DEPARTMENT OF ENERGY & CLIMATE CHANGE

Appendices to the Appraisal of Sustainability Site Report for Sellafield

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 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 revised draft Nuclear NPS
Introduction
Approach and Methods
Alternatives
Radioactive Waste
Findings
Summary of Sites
Technical Appendices

Annexes to Main AoS Report: Reports on Sites
Site AoS Reports
Technical Appendices

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

This document is the Appendices to the Appraisal of Sustainability Site Report for Sellafield. 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.

Contents

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)? 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.

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
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 internationally and nationally important features of the historic environment. 23. To avoid adverse impacts on the setting and quality of built heritage, archaeology and historic landscapes	Will it adversely affect historic sites of international/national importance and their setting? Will it adversely affect other historic sites of known value? Will it adversely affect landscapes of historic importance?
Landscape	
24. To avoid adverse impacts on nationally important landscapes 25. To avoid adverse impacts on	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?

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
landscape character, quality and tranquillity, diversity and distinctiveness	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 water quality (including coastal and marine water quality) and assist achievement of Water Framework Directive objectives	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?
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	Will it cause deterioration in groundwater quality as a result of accidental pollution, for example spillages, leaks?

AoS/SEA Objective (Numbers refer to Scoping Report and Environmental Study)	Guide Questions
groundwater quality, distribution and flow and assist achievement of Water Framework Directive objectives	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 as being 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 Hallsenna Moor National Reserve and SSSI; Drigg Coast SAC and SSSI; plus Haile Great Wood, Black Moss, Drigg Holme, Florence Mine, Low Church Moss, and Silver Tarn, Hollas and Harnsey Mosses SSSIs.

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 Sellafield nuclear facility operated 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 nominated site. The prevailing wind direction is south to south-westerly through the year. Although the prevailing wind direction could cause any emissions to be dispersed over the Irish sea, in extreme circumstances (both in terms of releases and meteorological conditions) there is a potential for transboundary effects, in particular the Isle of Man and the eastern coastline of 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 existing Sellafield nuclear power facility (currently ongoing).

3. There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature conservation interest. Any accidental or planned release of radioactive emissions may also affect sensitive ecosystems. This is discussed further in the Biodiversity and Ecosystem Sections.

Air Quality

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. No Air Quality Management Areas (AQMAs) have been declared in the Copeland Borough Council region. The effect on air quality from the development is not likely to be significant, provided construction and operation is in accordance with regulatory/consenting regimes.

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 and operational activities.

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.

Summary of Significant Strategic Effects:

Timescale	C	O	D
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.

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

Air Quality	
• Potential for related effects on European-designated wildlife sites due to increase in airborne pollutants and consequent nutrient loading potentially of strategic significance. This is discussed further in the Biodiversity appraisal.	undertaken for consenting process. • Assessment of alternative methods of transport (sea/rail), Traffic management Plans, green Travel Plans

Biodiversity and Ecosystems

AoS Objective:

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

Guide questions:

Will it result in the loss of habitats of international/national importance?
Will it affect other statutory or non-statutory wildlife sites?
Will it result in harm to internationally or nationally important or protected species?
Will it adversely affect the achievement of favourable conservation status for internationally and nationally important wildlife sites?
Will it affect the structure and function/ecosystem processes that are essential to restoring, securing and/or maintaining favourable condition of a feature or a site?
Will the proposal enable the BAP targets for maintenance, restoration and expansion to be met?
Will the proposal result in changes to coastal evolution that is otherwise needed to sustain coastal habitats?
Will it result in the release of harmful substances for example. oil, fuel and other pollution into waterbodies which could affect aquatic ecosystems?
Will it result in the accidental migration of radionuclides which could harm aquatic or terrestrial ecosystems?
Will it result in changes to stream hydrology and morphology that could affect aquatic or terrestrial ecosystems?
Will it result in thermal discharges that could adversely affect aquatic ecosystems?
Will it result in soil contamination that could damage aquatic or terrestrial ecosystems?

Potential Receptors:

Designated Sites

- Drigg Coast SAC/SSSI – approximately 3km south of the nominated site.
- River Ehen SAC/SSSI - approximately 9.5km north of the nominated site.
- Low Church Moss SSSI – approximately 3km north of the nominated site.
- Hallsenns Moor SSSI - approximately 4km south of the nominated site.
- Silver Tarn, Hollas and Harnsey Mosses SSSI - approximately 5km north of the nominated site.
- St. Bees Head SSSI – approximately 9.5km north of the nominated site[1].

[1] Please note that where SSSI's are mentioned this only refers to those within 5km of the nominated site with the exception of St. Bees Head.

Habitats considered to be potential receptors are as follows:

- Estuaries (which contain a number of UK BAP priority habitats such as mudflats, sandflats and saltmarsh)
- Coastal Sand Dunes
- Rivers
- Lowland Heathland
- Lowland Fens
- Rivers

Species which may be potential receptors include:

- Amphibians; including Great Crested Newt (EPS) one of the primary reasons for selection of the Drigg Coast SAC and the Natterjack Toad (EPS)
- Breeding birds within the locality, including sea bird populations associated with St. Bees Head SSSI
- Common Species of Reptile
- Otters (EPS)
- Bats (EPS)
- Rare and uncommon plants
- Nationally important invertebrate species

***EPS = European Protected Species*

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

Disturbance (noise, light and visual)

1. Potential significant effects may arise due to disturbance from construction activities (duration 5-6 years), increased vehiclular movements, machinery, earthworks and excavations, an increase in lighting and increased personnel presence on the nominated site. Similar impacts could also occur during decomissioning. This could have an adverse impact on fauna within the immediate locality of the nominated site. The nominator will need to assess the potential for disturbance effects on fauna, especially on any European Protected Species and devise appropriate mitigation to avoid or minimise such effects on protected species.

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 priority habitats as listed in the UK Biodiversity Action Plan and Cumbria Biodiversity Action Plan. Potential impacts on important habitats/species will need to be investigated further (both the site level and within the wider area). Mitigation will need to avoid or minimise any loss with appropriate measures defined in the nominator's proposals and Environmental Impact Assessment (EIA). Further studies[2] would be required to determine a baseline for the prediction of the effects of developing the nominated site on any habitats/species so that suitable mitigation measures can be implemented. Protected species likely to occur in the area include great crested newts, natterjack toad, other common amphibian species, common reptile species, breeding birds, bats, otter and invertebrate species.

Water Resources and Quality

3. Discharge of heated water into waterbodies can impact upon aquatic ecosystems due to the temperature of the water being up to 10°C warmer. Drigg Coast SAC/SSSI is in close proximity to the nominated site and therefore any discharge of heated water into the Irish Sea and through to 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 other species which rely on such sources for feeding. Further studies will be required by the nominator to assess the effects of discharged heated water on aquatic ecology especially any effects which could impact on the Drigg Coast SAC/SSSI and its interest features.

4. 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. St. Bees Head SSSI is within close proximity (9.5km) to the nominated site, any loss of fish food sources could have an adverse impact on important seabirds associated with this site. A suitable intake system design should be adopted to avoid any significant ecological impacts.

5. Cooling water may be sourced from the Irish Sea. As such, the inlet and outlet pipes may have impacts on biodiversity in relation to altering coastal processes and accelerated erosion. Other off-shore infrastructure, such as marine off-loading facilities may also affect coastal processes, and impact on habitats and fauna, such as sabellaria reefs, marine turtle migrations and fish migration routes (for example salmon and lamprey) along the coastal strip.

6. Groundwater abstractions may affect groundwater supply to other areas hydrologically linked to the nominated site, this could result in habitat degradation further afield. Low Church Moss SSSI falls approximately 3km north from the nominated site and Hallsenna Moor lies approximately 4km to the south. These areas contains habitats such as wet heath, marshy grassland, fen, swamp and mire, which could be vulnerable to groundwater extraction. Further hydrological studies will be required by the nominator to assess the effects of any proposed water abstraction on ecology,

[2] Where it is stated further studies are required this is in reference to further studies to be carried out by the nominator at the EIA stage.

particularly wetland habitats (such as Low Church Moss SSSI and Hallsenna Moor SSSI) and Drigg Coast SAC/SSSI which may be vulnerable to groundwater abstraction.

7. New drainage systems on or within the nominated 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. Further hydrological studies will be required by the nominator to assess the effects of any drainage infrastructure on local ecology, particularly aquatic habitats and/or areas of valuable habitat such as those associated with Low Church Moss and Hallsenna Moor SSSI's and the Drigg Coast and River Ehen SAC/SSSI sites.

8. Routine radioactive discharges to the aquatic environment may have a negative impact on both terrestrial and aquatic ecology. Depending on dosage lethal, genetic or reproductive effects may result. Radionuclides may also accumulate in organisms such as invertebrates and plants which could have both direct and indirect effects, in particular on the Drigg Coast SAC, River Ehen SAC/SSSI and St. Bees Head SSSI and their interest features such as the important bird assemblages and freshwater pearl mussel. There is also potential that radionuclides will be transported over considerable distances through the Irish Sea to affect marine and aquatic ecology in Ireland and South West Scotland. Further studies will be required to understand fully the extent and likely significance of effects on ecology of any proposals for radioactive discharges from the nominated site. Any new nuclear power stations would require a permit 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.

9. There is a very small risk of accidental release of radiation (either through the air, water or soil) into the environment which could affect aquatic or terrestrial fauna or flora associated with the Drigg Coast SAC/SSSI and River Ehen SAC/SSSI 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 the Drigg Coast SAC/SSSI and River Ehen SAC/SSSI, key interest features of these designated sites could be impacted, for example contaminants could have lethal effects or sub-lethal effects on aquatic organisms impairing reproduction, physiology, genetics and health, or compounds could be bioaccumulated within tissues and could subsequently enter the food chain. The operation of the nominated 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. 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.

10. Impacts of climate change regarding reduced summer surface water availability, increased/unpredictable fluval flooding and sea level rise may impact on diversity, and need to be considered.

Cumulative effects

11. The North West 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 could be significant to the overall impacts on biodiversity.

Regional/ Local

Air quality

12. The development of the nominated 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 nominated 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 Drigg Coast SAC/SSSI as well as biodiversity in the general locality, particularly if the dust is of a different acidity to the surrounding habitats. Further background environmental condition information and modelling is likely in order to predict potential impacts of changes in air quality on biodiversity.

Water Resources and Quality

13. 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 on or near to the nominated site. Further studies should be undertaken by the nominator to assess the effects of any pollution on local biodiversity. Good site environmental management practices should be put in place to minimise the above risks.

Loss, damage and fragmentation of important habitats and species

14. Impacts on the internationally designated sites have been considered above however development of the nominated 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 predicting the effects of developing the nominated site on habitats and species so that appropriate migitation measures can be implemented.

15. Opportunties for on/off site habitat creation and enhancement may exist leading to biodiversity benefits and possibly assisting with flood risk management.

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

Significant Effects

Loss, damage and fragmentation of important habitats and species

- Noise, visual and light disturbance during construction on fauna such as legally protected species.
- Loss, damage or alteration of important habitats and subsequent disturbance to protected species (through severance of wildlife corridors) due to new buildings and infrastructure.

Water Resources and Quality

- Discharge of heated water into aquatic habitats could alter ecosytems.
- Abstraction of water for cooling purposes can lead to incidental mortality of fish and aquatic invertebrates.
- Groundwater abstraction can alter important habitats reliant on ground water supplies.
- Routine releases of radioactive discharges into water could impact aquatic ecosystems either directly or indirectly, for example through bioaccumulation of toxins within food chains.
- Accidental pollution from for example, leakage of radioactive waste or other chemical compounds. Such risks are present throughout construction, operation and decomissioning.
- Construction and operation of new drainage infrastructure could impact on both terrestrial and aquatic ecosystems.
- Improper management of materials during construction, operation and decomissioning could lead to contanmination of soil, water and air through leakages and spills. This in turn could have adverse impacts on local biodiversity.

Mitigation and Monitoring Possibilities

- Minimise need for encroachment of construction into sensitive areas through site design.
- Construction Environmental Management Plan to minimise disturbane. For example through timing, visual/noise screening.
- Avoid or minimise losses through site layout design.
- Habitat creation to replace lost habitats and maintain connectivity of wildlife corridors around the site.
- Ecological mitigation and management plan, informed by further site level baseline surveys.
- Further studies necessary to determine impact.
- Incorporation of fish protection measures within cooling water intake/system design.

Air Quality • Reduction in air quality, particularly due to increased dust and vehicle emissions, could have potential impacts on local biodiversity.	

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 are independent of the site chosen, and 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 windpowered stations with equivalent output but with significantly less land or area coverage. This consideration is independent of any life-cycle (embodied) carbon emission analysis, which is currently outside the scope of this study.

3. Although the effects of any emissions will be felt globally, the emissions during construction and decommissioning will largely be determined by regional and local factors, (for example local transport infrastructure and how the location of the nominated site will affect transport emissions) .

4. Construction and decommission activities will have both direct and indirect greenhouse gas emissions associated with them regardless of the

Climate Change

location of such plants. A comparison of these construction and decommissiong related emissions to those of fossil-fuelled power plants will largely depend upon the design parameters of such plants with the exception of specific sub-activities associated with nuclear fuel and nuclear wastes.

Regional/Local

5. The provision of a nuclear power station for energy generation at the nominated site will make a positive contribution to future local and national climate change targets. 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..

6. 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..The potential for coastal erosion and flooding as two of the climate change impacts may have consequences on the stability of the railway line stretching from Seascale station to the south of Sellafield to St Bees station to the north of Sellafield. This stretch of railway is in very close proximity to the shoreline.

