuary NCA (31). 'Key Characteristics include : • *Broad relatively flat lowlands enclosed by steeply sloping, commonly wooded escarpments, opening out dramatically into the undulating landscape of the coastal strip with substantial drumlin features.* • *Predominantly sheep and cattle grazing, enclosed by well maintained hedgerows with mature trees. Stone walls at higher elevations* • *Panoramic vistas across valley and Lancaster from higher ground.* • *Range of coastal landscape features towards the mouth of the estuary including: extensive salt marshes; reclaimed mosses and marshland; a small area of remnant mossland at Heysham; sand and shingle beaches north of the estuary; and sandstone cliffs at Heysham.* • *Development generally concentrated along the coastal strip where Heysham power station and caravan sites dominate the coastal scenery, with the remaining pastoral elements providing important countryside wedges.'* Surrounding NCA's within the local area include: • 32- Lancashire and Amounderness Plain • 33- Bowland Fringe and Pendle Hill • 20- Morecombe Bay Limestones • 7- West Cumbria Coastal Plain • 19-South Cumbria Low Fells • 8- Cumbria High Fells		

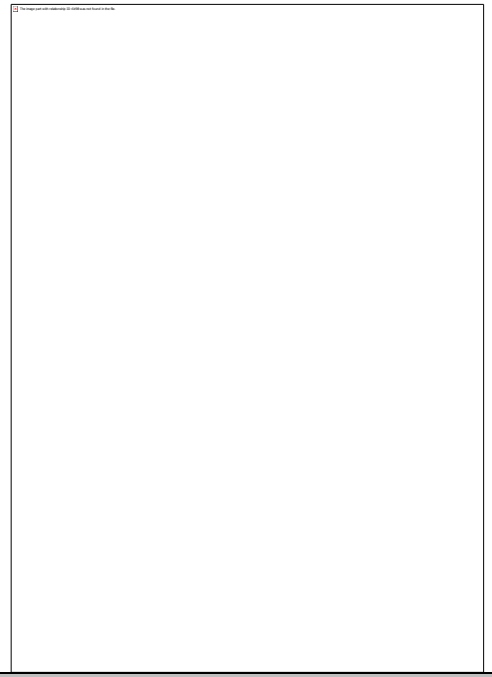
Indicator	Data Source	Current Data	Comparators	Trend
Areas of Outstanding Natural Beauty	2	**Map showing AONB sites** 1 – Arnside and Silverdale AONB to the north 13 – Forest of Bowland to the east		

Indicator	Data Source	Current Data	Comparators	Trend
National Parks	3	**Map showing National Parks** 4 – Lake District National Park to the north		

Key to Data Sources

1	Natural England. Landscape Character Areas – Vale of Taunton and Quantock Fringes http://www.naturalengland.org.uk/Images/jca146valeoftauntonandquantockfringestcm2-21223_tcm6-5615.pdf [accessed 13 February 2009]
2	Natural England. [2009] Areas of Outstanding Natural Beauty. http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/aonb/default.aspx
3	Natural England. National Parks [online] available http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nationalparks/default.aspx

Soils, Geology and Land Use

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Soils				
Agricultural Land Classification **Soils**	1	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. National Soils Research Institute (Report available) • Oglethorpe/Sandwich Soils • Deep well drained reddish coarse and fine loamy soils/Mainly deep well drained calcareous and non-calcareous sandy soils • Reddish drift/Dune sand and marine shingle • Free draining permeable soils in unconsolidated sands or gravels with relatively high permeability and high storage capacity • Dairying on short term and permanent grassland; stock rearing on high ground/Sand dune and some wetland habitats; recreation; very limited agriculture and coniferous woodland; some gravel extra	
Topic: Geology				
Geological SSSIs **Geology and Land Qulaity**	2 2	There are no geological SSSI's within the local vicinity Envirocheck Report (Report available)		

Indicator	Data Source	Current Data	Comparators	Trend
		• Geological Risks The local Geology is Made Ground over Tidal Flat Deposits, underlain by the Sherwood Sandstone Group and Eldroth Grit. There is an active mineral site (Heysham Wharf) recorded locally. Based on the information within the Envirocheck report the geological risks are; • Very low to moderate risk for the Potential for Compressible Ground Stability Hazards • Very low to low risk for the Potential for Landslide Ground Stability Hazards • Very low to moderate risk for the Potential for Running Sand Ground Stability Hazards • Low risk for the Potential for Shrinking or Swelling Clay Ground Stability Hazards • Environmental Hazards Based on the Envirocheck report the main environmental hazards are; • Four historical landfills, three local authority recorded landfills and four registered landfills are located within 1 km of the site. The nearest historical landfill is located approximately 570 m east of the site, the nearest local authority recorded landfill is located approximately 210 m south east of the site and the nearest registered landfill is located approximately 550 m east of the site. • There are a number of waste management facilities located within 1 km of the site.		

Indicator	Data Source	Current Data	Comparators	Trend
		• Historic Land Use Historic maps ranging from the 1890's to current were studied. No significant risks were identified, other than the existing power station.		

Key to Data Sources

1	National Soils Research Institute Report 27373722 – (Report available on request). Purchased 3rd March 2009
2	Envirocheck Report 27373722_1 – (Report available on Request) Purchased 2nd March 2009

Water Quality and Resources

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Water				
Flood Risk	1,2 3,4	The Eastern side of Heysham (as shown on the EA Floodmap), where the existing nuclear power stations are located, is in Flood Zone 1, and therefore not at risk from tidal or fluvial flooding. Analysis of Google terrain maps show that this area is raised. Parts of Heysham are in fluvial flood zone 3 and are at risk of flooding from the River Lune at the 1/100 year event. However the majority of Heysham is protected from fluvial flooding from the River Lune, the hatched area on the EA map details the area which is protected. The standard of protection of these defences is unknown. Defences along the coast are built to a standard of protection of 1/200. The SMP recommends that a level of coastal protection is required to prevent further coastal erosion.		.
Current State of the Waters in the North West River Basin District	5,6	The site at Heysham is located within the North West (NW) River Basin District (RBD). The NW RBD contains one third of the poorest quality rivers in England and Wales. Only 20% of rivers (by length) meet the requirements for good ecological status or good ecological potential. The majority of sources that fail do so because of the fish element of the classification. A greater number of groundwater bodies (44% by number) meet the requirements for good status. The percentage of estuaries, transitional and coastal waters meeting the requirements for good status or good potential is not listed in the NW draft River Basin Management Plan (RBMP). Similarly, the percentage of lakes meeting the requirements for good status or good potential is not listed in the RBMP. The RBMP predicts that by 2015, the current figure of 20% of rivers with good status or good potential will be maintained. The RBD also contains 25 Special Areas of Conservation (SACs) and 7 Special Protection Areas (SPAs). Heysham is located in the Lune catchment. Within this catchment 51% of surface water bodies are currently achieving good status. The RBMP aims to maintain this figure to 2015 and improve it to 100% by 2027.		

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td></td><td></td><td colspan="3">
Local information for the area around Heysham from the Environment Agency (EA) web site relevant to Water Framework Directive (WFD) is summarised below[11]:
<table>
<tr><th rowspan="2">Sector</th><th colspan="2">Ecological 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>
<tr><td>Rivers: Overton Dyke</td><td>Moderate</td><td>Good</td><td>High</td><td>Good</td></tr>
<tr><td>Groundwater: Permo-Triassic Sandstone</td><td>Poor</td><td>Poor</td><td>Good</td><td>Good</td></tr>
<tr><td>Groundwater: Lune and Wyre Carboniferous Aquifers</td><td>Good</td><td>Good</td><td>Poor</td><td>Poor</td></tr>
<tr><td>Estuary: Lune</td><td>Moderate</td><td>Moderate</td><td>High</td><td>Good</td></tr>
<tr><td>Estuary: Kent</td><td>Not Assessed</td><td>Not Assessed</td><td>High</td><td>Good</td></tr>
<tr><td>Coastal</td><td>Not Assessed</td><td>Not Assessed</td><td>Moderate</td><td>Moderate</td></tr>
</table>
The Overton Dyke (2-3km away) is the nearest watercourse to the site. The ecological water quality is moderate. It is predicted to improve to good quality by 2015. The chemical water quality of the river is high. It is predicted to deteriorate to good quality by 2015.

The ecological quality of the coastal waters around the site has not been assessed. The chemical water quality has been assessed as moderate. Moderate quality is predicted to be maintained to 2015.

There are no groundwater source protection zones in the vicinity of the site.
</td></tr>
</table>

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

Indicator	Data Source	Current Data	Comparators	Trend
		The quantitative quality of the groundwater the site is located on is poor (on the western half of the site) and good (on the eastern half of the site). It is predicted to maintain this status to 2015. The coast immediately bordering the site is a Designated Shellfish Water. The area is referred to as Lune (Broadfleet) and is regarded as an ecologically sensitive area. The bathing waters in the area around the site are of good quality.		
Current State of the Waters in the Lune Catchment Abstraction Management area	7,8	The site at Heysham is located within the Lune Catchment Abstraction Management Strategy area. The CAMS report for this catchment was prepared in March 2004. The site is not located in any of the 5 Water Resource Management Units (WRMUs) within the catchment. This is because the site is coastal and the WRMUs are at present limited to main rivers and sandstone aquifers only. Resource assessments have not been made for coastal areas or minor aquifers. Morecambe Bay is designated as a Special Area of Conservation and a Special Protection Area. The area is also designated as a RAMSAR site. A number of other watercourses also flow into Morecambe Bay. These are covered by the Kent, Wyre and Leven and Crake CAMS.		
Water Demand and Availability Projected to 2024	9	The assessment of demand and supply occurs at the level of a Water Resource Zone (WRZ). A WRZ is defined by the EA as '*the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall*'. Heysham is located in United Utilities' Integrated Resource Zone. Forecasts for the Integrated Resource Zone are that the dry year per captia demand for unmetered households is expected to increase from 154 lites per person per day (lppd) to 165 lppd by 2034/35. For metered households, average demand is forecast to increase from 130 to 137 lppd. However, the overall household demand is predicted to decrease from 149 to 138 lppd. The forecasted decrease in demand is due to the increased of uptake of water meters and the introduction of legal requirements on metering. Metering has been shown to lead to an 8.3% reduction in demand in a normal weather year. The United Utilities draft Water Resources Management Plan (WRMP) produced in April 2008 predicts an increase in population within the Integrated Resource Zone from 6.5 million to 7.0 million between 2006/07 and 2034/35. The number of households within the Integrated Resource Zone are predicted to increase from 2.8 million in 2006/07 to 3.4 million in 2034/35. Non-household consumption in the Integrated Resource Zone is expected to decrease by 2034/35. Metered non-household		