7. Energy and climate change impacts from decommissioning the plant at the end of its life are not sensitive to the site location other than the distance that will be required to transport nuclear waste to any long-term waste geological depository facility. The means of disposing of nuclear waste, including spent fuel, from new nuclear power stations is being considered as part of the Government's programme for Managing Radioactive Waste Safely.

8. The nominated site situated is in a region susceptible to the following impacts :
   - 0.4^0c 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.
9. The nominated site situated by the coast has a large area of foreshore and the County Council at the location acknowledges the impacts of climate change especially and have set in place coastal protection and defence since 1989. Further investigation is required to assess the impacts of coastal

Climate Change

processes, hydrodynamic and sediment transport on the nominated site, as a result of sea level changes.

10. Cumbria is a relatively large emitter of CO_2 per capita, due largely to having a large land mass and sparse population. Rural populations are heavily reliant on private vehicles as the primary source of transport, and in the more rural areas of the county there is an over reliance on oil/coal for domestic heating.

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 programme for climate change are further discussed in the main AoS report.
- This nominated site is particularly susceptible to the future impacts of climate change associated with coastal erosion, sea level rise, flooding and drought. Of these coastal erosion and sea level rise are most likely to affect the latter half of the site's operational phase and the site's decommisioning phases. (see Flood Risk)
- Locating a nuclear power station on the nominted site could have a positive multiplier effect on the further investment and implementation of renewable (low carbon) energy sources in the region.
- Construction activity will produce an increase in greenhouse gas emissions, but will make only a relatively small addition to the regional inventory of emissions in comparison to the low carbon energy output of the station. This is discusssed in the main AoS Report.
- The operational phase of the power station is likely to have far lower carbon footprint compared to those of fossil-fuel powered stations providing similar power output.
-

Mitigation and Monitoring Possibilities

- Appropriate sea and coastal defence measures along with flood allevation designs should be seriously considered.
- 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.
- The further enhancement of electrical transmission systems, road and rails systems could be co-ordinated and integratedin such a way as to minimise greenhouse gas emissions.

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, across a range of ages and functions. The quality and quantity of employment during the construction stages (approx 5-6 years) of the reactor will differ to the operational stage (approx 60 years), where longer-term employment will lead to quality of life benefits. Labour requirements will tail-off towards the end of the operational stage, however decommissioning will still require significant levels of labour for a minimum of 30 years. The significance of the effect is greater at the local level, whereas at the regional level this is of minor significance, as jobs are absorbed into regional employment figures.

2. The existing Sellafield site is a significant local employer, employing approximately 10,500 staff[3]. A new power station may assist in offsetting job-losses from the decommissioning of the existing power stations at the Sellafield site - however it is noted the time differences between decommissioning (estimated to be complete by 2040) and construction of any new reactor may require employees to seek employment elsewhere.

[3] NDA [April 2006]. Sellafield Site Summary. http://www.nda.gov.uk/documents/loader.cfm?url=/commonspot/security/getfile.cfm&pageid=4007

Climate Change

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 nominated 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. The A66 route from junction 40 of the M6 requires vehicles to travel through Keswick in the centre of the National Park. This route would need careful consideration prior to it being identified for construction or decommissioning traffic.

2. Further information would be required to determine whether these effects the M6 and as Sellafield is part of the national core transport network. This may include physical improvements, carrying of large loads outside of peak period, construction transport management plans, and green travel plans for the construction and operational workforces to encourage sustainable travel.

Communities: Supporting infrastructure

Regional/ Local

1. 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.

2. 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.

3. 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.

4. 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 utilise and extend the current arrangements for the existing Sellafield nuclear facility.

5. 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 Sellafield nuclear power facility (currently underway).

6. Long term pressures and effects on the (non-radiological) waste management infrastructure are unlikely to be significant.

7. There is potential for negative effects on local and strategic road infrastructure through increased congestion/disruption of traffic on the A595(T), particularly north of the nominated site towards Whitehaven where traffic is known to travel slowly during peak periods. The A595 south of the nominated site could also potentially be severely affected during construction with an increase in HGV traffic. In addition, some local settlements along the A595(T) may be negatively impacted as a result of the construction, operation and decommissioning traffic, for example, affecting access to local services.

8. Negative effects identified for transportation network. Nature and significance of effects depend on mode of transport, and further details on construction workforce, timeframes and volume of materials to be transported.

Communities: Supporting infrastructure

9. The development of a nuclear power station at Sellafield may require new power lines to be built, or existing lines to be upgraded, to connect the facility with the National Grid. The potential impact of new or upgraded power lines will be considered in a separate Networks National Policy Statement (NPS)

Summary of Significant Strategic Effects:

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

Significant Effects

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

Mitigation and Monitoring Possibilities

- Further studies will be required to assess in detail the effects on the road network, including the A595, A590/A5092, A5093, A66 and M6 motorway.
- Appropriate mitigation measure to reduce the effects of transportation could include a Transport Management Plan (construction and decommissioning) and Green Travel Plan (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 nominated site to travel both nationally and internationally (for example to the Republic of Ireland). However, current radiological monitoring of the nuclear power stations and other nuclear installations that have been adjacent to the nominated site since 1956 (see Appendix 4), suggests that the risk to the public is low with total dosage from all sources (including direct radiation) estimated as being less than 38% of the limit specified in the Ionising Radiations Regulations 1999. With regard to transboundary effects, there is a requirement under Article 37 of the Euratom Treaty for the United Kingdom, before plant authorisation can 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 1 mSv 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 Sellafield 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 nominated 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 the nominated site brings with it the possibility of health and safety incidents. However, nuclear power stations are highly regulated in this regard and must not only comply with the requirements of the Health and Safety at Work Act 1974 but also with the requirements of the Nuclear Installations Act 1965 and the Ionising Radiations Regulations 1999. This means that the potential operator must have a licence from the Nuclear Installations Inspectorate (NII) before construction can begin. Such a licence will only be granted if the NII is satisfied that the power station can be built, operated and decommissioned safely with risks being kept to 'as low as reasonably practicable' (ALARP) at all times. The licence will, therefore, have conditions attached to it which will allow NII to control safety risks throughout the lifetime of the project.

9. 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 nominated site, people living and working nearby have had a long time to get used to there being an adjacent nuclear plant so this is unlikely to be a problem at this location.

10. Recreation: With regard to recreation, there is a potential impact associated with the coastal path which passes the nominated site. It is likely that this path may need to be closed during some phases of power station construction but this effect will be temporary and can readily be mitigated by providing a bypass path around the nominated site.

11. Community well-being: The Copeland Borough Council area is a deprived area with barriers to housing and services being a particular problem. The siting of a new nuclear power station at the nominated site should help to alleviate this deprivation somewhat as more jobs will be created in the area leading to an increase in community wealth, additional housing and other associated neighbourhood infrastructure.

12. Community disturbance: The presence of, and more particularly the construction of, a nuclear power station at the nominated site is certain to increase

Human Health and Well-being

community disturbance to some degree when compared to the current situation. Potential disturbances in the construction phase include noise and vibration, dust and increased traffic although these effects would be temporary. Construction noise will be variable and transient in nature and will need to be mitigated by the use of good construction practice, regulation and timing of construction operations, the use of noise controlled plant and equipment and noise and vibration monitoring. There is also likely to be some disturbance associated with increased traffic during the operational and decommissioning phases of the power station. These effects should be considered, and mitigated if necessary, during the planning stage of the power station project by considering the adoption of an environmental management plan for the construction phase and an appropriate transport plan for all project phases. In particular, significant benefits would result if potential sources of noise emissions could be reduced through a combination of engineering design solutions.

13. Employment: Whilst employment levels in the Copeland Borough Council area are reasonable when compared to the rest of England, there are still people seeking work in this area and the region in general. As has been demonstrated[6], 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 the nominated site can thus be expected to improve the general mental and physical health and well-being of the area's population by providing more short term (construction and decommissioning phases) and long term (operational phase) work opportunities.

Summary of Significant Strategic Effects:

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

Significant Effects

- The rigorous system of regulating routine radioactive discharges from the potential nuclear power station at Sellafield should ensure that there are no unacceptable risks to health when the plant is operating normally
- 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 the nominated site will lead to an increase in employment, community wealth, additional housing and other associated neighbourhood infrastructure – these positive effects are likely to be much more significant

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

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

Human Health and Well-being	
than any potential negative consequences assuming any effects on population health are not realised.	discharges and effects on local health is undertaken throughout the operational and 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
- Historic Landscape
- Archaeology

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

1. The nearest scheduled monument consists of two high cross shafts in St. Bridget's Churchyard which lies within 1km. A potential effect on its setting may arise from the development of a new nuclear power station, as for other scheduled monuments in the wider vicinity.

2. There are 2 Grade I and 9 Grade II* listed buildings within an approximate distance of 5km of the nominated site and a potential effect on their settings may arise from the development.

3. Adverse effects on the settings of the monuments and listed buildings closest to the nominated site could be minimised by locating the power station development adjacent to the existing power station. Mitigation possibilities also include appropriate landscaping / planting schemes to reduce setting effects.

Regional/ Local

4. Conservation Areas exist at Beckermet and Egremont and there is a potential setting effect.

5. There are around 33 Grade II listed buildings within an approximate 5km distance of the nominated site and there may be an effect on their settings.

Cultural Heritage

6. Some of the fields within the nominated site are shown on a 19th century Ordnance Survey map and there is potential for historic landscape to exist.

7. Prehistoric or Roman flints have been found within the nominated site and a Roman occupation site is known within close vicinity. The presence of these features indicates prehistoric and historic activity within and close to the nominated site. As such the area is likely to be considered of at least local to regional archaeological importance.

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

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

10. Adverse effects on the settings of the Conservation Areas and listed buildings closest to the nominated site could be minimised by locating the power station development adjacent to the existing power station. Mitigation possibilities also include appropriate landscaping / planting schemes to reduce adverse setting effects. It is likely that a detailed archaeological investigation of the area will be required, including intrusive investigation (for example trial trenching and detailed recording).

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

- 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?
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 and visual amenity of visitors to and residents of the nearby Lake District National Park will be affected, at a distance of 1km.
- The landscape character, landscape value/visual amenity and perception of tranquility of visitors to the area and residents within National Character Area 7 and the adjacent National Character Area 8 (within 5 km) will be affected.
- The landscape character, landscape value/visual amenity and perception of tranquillity of visitors to and residents of the St Bees Head Heritage Coast may be affected.
- The landscape character, landscape value/visual amenity and perception of tranquillity of visitors to the adjacent Landscape of County Importance may be affected.

Potential Significant Effects and Mitigation Possibilities:

International/ National / Transboundary

1. Views from the Isle of Man (55km west of the nominated site) towards the nominated site are possible on clear days and likely to be significant.

2. The Lake District National Park lies 1km to the east of the nominated site and significant views of the nominated site are possible from many locations within the National Park, including Scafell Pike and other peaks. The existing facilities and reprocessing plant have been visible in the landscape over a long period of time from these views however; a new power station, associated new grid infrastructure and cumulative effects from other energy projects along this coast will potentially lead to further deterioration in views on what is a nationally important landscape. Opportunities for mitigation are likely to be limited during the construction and operational phases given the potential scale of new buildings and the extent of associated construction areas.

3. The St Bees Head Heritage Coast is located approx 10km to the north of the nominated site. Although not directly affected, views of the nominated

Landscape

site are likely from this designated coast and are likely to be significant.

Regional/ Local

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

5. The nominated site is not located in a locally designated landscape but land adjacent to it, on its northern boundary lies within a Landscape of County Importance and within the landscape character type known as Low Farmland as described in the Cumbria and Lake District Joint Structure Plan 2001 - 2016: Technical Paper 5: Landscape Character, 2003. The existing facilities/reprocessing plant and associated infrastructure are not specifically identified within this landscape character type although views of it are noted within the adjoining character type – Coastal Sandstone.

6. There will be a loss of local landscape features including woodland pockets, roadside tree belts, farmsteads and farmland - arable and pasture with managed hedgerows, effects on a route that forms part of the National Cycle Network, loss of the buildings and associated car park and buffer planting. The nominated site lies to the east of the railway line and thus beyond the immediate shoreline so there will be limited effects on the intertidal flats, coastal marsh and beach areas.

7. Given the likely scale of any new development and the open nature of the landscape surrounding the nominated site, it will not be possible to mitigate for all the indirect landscape and visual impacts over a long timescale, either immediately surrounding the nominated site or from surrounding areas of higher ground, from which the nominated site is visible. In addition, new development alongside the existing facility will add to the landscape and visual impacts of the existing facility and reprocessing plant, which is already a prominent feature along the coast.

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

9. Mitigation potential includes the following measures:

    - Protection measures allowing for the conservation of existing vegetation particularly existing screening tree belts in the overall development including in the temporary construction laydown area and avoidance of temporary laydown areas on the foreshore, where views are prominent.
    - Siting of new power station building and ancillary facilities in close proximity to existing infrastructure and the existing power station buildings to

Landscape

avoid a significant broadening of visual impact.

- Sensitive design and/or alignment of the water cooling facilities potentially using tunnelling techniques and a low impact design for the marine landing platform to avoid adverse impact on the coastline.
- Provision of buffer zones between construction areas and the residential areas surrounding the existing power station and reprocessing plant; delivery of construction materials by sea to reduce road use and the use of strict directional, cut off low level lighting and restricted working hours to limit light pollution.

10. Key positive mitigation opportunities include landscape restoration and off site enhancement measures, including creation of replacement tree belts, cycle paths, grazing land and hedgerow restoration to the decommissioned site, the temporary construction areas and the surrounding landscape. Opportunity for rationalisation and reduction of clutter and existing detracting infrastructure. Also the opportunity to ensure long term delivery of landscape and habitat enhancement through the development of an integrated land management plan for the nominated site.

11. With the potential site design and mitigation in place, local impacts could be reduced to a slight adverse to neutral level after decommissioning, however, there is some uncertainty over the future land use given the timescales involved.