Indicator	Data Source	Current Data	Comparators	Trend
		consumption is expected to decrease from 417 Ml/d in 2006/07 to 269 Ml/d in 2034/35. Unmetered non-household consumption is expected to decrease from 13 Ml/d to 2 Ml/d over the same period. United Utilities currently supplies 200,000 businesses within the Integrated Resource Zone. The predicted decrease in non-household consumption is a result of continuing water efficiency measures and a significant reduction in water-intensive industry in the North-West of England. 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. 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 2024/25.		
Coastal Processes and Sediments		Tidal currents dominate Morecambe Bay sediment transport with net direction being controlled by an asymmetry between flood and ebb tides. Sediment is transported into the Bay along the coastline and then outwards in the Centre of the Bay. Sediment is reworked towards the shore by the action of the waves and deposited onto the shallow sand banks. Morecambe Bay is currently a sink for sediment.		

Key to Data Sources

1	Environment Agency [2008] Map of Heysham. http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=341500.0&y=461500.0&topic=floodmap&ep=map&scale=4&location=Heysham,%20Lancashire&lang=_e&layerGroups=default&textonly=off Accessed 3rd March 2009
2	Google [2009] Terrain Map for Heysham http://maps.google.co.uk/maps?hl=en&tab=wl
3	Lancaster City Council Strategic Flood Risk Assessment (SFRA) http://www.lancaster.gov.uk/planning-environment/forward-planning/local-development-framework/ldf-evidence-base/environmental-protection--enhancement-and-recreation-evidence/flooding/strategic-flood-risk-assessment-sfra/
4	Lancaster City Council [March 1999] Shoreline Management Plan http://www.lancaster.gov.uk/Documents/Shoreline%20Management%20Plan.pdf
5	Environment Agency [Dec 2008 corrected Feb 2009] Water for Life and Livelihoods: A consultation on the Draft River Basin Management Plan: North West River Basin District http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/northwest/Intro.aspx
6	Environment Agency [2009]. What is my backyard website http://maps.environment-agency.gov.uk/wiyby/wiybyController
7	Environment Agency [2009], The Lune Catchment Abstraction Management Strategy. http://www.grdp.org/cy/ymchwil/cynllunio/33502.aspx
8	Environment Agency [June 2008], Managing Water Abstraction. http://publications.environment-agency.gov.uk/pdf/GEH00508BOAH-E-E.pdf
9	United Utilities [January 2009], Draft Water Resources Management Plan http://www.unitedutilities.com/Documents/Revised_Draft_WRMP_Full_Report_-_January_2009.pdf

Flood Risk

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Flood Risk				
Flood Risk	1,2 3,4	The Eastern side of Heysham (as shown on the EA Floodmap), where the existing nuclear power stations are located, is in Flood Zone 1, and therefore not at risk from tidal or fluvial flooding. Analysis of Google terrain maps show that this area is raised. Parts of Heysham are in fluvial flood zone 3 and are at risk of flooding from the River Lune at the 1/100 year event. However the majority of Heysham is protected from fluvial flooding from the River Lune, the hatched area on the EA map details the area which is protected. The standard of protection of these defences is unknown. Defences along the coast are built to a standard of protection of 1/200. The SMP recommends that a level of coastal protection is required to prevent further coastal erosion.		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. '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: • 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 Most recently in June 2009, UKCIP launched the latest UK Climate Change Predictions 2009 (UKCP09). These give information about climate change but not directly

Indicator	Data Source	Current Data	Comparators	Trend
				about flood risk. The key findings on climate change confirm the trends highlighted in the 2008 report and suggest: • 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	Environmental Agency [January 2009]. Map of Heysham http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=341500.0&y=461500.0&topic=floodmap&ep=map&scale=4&location=Heysham,%20Lancashire&lang=_e&layerGroups=default&textonly=off Accessed 3rd March 2009
2	Google [2009] Terrain Map for Heysham http://maps.google.co.uk/maps?hl=en&tab=wl
3	Lancaster City Council Strategic Flood Risk Assessment (SFRA) http://www.lancaster.gov.uk/planning-environment/forward-planning/local-development-framework/ldf-evidence-base/environmental-protection--enhancement-and-recreation-evidence/flooding/strategic-flood-risk-assessment-sfra/
4	Lancaster City Council [March 1999] Shoreline Management Plan http://www.lancaster.gov.uk/Documents/Shoreline%20Management%20Plan.pdf

URN 10D/878

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