Summary of Significant Strategic Effects:	Timescale	**C**	**O**	**D**
	Significance	**--**	**--**	**0?**
	Likelihood	M	M	M
Significant Effects	**Mitigation and Monitoring Possibilities**			
• During construction and operation there would be direct impacts at the local level and over time these could be partly compensated for. However, there are likely to be some long lasting national level adverse landscape and visual impacts on the nearby Lake District National Park and the Heritage Coast including direct in-combination effects arising from grid connectivity infrastructure, with limited potential for mitigation. The existing power station is already a prominent built feature from viewpoints within the National Park and Heritage Coast and also from long-distance viewpoints, including the Isle of Man. However, despite this, further development and the cumulative effects from other energy projects along the coast are highly likely to lead to a perceptible deterioration in some views, which would not be able to be mitigated, given the scale of new buildings and infrastructure. • The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long term, however, the long term land uses for restored areas are difficult to predict. This	• Given the scale of the likely development, effective mitigation of adverse visual impacts during the construction and operational phases on the lake District National Park, heritage Coast and local area is unlikely. • There is some limited potential for landscape / ecological mitigation to address some local impacts in and around the nominated site though, for example, buffer planting and siting of			

Landscape	
leads to the view that the precautionary principle ought to be applied when it comes to assessing the significance of impacts at this stage.	new buildings in close proximity to existing ones. These could be delivered and monitored through an integrated land management plan. After decommissioning, the time scales involved present uncertainties as to long term land uses and therefore the final form of any landscape mitigation.

Soils, Geology and Land use

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

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

Potential Receptors:

- The nominated site lies within an area mixed of agricultural land urban land use. No significant geological designated site lies within the local vicinity.
- Some land management areas are designated within the local vicinity including some floodplain grazing and country side steward schemes.
- Adjacent agricultural land/green field land (to be confirmed by nomination) adjacent to the nominated site

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

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

2. The loss of greenfield land is not considered to be significant on a National level.

Regional/ Local

3. The soils in the local area adjacent to the nominated site lie within a region classified to be of low fertility by the National Soils Resources Institute. Any development is likely to have a local effect on agricultural land use and agriculture in prevalent in the local area. The soils could potentially be returned to an equivalent agricultural grade but reinstating the original soils matrix is unlikely. The extent of the loss of agricultural land is unlikely to be significant in a national context. Soils could be returned to a similar agricultural importance once the nominated site has been decommissioned however the original soils matrix is unlikely to be restored.

Soils, Geology and Land use

4. Construction of new plant upon greenfield sites. The loss of greenfield land is likely to be of local significance.

5. 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 nominated 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.

6. Landfills have been identified to the south and north of the former Sellafield power stations. This is likely to be of minor significance as any disturbance/assessment would need to be addressed with the relevant regulator. Detailed assessments of existing contaminated land will need to be undertaken as part of the site specific EIA.

Summary of Significant Strategic Effects:

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

Significant Effects

- There are no significant effects identified around the nominated site.

Mitigation and Monitoring Possibilities

- n/a

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, fluvial and estuarial waters and on the foreshore.

Potential Significant Effects and Mitigation Possibilities:

International/National/Transboundary

1. The potential effects on surface water hydrology and fluvial and coastal geomorphology are likely to be limited to the Cumbria Coast and the coastline within approximately 10-20km of the nominated site. It will be necessary, however, to undertake a data collection and modelling exercise to confirm the spatial extent of this impact.

Regional/ Local

2. The nominated site is currently not at risk from coastal flooding, according to the Environment Agency (EA) maps[7]. However, during the life span of nominated site, and as a result of potential climate change and related sea-level rises, this will need to be confirmed by a more detailed assessment at the sites of interest. If this leads to the requirement for the construction of additional or upgraded coastal defences, these defences would be need to be designed to counteract the effects of existing coastal processes such as coastal retreat, but are likely to have the secondary effect of impacting the tidal-driven movement of sediment along the coastline. These may have further effects on marine ecosystems. The effects are likely to continue as long as the coastal defences need to be maintained to protect the nominated site. It is not possible to assess whether these effects will be positive or negative without further information on the proposed design of the defences, and a more detailed investigation of the local and regional coastal

[7] http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=303500.0&y=501500.0&topic=floodmap&ep=map&scale=1&location=Seascale,%20Cumbria&lang=_e&layerGroups=default&textonly=off

Water:Hydrology and Geomorphology

physical processes/dynamics. The effects of the construction and long-term presence of upgraded coastal defences on coastal process, hydrodynamics and sediment transport along the coastline could be reduced or possibly eliminated by the adoption of suitable, environmentally-friendly designs.

3. The provision of cooling water for the proposed power stations is likely to be from coastal waters. Previous work on this issue from the mid 1990s was summarised in 2006 looking at potential impacts of New Build in Cumbria[8]. This review indicated that there were likely to be restrictions on fresh water supplies to provide cooling waters, and therefore sea water was the preferred option. This review also highlighted that the cooling water intakes and outfalls were proposed to be constructed by tunnelling to avoid disturbing radioactive materials on the seabed. In more general terms, 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 coastal, hydrodynamics and sedimentation processes. The effects of construction and operation of the cooling water system on coastal processes, hydrodynamics and sediment transport along the coast could be reduced or potentially eliminated by suitable design and construction methods.

4. The potential effects of the development on the local river network includes the modification of the local drainage network through local diversion of small watercourses and drainage ditches, the removal of riparian vegetation and associated bank collapse, and increased loading of channel banks from construction machinery. During construction there is also a risk of increased sediment transfer to water courses from excavated areas and stockpiles. In addition, there is the risk of increased transfer of sediment from site drainage and from dredging activities to water bodies. The development is also likely to affect surface water run-off through increasing the 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

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

Mitigation and Monitoring Possibilities

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

[8] Potential New Build in Cumbria (2006) Report prepared for Cumbria Partners by ERM and IDM, March 2006

Water:Hydrology and Geomorphology	
transport, and any indirect effects on internationally designated habitats. Disturbance of existing radioactive sediments.	

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 Fisheries 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, fluvial and estuarial waters and on the foreshore.
- Regional and international receptors could potentially be affected by releases of persistent contaminants.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

Not significant.

Regional/Local

1. The main liquid discharges from the proposed power station during routine operation 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 Environment Agency 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. Detailed appraisal of the proposals for disposal of cooling water will be required to assess the acceptability of this effect. Earlier studies have recently been reviewed and

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

have indicated that to achieve the required thermal and chemical dispersion, a single station outfall would need to extend 2.5km offshore. If a second station were contemplated, a 4km separation would be required between the two outfalls. The intakes would be 1.8km offshore in both cases. In terms of impacts on ecology, predicted effects were based upon modelling and experience from other power stations and indicated that neither thermal effluent nor biocide would exert significant impacts on the ecology of receiving waters. The review highlighted some potential impacts on migrating salmon and sea trout by baseline data on the behaviour of these species off-shore was not available.

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 Environment Agency to ensure compliance with all relevant legislation.

Summary of Significant Strategic Effects:

	C	O	D
Timescale			
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 limited to local and regional significance.

Mitigation and Monitoring Possibilities

- Thermal discharges will need to be consented by the Environment Agency. 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 nominated site lies within the River Calder catchment. Surface and groundwater in the vicinity of the nominated site is not currently used for water supply. However, both the River Calder and River Ehen Water Resource Management Units (WRMUs) are classified as over-abstracted, while the River Irt WRMU, which includes Wast Water from which the existing works draws its water supply, is classified as having "no water available". If groundwater abstraction is proposed, there is a risk of saline intrusion into the aquifer. This may also impact on existing abstractions. Further assessment of impacts on surface and groundwater is required, including the assessment of alternative options.

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, especially as the WRZ in which the site(s) are located is projected to be in deficit without implementation of measures to address this (see below). 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. Nevertheless the issue of water resources availability over the lifetime of the nominated site needs to be assessed.

   The West Cumbria WRZ has a projected deficit to 2035. Measures to address this deficit include leakage reduction and by 2014/15 bringing into supply a new groundwater source at South Egremont. Thus, there is the potential to provide water supply to the nominated site without a negative impact on the WRZ supply-demand balance. This would need to be confirmed once estimates of predicted water use are available and can be

Water: Water supply and demand

included with the supply-demand balance calculations.

3. Cooling water may be sourced from the Irish Sea. As such, the inlet and outlet pipes may have impacts on biodiversity in relation to altering coastal processes and accelerated erosion.

4. Impacts of water supply and demand on biodiversity need to be considered.

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

Significant Effects

- Increased demand for water during the lifetime of the nominated site. The potential magnitude and duration of increased water demand will depend on the timing of the new site development in relation to the activities (operation or decommissioning) of the existing site, through to operation and decommissioning.

- 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 nominated site is located on both a Minor and Major aquifer. However, there are no groundwater protection zones in close vicinity of the nominated site. There is no known use made of these water resources in the vicinity of the nominated sites but springs on the beach are fed by groundwater and groundwater may also flow into the lower reaches of the rivers.

2. There may be some disruption of local groundwater flows during construction, but in the long term impacts are expected to be minimal.

Water: Groundwater Quality and Flow

Summary of Significant Strategic Effects:

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

Significant Effects

- Potential impacts on groundwater dependent features and aquatic ecosystems in proximity to the site.

Mitigation and Monitoring Possibilities

- Studies to ensure that groundwater dependent bodies are investigated and that suitable monitoring and 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 and District ecosystems in estuarine waters.

Potential Significant Effects and Mitigation Possibilities:

International/ National/ Transboundary

There are no effects at International/National and Transboundary level.

Regional/ Local

1. The nominated site is located mostly in Flood Zone 1, but is bounded along the coastline by Flood Zone 3.

2. It is likely through the impacts of climate change on sea level rise that flood risk to the nominated site will increase. Further investigation is required to assess the impacts of coastal processes, hydrodynamic and sediment transport on the nominated site, as a result of sea level changes.

3. The nominated site is shown to be defended, but at this time no information was available regarding the composition, condition grade and standard of protection afforded by these defences.

4. To mitigate against flood risk for the lifetime of the development ongoing maintenance and improvement of these defences may be required, which may affect coastal processes.

5. To mitigate against these effects any improvement in existing or construction of new defences will require appropriate design, construction and management.

6. Local land raising of the nominated site could also mitigate against increased flood risk.

Flood Risk

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

Significant Effects

- Main effects are through the continued management and improvement of existing defences which may affect coastal processes.

Mitigation and Monitoring Possibilities

- Further investigation is required to assess the impacts of coastal processes, hydrodynamic and sediment transport on the nominated site, as a result of sea level changes.
- It may be possible to mitigate these effects appropriate management and techniques for improving the existing defences.

Appendix 3: Plans and Programmes Review (Regional)

Regional Spatial Strategy for the North West 2008-2021 (North West Regional Development Agency)

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.

Natural Environment :

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

Renewable Energy:

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

Historic Environment:

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

Coastal Planning and flood risk:

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

Water Resources:

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

Waste Management:

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

Mineral extraction:

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

LINK: http://www.gos.gov.uk/gonw/Planning/RegionalPlanning/

Regional Economic Strategy for North West England 2006-2026 (North West Regional Development Agency)

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 (North West Climate Change Partnership)

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 practice 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

Cumbria Biodiversity Action plan (2001) (Cumbria Biodiversity Partnership)

The Cumbria Biodiversity Action Plan identifies 39 species and habitat plans covering over 700 individual actions designed to conserve and/or enhance a range of threatened species or habitats of both local and national importance. 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 re-establishment of salt marshes to compensate for past loss and to mitigate sea level rise.

LINK: http://www.wildlifeincumbria.org.uk/

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. 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 Sellafield 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 (Office of the Deputy Prime Minister)

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

Regional Waste Strategy for the North West 2004 (North West Regional Assembly)

This strategy will contribute to the sustainable development of the North West by encouraging waste management practices that will reduce waste generation, lessen the environmental impacts of waste production and improve resource efficiency. The strategy sets out 19 targets and actions for the North West to work towards achieving, some of which include:

- Reducing growth in municipal waste across the North West to 2% by end of 2006, with a further reduction in growth to 1% before 2010 and 0% by 2014 across the region
- Recycle and/or compost 55% of household waste by 2020
- Recycle 35% of all commercial and industrial wastes by 2020
- Recover value from at least 70% of all commercial and industrial wastes by 2020
- Promote the use of recycled construction and demolition waste in construction projects and encourage developers and contractors to specify these materials wherever possible in the construction process

LINK: http://www.nwrpb.org.uk/?page_id=129

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

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

The key targets of the plan are:

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

The following challenges are addressed in the plan:

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

- diffuse pollution from urban sources

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

Appendix 4: Baseline Information

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

Air

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Air				
Air Quality	1,2	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). The prevailing wind direction for the region is south to south-south west. There are 47 Air Quality Management Areas (AQMAs) declared in the North West region of England, the majority of which serve to control emissions of nitrogen dioxide and particulate matter from traffic. No AQMAs have been declared within the Copeland Borough Council area.		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 [May 2008]. http://www.environment-agency.gov.uk/research/library/publications/34061.aspx [accessed 12 March 2009]
2	UK Air Quality Archive [1997]. http://www.airquality.co.uk/archive/laqm/laqm.php [accessed 12 March 2009]
3	Met Office: Regional Climate – North West [2004]. http://www.metoffice.gov.uk/climate/uk/nw/ [accessed 12 March 2009]

Biodiversity and Ecosystems

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Biodiversity and Ecosystems				
North West Biodiversity Audit **Protected Habitats**	1	North West England is rich in wildlife and habitats with coasts, estuaries, uplands and wetlands of international importance. A total of 82 habitats of which 37 are UK key habitats have been identified in the North West Biodiversity Audit and 18% of land within the north west is protected through designations. Regional targets for important habitats are delivered through Local Biodiversity Action Plans. The Cumbria Biodiversity Action Plan is relevant to the site.		
North West Biodiversity Audit Protected Species	1	97 species of particular conservation importance are identified within the North West Biodiversity Audit including UK BAP priority species and those which are endemic to the region. Regional targets for important species are delivered at a more local level through Local Biodiversity Action Plans. The Cumbria Biodiversity Action Plan is most relevant to the site.		
Cumbria Biodiversity Action Plan	2,3	The Cumbria BAP was published in April 2001 and contains over 700 actions within 21 Species Action Plans, 18 Habitat Action Plans and four generic 'Action Plans for Common Themes'. The latter cover issues of public involvement, legislation and planning, land management and policy for the wider environment and data and information.		
Natura 2000 sites (N2K)	4	There are 6 N2K sites within 20 km of the site : • Borrowdale Woodland Complex SAC • Wast Water SAC • River Ehen SAC • Lake District High Fells SAC • River Derwent and Bassenthwaite Lake SAC • Drigg Coast SAC N2K sites considered to be most relevant in relation to any development of the site are described in more detail below:		

Indicator	Data Source	Current Data	Comparators	Trend
Drigg Coast SAC	5	The Drigg Coast qualifies as a SAC for the following primary and qualifying Annex 1 Habitats: • Mudflats and sandflats not covered by seawater at low tide • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Embryonic shifting dunes • Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`) • Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature • Humid dune slacks Annex II species associated with the SAC include great crested newt Tristurus cristatus.		
River Ehen SAC	6	The River Ehen supports the largest freshwater pearl mussel Margaritifera margaritifera population in England. Exceptionally high densities (greater than 100 m^2) are found at some locations, with population estimates for the entire river exceeding 100,000. The conservation importance of the site is further enhanced by the presence of juvenile pearl mussels, indicating recruitment since 1990. Annex II species that are a primary reason for selection of this site: • Freshwater pearl mussel Margaritifera margaritifera Annex II species present as a qualifying feature, but not a primary reason for site selection: • Atlantic salmon salmo salar		
Ramsar sites	7	There are no Ramsar sites within 20 km of the site.		

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td>Drigg Coast SSSI</td><td>9</td><td colspan="3">Drigg Coast SSSI extends for almost 11 km along the West Cumbrian coast and supports a very broad range of maritime habitats, including an extensive sand dune system and saltmarsh. These habitats support a rich and varied flora including several species of local or nationally rare distribution. Fauna includes nationally important invertebrate species, one of the two largest natterjack toad colonies in England, as well as populations of all four common amphibians and the great crested newt. Adder, slow worm and common lizard also inhabit the sand dune system.

Condition Summary: Drigg Coast 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>93.19%</td><td>90.12%</td><td>3.07%</td><td>4.53%</td><td>2.27%</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>Low Church Moss SSSI</td><td>10</td><td colspan="3">This wetland area supports a variety of habitats that are very scarce on the intensively farmed West Cumbria coastal plain. These habitats include wet heath, acidic marshy grassland, tall fen and swamp, willow scrub a transition between poor fen and open water. The site has a rich invertebrate fauna, with several species scarce in Cumbria.

Condition Summary: Low Church 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>0.00%</td><td>0.00%</td><td>0.00%</td><td>0.00%</td><td>0.00%</td><td>100.00%</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>Hallsenna Moor SSSI</td><td>11</td><td colspan="3">Hallsenna Moor is situated on the West Cumbrian coastal plain approximately 1.5 km north of the Drigg Coast. The site is one of the few lowland heathland and peatland complexes remaining in the county and is the largest in West Cumbria. It contains a wide range of habitats developed on peat which form a mosaic including wet and dry heath, nutrient poor fen, basin mire and woodland. The site supports a rich invertebrate fauna and of particular note is the diversity of Chrysomelid and Curculionid beetles with over 60 species recorded.

Condition Summary: Hallsenna Moor 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>11.09%</td><td>11.09%</td><td>0.00%</td><td>81.22%</td><td>7.69%</td><td>0.00%</td></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>Silver Tarn, Hollas and Harnsey Mosses</td><td>12</td><td colspan="3">The site exhibits typical stages in the development of kettlehole vegetation from open water, represented by Harnsey ‘Moss’, through to the acid poor-fen of Silver Tarn, to a transitional basin fen stage reflected in the Hollas Moss communities. Additional associated communities include: inundation, tall fen/emergent vegetation, acid flush and carr. This is one of only two known examples in the country of a suite of intact, small, kettlehole formations.

Condition Summary: Silver Tarn, Hollas and Harnsey Mosses SSSI

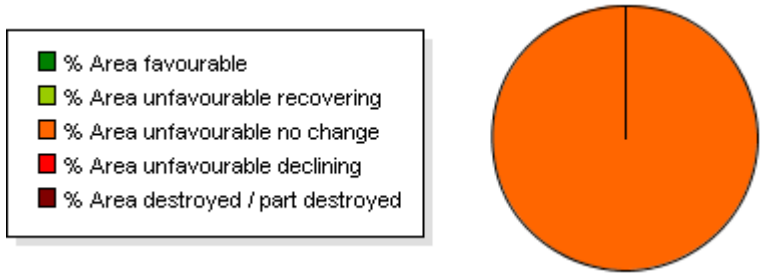
<table>
<tr><th>% Area meeting PSA target</th><th>% Area favourable</th><th>% Area unfavourable recovering</th><th>% Area unfavourable no change</th><th>% Area unfavourable declining</th><th>% Area destroyed / part destroyed</th></tr>
<tr><td>92.68%</td><td>92.68%</td><td>0.00%</td><td>7.32%</td><td>0.00%</td><td>0.00%</td></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>St. Bees Head SSSI</td><td>13</td><td colspan="3">The biological interest of the site is represented in a number of different ‘habitats’: natural cliff-top grassland and heath, sheer cliff face and cliff-fall rubble, shingle and wave-cut platform. The outstanding interest of this area lies, however, in the sheer cliffs which provide the only breeding site on the coast of Cumbria for a variety of colonial seabirds. These include over 2,000 pairs of guillemots along with lesser numbers of fulmar, kittiwake, razorbill, cormorant, puffin, shag and herring gull. The cliffs also support the only breeding site on the entire coast of England for black guillemots.

Condition Summary: St. Bees Head 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>100.00%</td><td>0.00%</td><td>0.00%</td><td>0.00%</td><td>0.00%</td></tr>
</table>

</td></tr>
<tr><td>River Ehen (Ennerdale Water to Keekle confluence) SSSI</td><td>14</td><td colspan="3">The River Ehen is on the western fringe of the Lake District. It forms the outfall from Ennerdale Water SSSI and flows some 20 km before reaching the Irish Sea at Sellafield. For much of its upper length the River Ehen is classed as an oligotrophic, or nutrient-poor, river flowing over bryophyte-dominated substrates of shingle, pebbles and rock. Between Ennerdale Water and the confluence with the River Keekle at Cleator Moor the Ehen meanders across a narrow floodplain with extensive areas of riparian woodland and trees. This stretch of the river supports outstanding populations of the Freshwater Mussel Margaritifera margaritifera. Collectively, this is the largest known population of this species in England, and the third largest population in Britain. An important feature of this stretch of the Ehen is the amount of tree shade along the banks, as along with the oligotrophic status of the river, the shade from direct sunlight helps to reduce the amount of algal growth in the channel which would make it unsuitable for the mussels. Margaritifera margaritifera has a complex lifecycle, and maintenance and successful recruitment of the mussel populations is dependent on the well-being of the whole river system.</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td colspan="2">
Condition Summary: River Ehen (Ennerdale Water to Keekle confluence) 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>0.00%</td><td>0.00%</td><td>0.00%</td><td>100.00%</td><td>0.00%</td><td>0.00%</td></tr>
</table>


</td>
</tr>
<tr>
<td>National Nature Reserves (NNR)</td>
<td>15</td>
<td>There are 31 NNR within the North West, 24 within Cumbria. The following NNR’s are within 20km of the site:

• Hallsenna Moor
• High Ley</td>
<td></td>
</tr>
</table>

Indicator	Data Source	Current Data	Comparators	Trend
Local Nature Reserves (LNR)	16	There are 122 LNR within the North West, 9 within Cumbria. The following LNR is within 20km of the site: • Drigs Dunes and Gullery, Ravenglass		
Local Wildlife Sites	17	Information to be obtained from a local record centre at the appropriate time.		
Legally protected Species ***EPS = European Protected Species**	18	The following legally protected species have been recorded within 10km of the site (please note this excludes terrestrial invertebrates for which there are a vast number of different species): • Great Crested Newt (EPS) • Natterjack Toad (EPS) • Common Species of Reptile (Adder, Slow Worm, Common Lizard and Grass Snake) • Otter (EPS) • Badger • Red Squirrel 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]. http://www.biodiversitynw.org.uk/default.asp
2	Cumbria Biodiversity Action Plan [2002]: http://www.wildlifeincumbria.org.uk/cbap/generic_biodiversity.asp
3	Cumbria Biodiversity Action Plan [2002].The UK Biodiversity Action Plan: http://www.ukbap.org.uk/lbap.aspx?ID=436
4	JNCC, UK SAC Sites: http://www.jncc.gov.uk/page-1458
5	JNCC, Drigg Coast SAC, Site details. http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0013031

6	JNCC, River Ehen SAC, Site details. http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030057
7	JNCC, UK Ramsar Sites. http://www.jncc.gov.uk/page-1389
8	Natural England, Regional and County SSSI. 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=1009
9	Natural England. Drigg Coast SSSI citation. http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1000077 Natural England. Drigg Coast Condition Summary. http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1000077
10	Natural England. Low Church Moss SSSI citation. http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1001117 Natural England. Low Church Moss, Condition Summary. http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1001117
11	Natural England. Hallsenna Moor SSSI citation. http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1000927 Hallsenna Moor, Condition Summary, Natural England http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1000927
12	Natural England. Silver Tarn, Hollas and Harnsey Mosses SSSI citation. http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1001998 Natural England. Silver Tarn, Hollas and Harnsey Mosses, Condition Summary. http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1001998
13	Natural England. St. Bees Head SSSI citation. http://www.sssi.naturalengland.org.uk/Special/sssi/sssi_details.cfm?sssi_id=1001877 Natural England. St. Bees Head, Condition Summary. http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1001877
14	Natural England. River Ehen (Ennerdale Water to Keekle Confluence) SSSI citation and SSSI condition summary: http://www.sssi.naturalengland.org.uk/special/sssi/sssi_details.cfm?sssi_id=2000147
15	Natural England. National Nature Reserves. http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nnr/regions/northwest.aspx
16	Natural England. Local Nature Reserves. http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_results.asp?N=&C=9&Submit=Search
17	National Biodiversity Network [no date]. Local records centres database http://www.nbn-nfbr.org.uk/nfbr.php
18	National Biodiversity Network [no date]. 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	Compared with the rest of England, Cumbria has a cold climate and winters are severe, with heavy snowfall in the mountains. This region is the wettest part of England and in the Lake District the average annual rainfall is over 2,540 mm (100 inches); elsewhere in the county it is in the region of 1,520-2,540 mm (60-100 in). The following trends have been observed in the North West Region: • 0.4°c rise in annual mean temperature at Manchester Airport between 1988 and 1997 (compared to the 1961 – 1990 30 year average) • 20% decrease in summer rainfall over the last century • Increase in high intensity rainfall since the 1960s • Seasonal rainfall varying by as much as 15% from the average in the last 30 years • Sea level rise at Liverpool of around 6cm in the last 50 years • Increased flooding of some of the region's major rivers in the last few 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 Cumbria. 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 Cumbria, causing disruption to services, and affecting people's health and wellbeing • A rise in sea levels due to climate change-related events • A rise in temperature would put areas such as the Lake District National Park, part of the Yorkshire Dales National Park, the North Pennines, and the Solway Firth at risk of drought and deterioration of plant life and melting of snow caps • Large parts of Cumbria have been identified as key areas for mosquito habitation should temperatures increase. This could have profound implications on health, as mosquitoes can spread a range of diseases		

Indicator	Data Source	Current Data	Comparators	Trend
		• It is possible that climate change could bring some benefits to Cumbria. An increase in temperature and hours of sunshine could help bring an increase in investment and spending to Cumbria's coastal resorts		

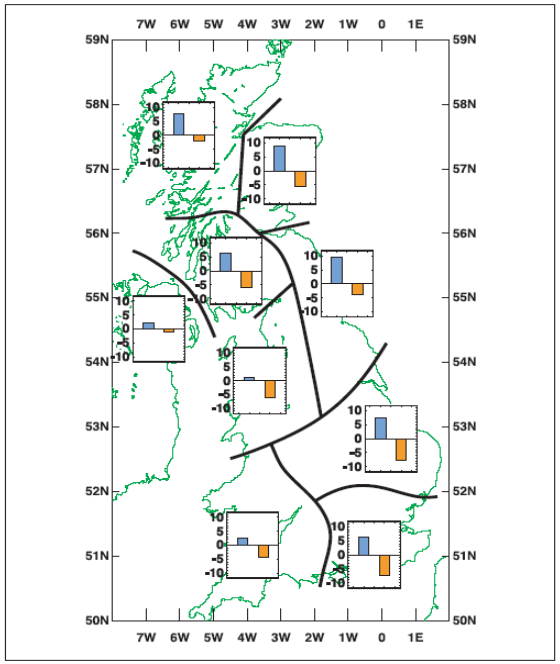


Figure 12: The trend (1961 to 2000) in the fraction of the total seasonal precipitation contributed by the "most intense" precipitation events in winter (left-hand bars) and in summer (right-hand bars) for a number of UK regions. Positive (blue) numbers indicate an increasing trend in the proportion 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]

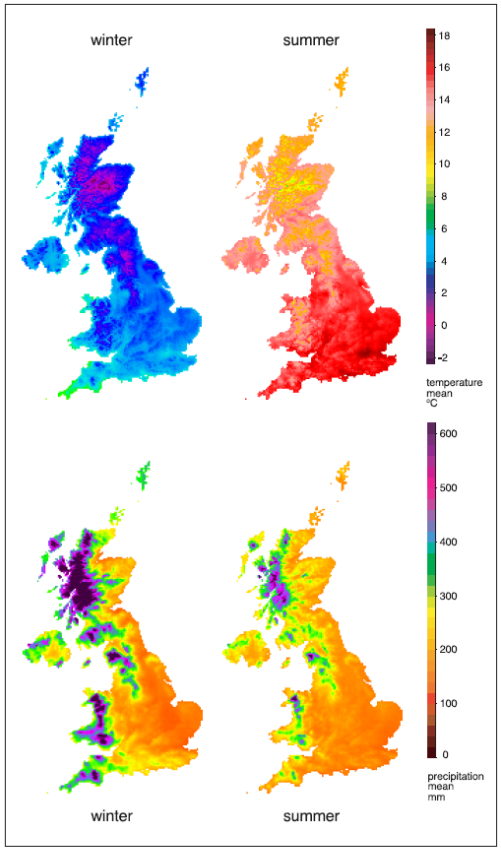
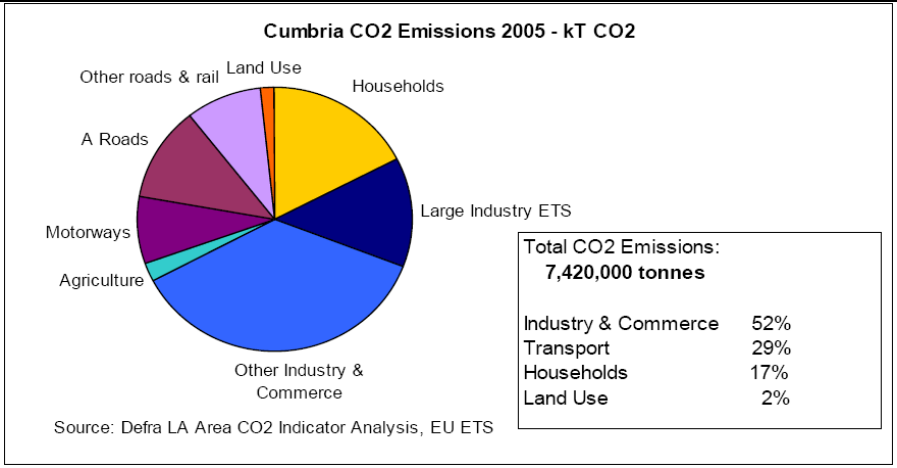


Figure 18: Average observed 1961-1990 winter and summer temperature (°C, top) and precipitation (mm, bottom) in the UK. Data on a 5 km grid.

Indicator	Data Source	Current Data	Comparators	Trend
Greenhouse Gas Emissions	3,6	The recent NWRA Energy and Greenhouse Gas Emissions Inventory sets out the challenges facing Cumbria on climate change and they include: • Of the 5 sub-regions, Cumbria has the lowest overall emissions (measured as CO_2 equivalent), but the highest per capita emissions (CO_2 equivalent), due mainly to its dispersed population and the need to travel by road; • CO_2 represents the greatest source of greenhouse gas emissions in Cumbria at 75%, but this figure is considerably lower than in other sub-regions (Greater Manchester – 91%, Merseyside 91%, Cheshire – 90%, Lancashire – 86%). This is due to a much higher contribution in Cumbria of methane (17%) and nitrous oxide (6%) emissions arising from agriculture and natural processes. • Cumbria is the only sub-region where transport is the largest sector contributing to carbon emissions (representing 28% of total emissions).		
Cumbria County Council Greenhouse Gas Emissions	2,4,6,7	The breakdown of CO_2 emissions in Cumbria is shown in the pie chart below. Total CO_2 emissions in the county amount to 7.4 million tonnes per year, of which 607,000 tonnes (8%) is attributed to traffic on the M6 (the accounting of emissions from the M6 should be omitted from local data). Just over 3.8 million tonnes (52%) are due to industry and commerce and, of this, 988,000 tonnes are emitted by 14 large manufacturing sites. Tourism accounts for between 750,000 and 1,080,000 tonnes (10-15% of total emissions).		

Indicator	Data Source	Current Data	Comparators	Trend
		 The table below shows that emissions as a result of energy use in the industrial and domestic sectors are relatively high compared to national figures. For domestic emissions, households in the North West emit, on average, 6.2tCO_2Eqv, compared to a national average of 5.4tCO_2Eqv. This is despite above average levels of fuel poverty in the region, and is likely to reflect the age and quality of the housing stock. Other sources of CO_2 emissions; from industrial processes, waste and agriculture; are comparatively small. However, of the other greenhouse gases, it is worth noting that the North West accounts for just over 30% of national emissions of Hydroflourocarbons (HFCs) as a result of production facilities in the region.		

Indicator	Data Source	Current Data	Comparators	Trend

	UK CO_2 emissions (thousand tonnes)	NW CO_2 emissions (thousand tonnes)	% of UK emissions (for that sector)	% of regional total emissions
Domestic	133,802.67	18,506.67	13.83	29.73
Industrial	97,177.84	13,787.43	14.19	22.15
Services	58,445.15	6,148.31	10.52	9.88
Energy transformation	39,948.80	3,781.05	10.82	6.07
Energy Industry use	45,370.78	2,959.39	6.52	4.75
Fugitive emissions	20,258.24	1,751.01	8.64	2.81
Other	9,507.55	1,116.17	11.74	1.79
Transport	128,134.07	14,189.54	11.07	22.8
TOTAL	527,645.10	62,239.56	11.80	

Cumbria Strategic Partnership has signed up to the Local Area Agreement indicator NI 186 to reduce per capita CO_2 emissions across Cumbria as a whole, excluding emissions from large industry, motorways, large scale renewables and excluding 'indirect emissions' from food or imported goods into the county. The target is 11.5% savings by 2010/11, which equates to savings of 619,000 tonnes CO_2 per year. Of this, national initiatives are assumed to contribute 7.75%, leaving 3.75% to be achieved by local actions, or the local component of national programmes. This equates to around 202,000 tonnes CO_2 per year. The baseline CO_2 emissions for Cumbria for this indicator are 5,379,000 tonnes, split by district and sector as shown below.

Indicator	Data Source	Current Data	Comparators	Trend

CO2 emissions (kt CO2) 2005 by End User

Local Authority	Industry and Commercial (not inc ETS installations or diesel railways)	Domestic	Road Transport (not including motorways)	Total emission for indicator	Population Thousands	Per capita Total CO2 (tonnes)
Allerdale	748	258	280	1,286	94.4	13.6
Barrow-in-Furness	396	162	70	628	71.9	8.7
Carlisle	406	269	245	919	102.9	8.9
Copeland	240	182	120	542	70.0	7.7
Eden	475	137	293	905	51.7	17.5
South Lakeland	440	301	359	1,099	104.9	10.5
CUMBRIA TOTAL	2,704	1,309	1,366	5,379	496	10.85
TOTAL NORTH WEST	22,137	17,062	9,647	48,845	6,840	7.1
UK TOTAL	191,654	151,278	104,651	447,583	60,238	7.4

The site is located in the Copeland Local Authority (4th row from the top).

The Cumbria Climate Change Strategy states that locally the electricity network remains vulnerable to the impacts of severe storms, particularly in rural areas, and the grid is insufficiently flexible to accommodate new connections.

<table>
<tr><th>Indicator</th><th>Data Source</th><th>Current Data</th><th>Comparators</th><th>Trend</th></tr>
<tr><td>Copeland Borough Council Greenhouse Gas Emissions</td><td>2,7</td><td colspan="2">
<table>
<tr><th>Local Authority and Government Office Region</th><th>Industry and Commercial</th><th>Domestic</th><th>Road Transport</th><th>Land use change and forestry</th><th>Total</th><th>Population Thousands (1)</th><th>Per capita Total CO2 (tonnes)</th><th>Domestic per capita CO2 (tonnes)</th></tr>
<tr><td>Allerdale</td><td>804</td><td>254</td><td>305</td><td>41</td><td>1404</td><td>93</td><td>15.0</td><td>2.7</td></tr>
<tr><td>Barrow-in-Furness</td><td>323</td><td>159</td><td>75</td><td>5</td><td>563</td><td>72</td><td>7.8</td><td>2.2</td></tr>
<tr><td>Carlisle</td><td>480</td><td>265</td><td>363</td><td>25</td><td>1132</td><td>101</td><td>11.2</td><td>2.6</td></tr>
<tr><td>Copeland</td><td>290</td><td>179</td><td>132</td><td>4</td><td>606</td><td>69</td><td>8.7</td><td>2.6</td></tr>
<tr><td>Eden</td><td>803</td><td>135</td><td>628</td><td>26</td><td>1593</td><td>50</td><td>32.0</td><td>2.7</td></tr>
<tr><td>South Lakeland</td><td>500</td><td>296</td><td>589</td><td>23</td><td>1409</td><td>102</td><td>13.8</td><td>2.9</td></tr>
<tr><td>TOTAL NORTH WEST</td><td>27201</td><td>16872</td><td>16637</td><td>607</td><td>61317</td><td>6730</td><td>9.1</td><td>2.5</td></tr>
</table>
Cumbria is a relatively large emitter of CO_2 per capita, due largely to having a large land mass and sparse population. Rural populations are heavily reliant on travelling by car as the primary source of transport, and in the more rural areas of the county there is reliance on oil/coal for domestic heating.
</td><td></td></tr>
<tr><td colspan="5">Topic: Energy</td></tr>
<tr><td>Energy</td><td>8,9,10</td><td colspan="2"><u>Electricity Consumption 2007 (Copeland)</u>
Overall: 263.2 GWh (0.08% of UK)
Average Domestic Consumption: 4,397 kWh
Average Industrial Consumption: 42,281 kWh

<u>Total Energy Consumption 2006 (Copeland)</u>
1,447.3 GWh

<u>Electricity Consumption 2007 (North West England)</u></td><td>Copeland’s electricity consumption accounts for less than 0.1% of Britain’s electricity consumption.

18% of Copeland’s energy consumption comes from electricity.

The Regional Spatial Strategy for North West England seeks to:
• Promote and exploit low carbon and renewable energy technologies and</td></tr>
</table>

Indicator	Data Source	Current Data	Comparators	Trend
		Overall: 35,352.7 GWh Average Domestic Consumption: 4,226 kWh Average Industrial Consumption: 91,275 kWh <u>Electricity Consumption 2007 (Great Britain)</u> Overall: 309,669.5 GWh Average Domestic Consumption: 4,392 kWh Average Industrial Consumption: 79,077 kWh <u>Total Energy Consumption 2006</u> North West England: 200,208.9 GWh UK: 2,120,261.5 GWh		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	8,10	<u>Energy Consumption from Renewable Sources 2006 (Copeland)</u> 6.2 GWh (0.4%) <u>Total Energy Consumption from Renewable Sources 2006</u> North West England: 701.4 GWh (0.35%) UK: 6,939.5 GWh (0.3%)		The Regional Spatial Strategy (RSS) 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: • The North West possesses some of the best renewable energy resources in the UK. • It also contains some of its most

Indicator	Data Source	Current Data	Comparators	Trend
				beautiful and ecologically fragile landscapes, which are particularly sensitive to the siting of some renewable energy technologies.
Current Capacity	11,12	Sellafield B power station has a capacity of 1,188 MW. It is expected to operate until 2035. Sellafield A Power Station ceased operation in 2006 and had a power output of 420 MW. Other power stations in the vacinity include: • Roosecote Power Station: CCGT, 229 MW, 48 km • Heysham 1 and 2 Power Stations: Nuclear, 1,150 MW and 1,250, 80 km		

Key to Data Sources

1	Microsoft [2009]. Cumbria, http://uk.encarta.msn.com/encyclopedia_761563762/cumbria.html.
2	Sustainability Northwest. [2005]. Climate Change in the Northwest and its impacts: a summary document. http://www.climatechangenorthwest.co.uk/assets/_files/documents/jun_07/cli__1181141206_Climate_Change_in_the_Northwes.pdf.
3	Quantum [2008]. The Economic Implications of Climate Change Legislation for Cumbria, http://www.cumbriastrategicpartnership.org.uk/elibrary/view.asp?id=28146
4	Cumbria Vision [2008]. Cumbria Economic Strategy 2008- 2028, http://www.copeland.gov.uk/CIS/pdf/210808_oscede6_App1.pdf
5	Cumbria County Council [2008]. Cumbria climate change strategy Draft for consultation http://www.lake-district.gov.uk/lake_district_docs95/2008_03_07_cumbria_climate_change_strategy_draft_for_consultation.pdf
6	Government Office for the North West [2008]. North West of England Plan Regional Spatial Strategy to 2021 http://www.gos.gov.uk/497468/docs/248821/457370/NorthWestEnglandRSS
7	Department of Business Enterprise and Regulatory Reform. Electricity Consumption Data at Regional and Local Authority Level http://www.berr.gov.uk/energy/statistics/regional/regional-local-electricity/page36213.html
8	Department of Business Enterprise and Regulatory Reform. Total final energy consumption at regional and local authority level [online] available: http://www.berr.gov.uk/energy/statistics/regional/total-final/page36187.html

9	Department of Business Enterprise and Regulatory Reform. 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
10	Wikipedia. Power Stations in the North West http://en.wikipedia.org/wiki/Category:Power_stations_in_North_West_England

Communities: Population and Economy

Indicator	Data Source	Current Data			Comparators		Trend
Topic: Population							
Age of population	1, 2,3		**Beckermet**	**Copeland (Non-Metropolitan District)**	**North West**	**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. The population of Copeland is 70,300 - 2006 mid-year estimate (69,318 in 2001 Census). Of this 70,300 population, 12,800 are aged 0 to 15, 43,200 are of working age, and 14,300 are older than working age. The mean average age is 40 years old compared with an average age of 39 for England and Wales. 2.2% of the resident population is retired compared with 13.2% in England and Wales overall. The Borough has low numbers of resident ethnic minority groups, and the population is overwhelmingly 'white' (Census classification), with 99.3% of the resident population belonging to this category. Although two thirds of the Borough lies within the Lake District National Park, around a mere 4000 people live there.
		All People (Count)	2,740	69,318	6,729,764	49,138,831	
		People aged 0-4 (%)	5.04	5.37	5.88	5.96	
		People aged 5-7 (%)	3.83	3.57	3.78	3.74	
		People aged 8-9 (%)	2.81	2.60	2.74	2.61	
		People aged 10-14 (%)	6.31	6.84	6.93	6.57	
		People aged 15 (%)	1.35	1.34	1.37	1.27	
		People aged 16-17 (%)	2.63	2.59	2.66	2.51	
		People aged 18-19 (%)	2.08	2.23	2.47	2.40	
		People aged 20-24 (%)	3.61	4.78	5.79	6.01	
		People aged 25-29 (%)	4.42	5.70	6.18	6.65	
		People aged 30-44 (%)	22.26	22.78	22.09	22.65	
		People aged 45-59 (%)	22.74	20.12	19.06	18.88	
		People aged 60-64 (%)	6.61	6.65	5.09	4.87	
			Beckermet	**Copeland (Non-Metropolitan District)**	**North West**	**England**	

Indicator	Data Source	Current Data		Comparators			Trend
		People aged 65-74 (%)	9.16	9.28	8.59	8.35	
		People aged 75-84 (%)	5.77	5.59	5.55	5.60	
		People aged 85-89 (%)	0.95	1.05	1.24	1.30	
		People aged 90 and over (%)	0.44	0.52	0.61	0.64	
		Mean age of population in the area	40.77	39.61	38.61	38.60	
		Median age of population in the area	42.00	39.00	38.00	37.00	
		The population of Beckernet and Copaland are older than the national and regional average. In Beckernett about 7.2% of the population is aged over 75 years, with 1.4% aged over 85 years. People aged 65 years and older make up approximately 16.4% of the Copaland population. This is higher than the national average.					
Topic: Employment							
Percentage Economically Active – Employed %	1, 2	**Beckernet**	**Copaland (Non-Metropolitan District)**	**North West**	**England**		
		Full Time 39.52	37.26	38.77	40.81		
		Part Time 11.22	12.80	11.87	11.81		
Percentage Economically Active unemployed %		3.72	5.02	3.63	3.35		
Industry of employment **All persons**		**Beckermet** **100%** **(1,243)**	**Copaland (Non-Metrpolitan District)** **100%** **(29,222)**	**North West** **100%** **(2,900,020)**	**England** **100%** **(22,441,498)**		

Indicator	Data Source	Current Data		Comparators		Trend
Agriculture/ Forestry (%)		6.60	2.87	1.22	1.45	
Fishing (%)		0.00	0.05	0.01	0.02	
Mining (%)		0.56	0.35	0.16	0.25	
Manufacturing (%)		31.13	27.19	16.89	14.83	
Electricity/Gas/Water Supply (%)		3.54	3.35	0.77	0.71	
Construction (%)		8.77	8.97	6.49	6.76	
Wholesale/ Retail Trade (%)		8.69	12.33	17.82	16.85	
Hotels/ Restaurant (%)		6.44	5.99	5.13	4.73	
Transport/ Communications (%)		3.78	3.84	6.79	7.09	
Financial (%)		0.97	1.06	3.77	4.80	
Real Estate (%)		7.96	8.20	10.80	13.21	
Public Admin (%)		2.82	4.92	5.68	5.66	
Education (%)		6.92	6.21	7.95	7.74	
Health and Social Work (%)		9.81	10.93	11.97	10.70	
Other (%)		2.01	3.73	4.54	5.20	
Self Employed (%)		9.68	6.40	7.10	8.32	
Large employers and higher managerial occupations		5.01	2.64	2.86	3.50	
		Beckermet 100% (1,243)	**Copaland (Non-Metrpolitan District) 100% (29,222)**	**North West 100% (2,900,020)**	**England 100% (22,441,498)**	

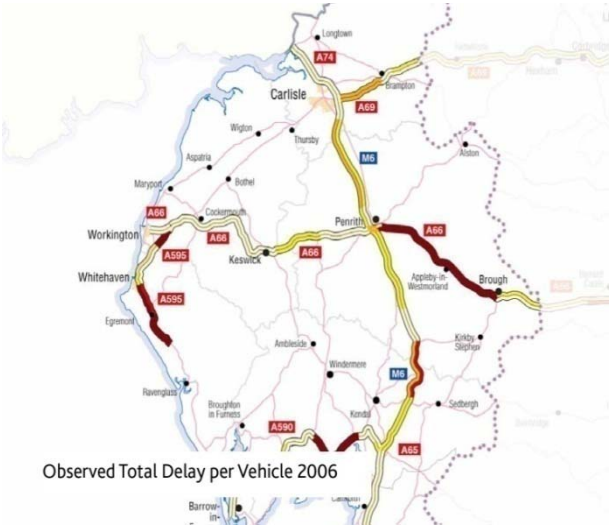
Indicator	Data Source	Current Data		Comparators		Trend
Higher professional occupations		4.72	3.09	4.17	5.11	
Lower managerial and professional occupations		16.63	13.96	16.78	18.73	
Semi-routine occupations		10.87	13.01	12.17	11.65	
Routine occupations		8.49	11.73	9.82	9.02	
Never Worked		1.54	2.65	3.13	2.72	
Full-time students		4.27	4.04	6.97	7.03	
		In the first 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 levels at ward level are higher than the regional level but lower than the national level. Full time employment levels at district level are lower than the national and regional average. Part time employment levels at ward level are below the regional and national level, they are higher at the district level. Unemployment levels are higher at both the ward and district levels than the regional and national level. According to the 2001 Census, the unemployment rate in Copeland is 5%. 41% of the population was working in 2001. Of the 28618 jobs in Copeland, around 50% of those depend on Sellafield. This includes those jobs on site, and those jobs which rely on the site. There has been a decline of around 3,500 manufacturing jobs in recent years. The decline of these manufacturing jobs has traditionally been			According to the 2001 Census, the unemployment rate in Copeland is 5%. 41% of the population was working in 2001 Of the 28618 jobs in Copeland, around 50% of those depend on Sellafield. This includes those jobs on site, and those jobs which rely on the site. There has been a decline of around 3,500 manufacturing jobs in recent years. The decline of these manufacturing jobs has traditionally been masked by continued recruitment at Sellafield. 34% of the 16-74 year old population have no educational qualifications. This compares to a national average of 29%.

Indicator	Data Source	Current Data	Comparators	Trend
		masked by continued recruitment at Sellafield. 34% of the 16-74 year old population have no educational qualifications. This compares to a national average of 29%.		

Key to Data Sources

1	Office for National Statistics [2001]. National Statistics 2001, Neighbourhood Statistics: Beckermet http://neighbourhood.statistics.gov.uk/dissemination/LeadAreaSearch.do?a=7&r=1&i=1001&m=0&s=1236613640337&enc=1&areaSearchText=CA20+1PG&areaSearchType=14&extendedList=false&searchAreas=Search
2	National Statistics, North West. http://www.statistics.gov.uk/cci/nugget.asp?id=1127
3	Copeland Brough Council. http://www.copeland.gov.uk/default.aspx?Page=341.

Communities: Supporting Infrastructure

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Transport				
Regional Freight Routes	1	 Observed Total Delay per Vehicle 2006		 Forecast Daily Stress 2016	

Indicator	Data Source	Current Data	Comparators	Trend
		 Observed Stress 2006		 Forecast Daily Stress 2026
		West Cumbria is crossed by north to south strategic transport corridors, en route from Carlisle to Barrow-in-furness. The M6 and other core national routes are remote from the area. The main transport corridors are: **Road** • M6 (Carlisle to Manchester); • A66(T) (Penrith to Cockermouth, via Keswick) – Single carriageway from Penruddock to Cockermouth • A595(T) (Carlisle to Barrow-in-Furness trunked on the northern section). **Rail** • West coast main line; • Camforth to Carlisle (via Whitehaven); • Existing rail stop at Sellafield; The **county road network** may be characterised as: • Unreliable journey times; • Low overall journey speed;		

Indicator	Data Source	Current Data	Comparators	Trend
		• Environmental impact upon roadside communities; and • Variable standard of highway provision.		
Topic: Waste				
Municipal Waste	2,3,4	A total of 4,215,000 tonnes of wastes were generated in the North West of England in 2006/07. Landfill remains the predominant method of municipal waste disposal in the East of England, where 66% of waste was dealt with in this manner in 2007. During this period, 31% of municipal waste was recycled, with the remaining 3% incinerated. Cumbria County Council acts as the Waste Disposal Authority (WDA) for Copeland Borough Council. In 2006/07 351,403 tonnes of municipal wastes were generated within the area. Of this total, 68% was sent to landfill, and the remaining 32% recycled. A relatively insignificant proportion (25 tonnes) was incinerated during this period. Cumbria's seven local authorities have formed the Cumbria Strategic Waste Partnership (CSWP). The County Council is currently in the process of procuring MBT waste treatment plant for sites at Carlisle and Barrow (contract currently approved). Two MBT plants will provided for the region, with a treatment capacity of 70,000 tonnes of waste each. There are currently three non-hazardous landfill sites in the region. No detailed information exists as to their projected capacity. There are currently no hazardous waste landfills or treatment facilities in the Cumbrian region, although established waste management contractors are known to operate and provide services within the region.		Over the period 2000/01 to 2006/07, there has been an overall increase of just over 2% in the amount of municipal wastes generated in the North West of England, rising from 4,125,000 tonnes to 4,215,000, peaking at 4,380,000 tonnes in 2003/04 and steadily declining since. There has however been a consistent and noticable reduction in the amount of wastes disposed of at landfill sites, down from 90% in 2000/01 to 66% in 2006/07. This reduction largely correlates with the increase in recycling rates across the region, particularly as the amount of municipal wastes treated at EfW plants has largely remained the same throughout that period at 1%.

Indicator	Data Source	Current Data	Comparators	Trend
Radio-active and Hazard-ous 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 Data Sources

1	West of England Partnership [2006]. Final Joint Local Transport Plan 2006/07 - 2010/11. Freight Supporting Statement.
2	Department for Environment, Food and Rural Affairs [2006]. Municipal Waste Management Statistics http://www.defra.gov.uk/environment/statistics/wastats/bulletin07.htm [accessed 18 March 2009]
3	Cumbria County Council [2007]. Joint Municipal Waste Management Strategy 2007 - 2020 http://www.cumbria.gov.uk/planning-environment/waste-management/JMWMS.asp
4	Urban Mines [no date] Urban Mines Municipal Waste Procurement webpage: http://www.urbanmines.org.uk/?i=1459&s=1111 [accessed 18 March 09]

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, Copeland 007C to England as a whole as follows: • Income deprivation much less than average • Employment deprivation much less than average • Health deprivation less than average • Education deprivation less than average • Barriers to housing and services are greater than average • Crime is much less than average • Living environment deprivation is slightly less than average		
Index of multiple deprivation (2007)	2	The Department of Communities and Local Government's index of deprivation (an index combining a range of economic, social and housing issues into a single deprivation score) shows Copeland Borough Council's area ranked as 78 out of 354 (where 1 is most deprived). This ranking shows that the Copeland area is	Other borough councils in Cumbria are ranked as follows: • Allerdale is 119 • Barrow-in-Furness is 29 As can be seen from the above a number of council areas in Cumbria are deprived with	

<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>deprived.</td><td>Barrow-in-Furness, which is adjacent to Copeland, being one of the most deprived areas in England.</td><td></td></tr>
<tr><td>Age profile (mid 2006)</td><td>1</td><td>In the Super Output Area, Copeland 007C 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>13.6</td></tr><tr><td>16 – 64 (males)
16 – 59 (females)</td><td>57.0</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 smaller proportion of people in the lower age bracket and a much higher proportion of people in the upper age bracket (retired or approaching retirement) in the Super Output Area, Copeland 007C than in the UK as a whole. There are also proportionately fewer people of working age in the area.</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, Copeland 007C were as follows:

• Good – 70.6%
• Fairly good – 20.1%
• Not good – 9.3%</td><td>For comparison purposes, the same data for the overall Copeland area and England are as below:

<table><tr><th></th><th>Copeland</th><th>England</th></tr><tr><td>Good</td><td>66.7</td><td>68.8</td></tr><tr><td>Fairly good</td><td>22.9</td><td>22.2</td></tr><tr><td>Not good</td><td>10.3</td><td>9.0</td></tr></table>
Overall there are more people reporting good health in the Super Output Area, Copeland</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>007C than in England as a whole although the percentage reporting poor health is similar.</td><td></td></tr>
<tr><td>Life expectancy at birth (Jan 04 – Dec 06)</td><td>1</td><td><table><tr><th></th><th>Copeland</th></tr><tr><td>Males</td><td>76.50</td></tr><tr><td>Females</td><td>80.60</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 Copeland Borough Council area is slightly below the national average for England.</td><td>Data from the same source for previous years show that these figures for life expectancy at birth in the Copeland Borough Council area have risen slightly for both males and females since 2001.</td></tr>
<tr><td>Infant mortality (Jan 03 – Dec 05)</td><td>1</td><td>Infant mortality in the Copeland Borough Council area for the years in question was 5.2 persons in every 1000.</td><td>This compares to the figure of 4.2 persons for the North-west of England region and 5.1 persons per thousand in England as a whole.</td><td>Data from the same source for previous years show that figures for infant mortality in the Copeland Borough Council area have decreased since 1998-2000.</td></tr>
<tr><td>Proximity to medical services</td><td>3</td><td>Medical services in the area of the site are as follows:

• One General Practitioner (GP) practice (Seascale Health Centre) within 5 km of the site. Two other GP practices are within 10 km of</td><td></td><td></td></tr>
</table>

Indicator	Data Source	Current Data	Comparators	Trend
		the site. • Closest hospital is the West Cumberland Hospital (13.5 km) at Whitehaven and this hospital has an Accident and Emergency department • The nearest hospital providing mental health services is Parkwood Hospital which is 73.4km away		
Education - examination results for young people (2006 – 07)	1	In the Super Output Area, Copeland 007C, there is no data available on the percentage of pupils that achieved 5 or more A*- C grade passes including English and Mathematics at GCSE or equivalent. However, in the Copeland Borough Council area 54% of students achieved this standard.	This compares to the 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 Copeland Borough Council area for the year in question was 5.5%.	This compares to a percentage of 5.2% for the North-west of England region and 4.2%for England as a whole.	Data from the same source show that the percentage of unfit dwellings has reduced since April 2001.
Radioactivity monitoring	4	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: • the power station at Sellafield	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 Sellafield sampling were as follows: • estimated dose from locally grown foodstuffs (on land with seaweed added) was 0.012 mSv • estimated dose to local fish and	Trends in the data noted from sampling in previous years are as follows: • estimated dose from locally grown foodstuffs (on land with seaweed added) was 0.013 mSv • estimated dose to local fish and shellfish consumers (using personal habits derived

Indicator	Data Source	Current Data	Comparators	Trend
		(Calder Hall) ceased operation in 2003; • the other nuclear activities on the site (two fuel reprocessing plants, decommissing and clean-up, manufacture of mixed oxide fuel and waste treatment and storage) make it difficult to apportion any radiological effects measured; • water, sediment, beach and terrestrial and marine food and animal samples were collected from around the site in 2007; • concentrations of all radionuclides associated with gaseous discharges from the site were low; • concentrations of artificial radionuclides in seafood are generally dropping or remaining static with the exception of certain of the heavier elements in lobsters • across a wide range of sampling locations and shellfish species, concentrations of lighter radionuclides were generally reduced from 2006 values • in the vicinity of Sellafield, slightly elevated concentrations of the heavier radionuclides were detected in lobsters and a range of molluscs	shellfish consumers (using personal habits derived in 2007) was 0.46 mSv (where 0.21 mSv was assessed as being due to nuclear industry discharges) • the total dose from all sources, including direct radiation, was assessed as being 0.37 mSv	in 2006) was 0.50 mSv (where 0.24 mSv was assessed as being due to nuclear industry discharges) • the total dose from all sources, including direct radiation, was assessed as being 0.44 mSv
Health related to nuclear	5	There has been, since 1956, a nuclear power station operating on the site. There	For comparison purposes, the figures derived using statistics for Britain as a whole are as	

Indicator	Data Source	Current Data	Comparators	Trend
installations		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 Sellafield are as below: • actual cases of childhood leukaemia and non-Hodgkin lymphoma between 1969 and 1993 in a 25km area around the plant were 25 • actual cases of childhood solid tumours between 1969 and 1993 in a 25km area around the plant were 40	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 21.95 • the expected number of cases of childhood tumours between 1969 and 1993 in a 25km area around the plant should have been 35.96 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. Neighbourhood Statistics : http://neighbourhood.statistics.gov.uk/dissemination/home.do;jessionid=ac1f930c30d607c6170cbe3146ada704c9cac1978fc7?m=0&s=1236174480737&enc=1&bhcp=1&nsjs=true&nsck=true&nssvg=false&nswid=996
2	Department of Communities and Local Government [2007]. Indices of Deprivation http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/
3	National Health Service. NHS 'Find Services' http://www.nhs.uk/servicedirectories/Pages/ServiceSearch.aspx

4	Food Standards Agency [2007]. Radioactivity In Food and the Environment 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

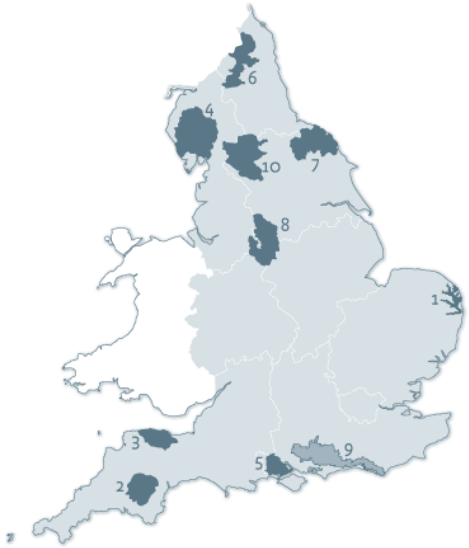
Indicator	Data Source	Current Data	Comparators	Trend
Topic: Cultural Heritage				
Scheduled Monuments	1	There are 6 Scheduled Monuments within an approximate 5km distance of the site, the closest of which consists of two high cross shafts in St. Bridget's Churchyard which lies within 1km. The others consist of Calder Abbey, an enclosure east of Winscales, Egremont Castle, Infell Wood Moated site and a stone circle.		
Conservation Areas	2	There are two Conservation Areas within an approximate 5km distance of the site, the closest of which is in Beckermet which lies within 1km.		
Listed Buildings	3	There are around 9 listed buildings within an approximate distance of 2km of the centre of the site and around 44 within an approximate 5km distance.		
Archaeological sites	3	Prehistoric or Roman flints have been found within the site and a Roman occupation site is known within close vicinity.		
Historic Landscape	4	Within the site there are field boundaries which are shown on late 19th century mapping. Therefore, potential elements of the historic landscape lie within the site.		

Key to Data Sources

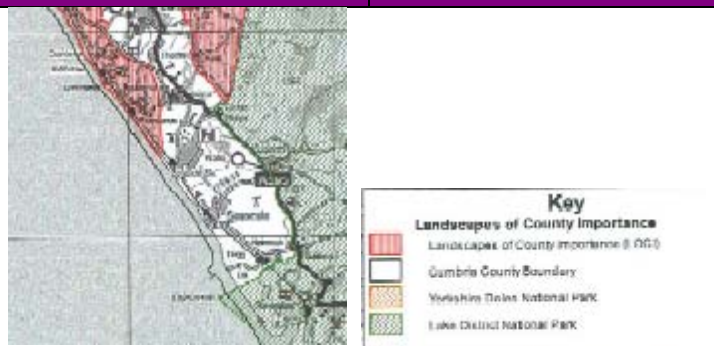
1	MAGIC. http://www.magic.gov.uk
2	Copeland Borough Council Local Plan http://www.copelandbc.gov.uk/ms/www/Local-Plan/Copeland-Local-Plan-2001-2016.htm [accessed 13.March 2009]
3	Heritage gateway. http://www.heritagegateway.org.uk [accessed 13.March 2009]
4	Old Maps. First Edition Ordnance Survey http://www.old-maps.co.uk/indexmappage2.aspx [accessed 13.March 2009]

Landscape

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Landscape				
National Character Area (NCA)	1	The site is situated within the West Cumbria Coastal Plain NCA (7). Key Characteristics: • Strong industrial history associated formerly with the mining of coal and iron ore and, more recently, the chemical industry, power generation and nuclear reprocessing. • Varied open coastline of mudflats, shingle and pebble beaches with localised sections of dunes, sandy beaches and sandstone cliffs. • Lowland river valleys with limited semi-natural ancient woodland, lowland raised mires and expansive estuarine landscapes with a range of intertidal habitats. • Gently undulating or flat improved pasture with hedgerows, wind-sheared trees and wire fences, occasional woodlands and copses, wetlands and herb-rich meadows. • Open agricultural landscapes that have extensive views to the higher fells in the east. • Extensive urban fringe areas within the coastal belt with large highly visible factories and manufacturing and processing plants, particularly near Workington, Whitehaven, Sellafield and Barrow. Surrounding NCA's within the North West include: 8- Cumbria High Fells 19- South Cumbria Low Fells		

Indicator	Data Source	Current Data	Comparators	Trend
National Parks	2	 Area 4 – The Lake District National Park 1km to the east. A Landscape Character Assessment has been completed for the National Park Note –Associated Cumbria County Council Policy **Policy E34: Areas and features of national and international conservation importance** *(Development and other land usechanges in areas or features of national or international conservation importance, or within their setting (ie landscape around National Parks), and that are detrimental to their characteristics will not be permitted. Exceptions will only be made where: 1. there is an over-riding need for development required to meet local infrastructure needs which cannot be located elsewhere and which is sited to minimize environmental impacts and meets high standards of design).*		

Indicator	Data Source	Current Data	Comparators	Trend
Heritage Coasts	3	 Heritage Coasts Area : 32. St Bees Head		
Relevant Local Designations	4	Cumbria County Council Structure Plan **Policy E36: Landscapes of County Importance** Cumbria Landscapes of County Importance The site is adjacent to a Landscape of County Importance (LOCI) as stated in Cumbria and Lake District Joint Structure Plan 2001 - 2016: Technical Paper 5: Landscape Character 2008.		

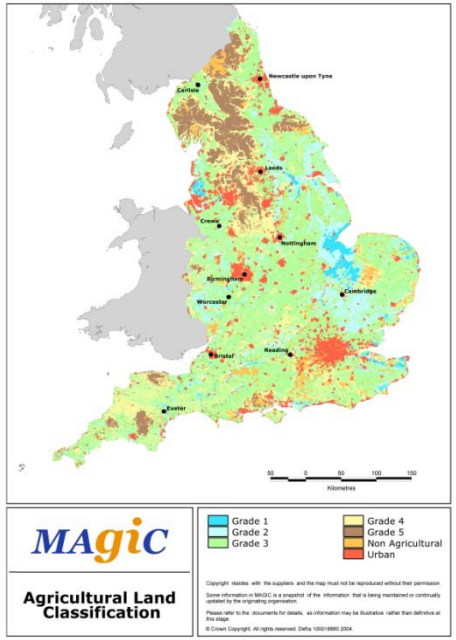
Indicator	Data Source	Current Data	Comparators	Trend
		 NB : Note on Status of Technical Paper 5 - This report does not constitute Structure Plan Policy at present (March 2009). The final version will replace two previous publications: Technical paper No 4 (1992) on the Assessment of County Landscapes and the Cumbria Landscapes Classification (1995). **Relevant District Policy Areas** ENV 9 : Areas of Local Landscape Importance ENV 14 : Development in the Coastal Zone ENV 15 : Undeveloped Coast **–(***Development will only be permitted on the undeveloped coast where: 1. the development requires a coastal location and there is no suitable site available within the developed coast. 2. the development maintains conserves or enhances the quality and character of the coastal zone.)*		

Key to Data Sources

1	Natural England. Landscape Character Areas – West Cumbria Coastal Plain NCA (7). http://www.naturalengland.org.uk/Images/jca7_tcm2-21069_tcm6-5165.pdf [accessed 13 February 2009] North West Character Areas: http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/northwest.aspx

2	Natural England – National Parks http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nationalparks/default.aspx http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/nationalparks/lakedistrict.aspx Lake District National Park Landscape Character Assessment (LCA) http://www.lake-district.gov.uk/lake_district_docs95/landscape_character_assessment.pdf
3	Natural England – Heritage Coasts http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/heritagecoasts/stbeeshead.aspx http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/heritagecoasts/default.aspx
4	Cumbria and Lake District Joint Structure Plan 2001 - 2016: Technical Paper 5: Landscape Character 2008 Plan showing areas at: http://www.cumbriacc.gov.uk/elibrary/Content/Internet/538/755/1599/2318/2323/38520131637.pdf [accessed March 12 2009] Landscapes of County Importance : Plan showing this: http://www.cumbriacc.gov.uk/elibrary/Content/Internet/538/755/2789/39854145824.pdf Landscape planning policies for Cumbria: http://www.cumbriacc.gov.uk/planning-environment/countryside/countryside-landscape/land/MC.asp

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) • Wick 1 Soils • Deep well drained coarse loamy and sandy soils locally over gravel • Glaciofluvial or river terrace drift • Free draining permeable soils in unconsolidated sands or gravels with relatively high permeability and high storage capacity • Cereals and some horticultural crops in drier lowlands; stock rearing and dairying in Cumbria		
Topic: Geology				
Geological SSSIs **Geology and Land Quality**	3 2	There are no geological SSSI's within the local vicinity EnviroCheck Report (Report available) **Geological Risks**		

Indicator	Data Source	Current Data	Comparators	Trend
		• The local Geology is Alluvium, Till, Devensian, River Terrace Deposits (Undifferentiated), Glaciofluvial Deposits, Devensian underlain by Calder Sandstone Formation and St Bees Sandstone Formation. The Environment Agency has identified one mineral abstraction site is present locally; the Florence Iron Ore mine near Egremont which, although flooded and not active, is considered to be a working mine. This mine is in hydrological continuity with Beckermet Mine, which is closed, although the existing Sellafield facility currently uses one shaft to abstract groundwater Based on the information within the Envirocheck report the geological risks are: • Moderate risk for the Potential for Compressible Ground Stability Hazards • Very low risk for the Potential for Landslide Ground Stability Hazards • Very low to low risk for the Potential for Running Sand Ground Stability Hazards • Very 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 Local Authority Landfills within 1 km of the site (the nearest one approximately 800 m north of the site) and four Registered Landfills within 1 km of the site (the nearest one approximately 790 m north of the site). • Five waste management facilities within 1 km of the site (the nearest one approximately 800 m north of the site). • The Environment Agency has identified the Calder Landfill Extension Segregated Area regulated under a Radioactive Substances Act permit/licence, plus five closed landfills regulated under the Waste Management Licensing Regulations (now Environmental Permitting Regulations).		

Indicator	Data Source	Current Data	Comparators	Trend
		Historic Land Use • Historic maps ranging from the 1880's to current were studied.		

Key to Data Sources

1	National Soils Research Institute Report 27374310 – (Report available on request).
2	Envirocheck Report 27374310_1_1 – (Report available on Request).
3	Natural England [no date]. Natural England Nature on the Map. http://www.natureonthemap.org.uk/map.aspx?m=nreserves

Water Quality and Resources

Indicator	Data Source	Current Data	Comparators	Trend
Topic: Water				
Current State of the Waters in the North West River Basin District	1	In the North West (NW) River Basin District (RBD), 20% of rivers (by length) meet the requirements for good ecological status or good ecological potential; the NW draft River Basin Management Plan (dRBMP) states that the target for 2015 will remain 20%. The majority of water bodies that fail do so because of pressures on fish. A greater number of groundwater bodies (44%) meet the requirements for good status. The NW RBD contains 18% of England's derelict land and a third of the poorest quality rivers in England and Wales. 25 Special Areas of Conservation (SCA) and 7 Special Protection Areas (SPA) with features that depend on water occur in the RBD. Of the 477 river water bodies in the RBD, 42% are candidate heavily modified or artificial water bodies. Of the 157 lakes and reservoirs, 40% are candidate heavily modified or artificial water bodies; 50% of these water bodies have not been assessed. Of the 12 identified transitional (estuary) water bodies, 9 are candidate heavily modified bodies, while for the 8 identified coastal waters, 6 are considered to be candidate artificial or candidate heavily modified bodies. There are 18 groundwater bodies in the North West RBD. The pressures and significant risks to these groundwater bodies have been identified as being from nutrient loading (nitrate and phosphate), hazardous substances (List 1 and chlorinated solvents), and abstraction and low flows (saline intrusion). Of the 18 groundwater bodies, 4 have been classified as good status, and the remaining 14 as poor. The groundwater body over which the site is located is the South Cumbria Lower Palaeozoic and Carboniferous aquifer. This is classified as good status for both quantity and quality. However, there are nutrient pressures on the water body.		.

<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>
The site is located within the South West Lakes catchment which is nested in the NW RBD. This is a mainly rural catchment, lying within the Lake District National Park. Much of the catchment consists of designated SAC and Sites of Special Scientific Interest (SSSI). Most water bodies support good populations of migratory salmon and other coarse fish. Otters and native crayfish are also present in good numbers.

Catchment pressures come predominantly from diffuse pollution from rural sources. There are also localised pressures as a result of historic mining and isolated landfill sites. Non-native invasive species are an increasing problem. Currently 26% of surface water bodies in this catchment achieve either good status or good potential. The NW dRBMP has set a target of 32% of surface water bodies achieving good status or good potential 2015.

The existing site is bisected by the River Calder, while to the immediate south-west the River Ehen flows out to the sea between the coastline and the site, sharing the same outlet as the River Calder. This outlet to the sea is also shared by Newmill Beck, which is located to the immediate south and east of the site.

Local information for the area around site, Sellafield, from the Environment Agency (EA) web site relevant to Water Framework Directive (WFD) is summarised in the table below:

Several non main watercourses also cross the site (source: Environment Agency)
<table>
<tr><th rowspan="2">Sector</th><th colspan="2">Ecological / Quantitative (GW) Quality</th><th colspan="2">Chemical Quality</th></tr>
<tr><th>Current</th><th>Predicted 2015</th><th>Current</th><th>Predicted 2015</th></tr>
<tr><td>Rivers (River Calder, includes Newmill Beck)</td><td>Moderate</td><td>Good</td><td>High</td><td>Good</td></tr>
<tr><td>Rivers (River Ehen)</td><td>Good</td><td>Good</td><td>High</td><td>Good</td></tr>
</table>
</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>
<table>
<tr><td>Groundwater</td><td>Good</td><td>Good</td><td>Good</td><td>Good</td></tr>
<tr><td>Coastal</td><td>Moderate</td><td>Moderate</td><td>High</td><td>Good</td></tr>
</table>

The location of the existing site is close to the Cumbria coast water body which has a current ecological quality status of moderate. This is predicted to remain the same by 2015. The current chemical quality is high; this is predicted to be good by 2015.

There is no groundwater source protection zone located in the vicinity of the site.</td><td></td><td></td></tr>
<tr><td>Current State of the Waters in the North West River Basin District</td><td>2</td><td>There are a large number of sites designated for their environmental importance within this CAMS area. The River Ehen, Wast Water and the River Derwent and Bassenthwaite, are all designated as candidate Special Areas of Conservation (SAC), which are of European importance. The rivers are designated for several species and associated habitats, including lamprey, otter, salmon, pearl mussel and water crowfoot. Wast Water is designated because it provides a special low-nutrient habitat.

This CAMS area is largely rural, but there are significant industrial water abstractors along the coast. Throughout the area small-scale water abstraction is important for a range of uses including agriculture, hydropower, campsites and private water supply.

The largest water abstractions within this CAMS area are from lakes and reservoirs. Water from Wast Water is used at the site. Public water supply for the area is mainly from Crummock Water and Ennerdale, along with a number of smaller reservoirs. Thirlmere is used to supply water locally and elsewhere in the North-West.

The River Ehen Water Resource Management Unit (WRMU 6) is classified as “over licensed” as a target status to 2019, with a strategy to address this based on reducing full licensed quantities. Within the WRMU, Ennerdale Water and the River Ehen are water based designated SSSIs while the River Ehen is also a water based SAC.

The River Calder WRMU 7 is also classified as “over licensed” to 2013, with a target</td><td></td><td>.</td></tr>
</table>

Indicator	Data Source	Current Data	Comparators	Trend
		status of “no water available” by 2019, with a strategy to address this based on reducing full licensed quantities. The River Irt WRMU 8 is classified as “no water available” through to 2019. Wast Water is located within this WRMU and has both water related SSSI and SAC designations. The sites are also located on the West Cumbria Groundwater Management Unit (GWMU). This is classified as “water available” to 2013, moving to “no water available” by 2019. Water supply to a new nuclear power station at Sellafield could potentially be provided by Ennerdale Water, but this would need to be confirmed with United Utilities.	
Water Demand and Availability Projected to 2035	3, 4,5, 6	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’. The site is located within United Utility’s (UU) West Cumbria WRZ. The Government is proposing major house building programmes across the country. One of the reasons for needing more houses is that average occupancy in dwellings is reducing with changing social patterns. This has the potential to impact significantly on the demand for water as average per capita consumption is much higher in low occupancy dwellings than in homes with higher occupancy. The d WRMP has taken account of the additional water demand expected from the 411,000 new homes between 2003 and 2021 proposed by the North West Regional Assembly’s Draft RSS (2006). However, UU recognise the need to review the WRMP in the light of any changes to projections for development of new homes or commercial properties. As commented earlier, Sellafield is supplied from Wast Water, but is also located within the West Cumbria WRZ. Initial supply demand balances for this zone through the planning period are presented in the table below. There is a small deficit in	The Regional Spatial Strategy (RSS) for the North West of England sets out plans for growth in the NW RBD. This proposes an additional 411,000 homes in the period up to 2021 and associated employment, infrastructure amd commericial development. Six “growth points” have been designated in the Region, with significant numbers of new housing planned, particularly in the areas surrounding Manchester and Liverpool. The forecast for the UU supply area shows household demand per captia consumption is expected to fall from 139 lites per head per day (l/h/d) in a normal year to 124 l/h/d in 2035, and 149 l/h/d to 138 l/h/d in a dry year.

<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="2">2006/2007, but as a result of significant leakage reduction during 2007/2008, adequate supplies are currently available. A significant reduction in water availability for use is expected to occur in 2014/2015 as a result of sustainability reductions with planned changes in abstraction licences. The result of this is that supply-demand solutions will be required by 2014/2015 to maintain adequate water supply reliability in West Cumbria.

<table>
<tr><th></th><th>2006/07</th><th>2009/10</th><th>2014/15</th><th>2019/20</th><th>2024/25</th><th>2034/35</th></tr>
<tr><td>West Cumbria Zone</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Water source yield</td><td>58.9</td><td>61.5</td><td>52.6</td><td>52.3</td><td>52.2</td><td>52.0</td></tr>
<tr><td>Dry weather demand</td><td>57.9</td><td>54.5</td><td>54.9</td><td>54.7</td><td>53.9</td><td>51.5</td></tr>
<tr><td>Target headroom</td><td>1.4</td><td>2.6</td><td>1.9</td><td>1.7</td><td>1.3</td><td>1.9</td></tr>
<tr><td>Supply-demand balance</td><td>-0.4 (deficit)</td><td>4.3</td><td>-4.1 (deficit)</td><td>-4.1 (deficit)</td><td>-3.1 (deficit)</td><td>-1.4 (deficit)</td></tr>
</table>

For the West Cumbria WRZ UU is proposing development of new groundwater source at South Egremont with a reliable dry weather yield of 5Ml/d ready for supply by 2014/2015.

The EA classifies the underlying bedrock for the site as a major aquifer, with the superficial deposits as a minor aquifer. However, there is no known use made of these water resources in the vicinity of the sites but springs on the beach are fed by groundwater and groundwater may also flow into the lower reaches of the rivers.

There are no groundwater protection zones within the vicinity of the site.</td><td>UU estimate the average sustained effect of household metering on demand for water is a reduction of 8.3% in a normal weather year. Non-household consumption of potable water across the UU region has reduced substantially in recent decades. UU forecast that metered non-household water demand will fall by 37% between 2006/07 and 2034/35. The continuing decline in non-household water demand is as a result of continuing water efficiency measures and reduction in water-intensive industry in North West England, although there will be local variations.

The number of households served by UU is expected to increase significantly from the 2006/07 level of 2.94 million to 3.57 million by 2034/35. This is in accordance with projections published in Draft Submitted RSS for North West England (2006).</td></tr>
<tr><td>Sensitive Areas – Urban Waste Water Directive</td><td>7</td><td colspan="3">Urban Waste Water Directive Sensitive Areas bordering the site includes Seascale bathing waters, with the River Ehen classified as a Eutrophic Water downstream of Cleator.</td></tr>
</table>

Indicator	Data Source	Current Data	Comparators	Trend
Coastal Processes and Sediments		The site at Sellafield falls within the coastal cell from St Bees Head to Drigg and comprises of a multiple headland-bay system. This is a macro-tidal environment and tidal current action is the dominant process along this coastline. Tidal residual currents are directed from the west at St Bees Head and from the North West for the remainder of the coastline. The geometry of the Irish Sea and the dominant west to south-westerly direction of prevailing winds and waves tends to keep sediment close up against the coastline offering a measure of protection against erosion. There is a strong, wave driven northward longshore drift along the coast north of St Bees Head towards the Solway Firth, which helps maintain the spit at Grune Point. The site is characterised by a barrier beach backed by till cliffs. The Shoreline Management Plan (SMP) (phase one 1) describes the coastal processes active at the site as a projected progressive retreat of the coast at 0.2 to 0.5m/year until it is prevented by coastal defences associated with the Cumbria Coastal Railway. Such a situation would result in gradual loss of much of the fine beach material and steepening of the beach. It is further expected that storm events may then result in increased draw-down of material, resulting in increased vulnerability of the existing coastline to gradual erosion. In terms of coastline movement, the section of coastline is described at present by the SMP as experiencing 'No Movement'.		

Key to Data Sources

1	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[9]
2	Environmental Agency [2007]. The Derwent, West Cumbria and Duddon Catchment Abstraction Management Strategy http://www.environment-agency.gov.uk/research/planning/102274.aspx
3	United Utilities [2008], Draft Water Resources Management Plan.http://www.unitedutilities.com/Draft_Water_Resources_Management_Plan_-_Main_Report.pdf [accessed March 2009]
4	The North West Plan [2006]. Submitted Draft Regional Spatial Strategy for the North West of England http://www.gos.gov.uk/497468/images/267947/Draft_RSS.pdf
5	Government Office for the North West [2008] Regional Spatial Strategy for the North West of England. http://www.gos.gov.uk/gonw/Planning/RegionalPlanning/
6	Sellafield Ltd.Geology and Hydrogeology. http://www.sellafieldsites.com/land/pages/geology_hydrogeology.html

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

7	Defra [2007]. Urban waste water treatment directive sensitive areas for the north west region. http://webarchive.nationalarchives.gov.uk/20080305115859/http://www.defra.gov.uk/environment/water/quality/uwwtd/sensarea/pdf/sensarea-nwest.pdf

Flood Risk

Indicator	Data Source	Current Data	Comparators	Trend
Flood Risk				
Flood Risk	1 2	Most of the site is in Flood Zone 1 'low probability', but is bounded along the coastline by Flood Zone 3 'high probability, as indicated on the Environment Agency Flood map. The site is shown to be defended but at this time no detail was available on the composition, condition grade or standard of protection afforded by these defences. According to the SFRA this area is susceptible to tidal surges.		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 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 [no date] http://maps.environment-agency.gov.uk/wiyby/wiybyController Accessed 11th March 2009
2	Jacobs [2007].Copeland Borough Council Strategic Flood Risk Assessment http://www.copeland.gov.uk/ms/www/Local-Plan/PDF/flood-assessment/Copeland-SFRA-Final.pdf

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