

Appraisal of Sustainability: Site Report for Hartlepool

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

Preface:**Appraisal of Sustainability of the revised draft Nuclear National Policy Statement**

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

Applications for development consents to the Infrastructure Planning Commission (IPC) will need to be accompanied by an Environmental Statement having been the subject of a detailed Environmental Impact Assessment (EIA).

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 Appraisal of Sustainability: Site Report for Hartlepool.

This report has 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 Pearson Associates Ltd, Studsvik UK Ltd and Metoc plc.

Contents

Contents	2
Summary of Key Findings	5
1 Introduction	7
This Appraisal of Sustainability Report.....	7
The Nuclear National Policy Statement.....	7
Appraisal of Sustainability incorporating Strategic Environmental Assessment ..	8
Appraisal of Sustainability Methods	9
Background to Nuclear Power Stations.....	11
New Nuclear Power Station Designs	12
2 The Site: Hartlepool	15
3 Policy Context	17
Introduction	17
What are the other Key Sustainability Objectives that need to be considered?	17
4 Site Characterisation	19
Introduction	19
Air Quality	21
Biodiversity and Ecosystems	21
Climate Change	22
Communities: Population, Employment and Viability	23
Communities: Supporting Infrastructure.....	23
Human Health and Well-Being.....	25
Cultural Heritage	27
Landscape	28
Soils, Geology and Land Use.....	28
Water Quality and Resources	29
Flood Risk.....	31
5 Appraisal of Sustainability	32
Introduction	32
Air Quality	33
Biodiversity and Ecosystems	35
Climate Change	37
Communities: Population, Employment and Viability	37
Communities: Supporting infrastructure	39
Human Health and Well-Being.....	40
Cultural Heritage	44
Landscape	45
Soils, Geology and Land Use.....	46
Water Quality and Resources	47
Flood Risk.....	49
Key interactions between Sustainable Development Themes	50
Interactions and Cumulative Effects with other Key Regional Plans, Programmes and Projects.....	50
6 Summary of Appraisal of Sustainability, Key Findings and Possible Mitigation	53
Abbreviations	63

List of Tables

Table 1.1: Sustainable Development Themes and AoS/SEA Objectives	9
Table 1.2: Base Case Assumptions and Variations Considered for Hartlepool.....	13
Table 4.1: Summary of Scope of Baseline Data Collated for Hartlepool	19
Table 5.1: The Assessment of Potential Significance in the Site-Level AoS	33
Table 5.2: Interactions with Other Key Regional Plans, Programmes and Projects .	51
Table 6.1: Summary of the Significance of Potential Strategic Sustainability Effects	54
Table 6.2: Summary of Potential Strategic Significant Effects and Mitigation Possibilities (for Adverse Effects)	56

List of Figures

Figure 1:	Location of the Nominated Site at Hartlepool
Figure 2:	Sub-Regional Context Showing the Nominated Site at Hartlepool, with Strategic Transport Links
Figure 3:	Ordnance Survey Map Showing the Boundary of the Nominated Site
Figure 4-1:	Hartlepool Key Environmental Constraints – International Nature Conservation Interest
Figure 4-2:	Hartlepool Key Environmental Constraints – National Nature Conservation Interest
Figure 4-3:	Hartlepool Key Environmental Constraints – Cultural Heritage
Figure 4-4:	Hartlepool Key Environmental Constraints – Landscape

Appendices to Hartlepool AoS Report

1	AoS/SEA Objectives for Appraisal
2	Appraisal Matrices
3	Plans and Programmes Review (available on website)
4	Baseline Information (available on website)

Summary of Key Findings

This report considers the site at Hartlepool as a possible location for new nuclear power station(s). The purpose of this Appraisal of Sustainability (AoS) Report is to assess environmental and sustainability impacts on the Hartlepool site. This report also identifies the significance of those effects, and suggests possible ways of mitigation. More information on the methodology and background to the assessment please refer to Section 2. The national policy context, which also provides a background to the assessment, is included in Section 3.

The key findings of this assessment are included below (reproduced from Section 6 for ease of reference). These key findings are supported by site characterisation and the appraisal of sustainability, details of which are included in Section 4 and Section 5 of this report. Further details on the key findings and suggested mitigation of the potential effects identified of developing a nuclear power station at Hartlepool are included in Section 6.

Summary of Key Findings

The Appraisal of Sustainability process has included recommendations to inform the development of the Nuclear National Policy Statement. This Site Report for Hartlepool has helped to inform the decision-making for the Strategic Siting Assessment. It has included advice as to the strategic significant effects arising from the construction of a new nuclear power station at Hartlepool, and suggestions for how adverse effects may be mitigated, including proposed mitigation measures which could be considered as part of project level Environmental Impact Assessment.

A number of the strategic effects identified for Hartlepool will be similar across all the nominated sites, including positive effects for employment and well being. However a number of potential strategic effects have been identified that are of particular note for the nominated site at Hartlepool. These are discussed below:

There are potential negative effects on at least seven national and internationally protected conservation sites including Teesmouth and Cleveland Coast SPA/Ramsar, and the Seaton Dunes and Common SSSI; effects on water quality and migratory fish in the region due to the abstraction and release of sea water for cooling; and potential effects on coastal erosion and visual appearance principally as a result of new coastal flood defences that would be required to protect against sea level rise during the lifetime of the nominated site. These effects are potentially significant, but mitigation opportunities could be available following further study at the project level, for example the creation of replacement habitat. However, opportunities for compensation on the Tees may be limited.

The development of a new nuclear power station will have a negative visual impact on the landscape and could potentially be seen from parts of the North York Moors National Park, the Durham Heritage Coast and the North Yorkshire and Cleveland Heritage Coast. This impact could not be fully mitigated, however, the nominated site is adjacent to an existing nuclear power station, in an area that is already heavily

industrialised, and so the additional impact on the landscape would be less significant at a regional level.

There are likely to be positive local effects from employment generated by the development although the regional and national effects are considered to be marginal.

Hartlepool is not close to any other nominated site and therefore does not form part of a cluster. This means that regional cumulative impacts are not considered relevant for this site.

There remains some uncertainty relating to the significance of some effects and the most appropriate mitigation. It is expected that the mitigation measures will be refined iteratively as part of the development of the proposals for the nominated site, and will be assessed further in the project level Environmental Impact Assessment (EIA).

1 Introduction

This Appraisal of Sustainability Report

- 1.1 This report considers the site at Hartlepool as a possible location for new nuclear power station(s). The report sets out the Appraisal of Sustainability (AoS) of the nomination of land alongside the existing nuclear power station at Hartlepool. The nomination of land, as well as supporting information, was put forward by a developer. The AoS, which incorporates the Strategic Environmental Assessment (SEA), is a part of the Strategic Siting Assessment (SSA). The SSA is a process for identifying and assessing sites that could be suitable for new nuclear power stations by the end of 2025.
- 1.2 This report is one of the Appraisals of Sustainability that deal with individual sites. Together, these reports form an Annex to the Main AoS Report,¹ which accompanies the revised draft Nuclear National Policy Statement² (NPS). The Main AoS Report for the revised draft Nuclear NPS sets out the details of the AoS process, its methods, findings, conclusions and a summary of the appraisal of the nominated sites. The main report also includes a non-technical summary.
- 1.3 This AoS has been undertaken at a strategic level and is intended only as a high level assessment of the suitability of the site from an environmental and sustainability perspective. The AoS is part of an assessment process that started in March 2008. The revised draft Nuclear NPS lists sites that have been assessed to be potentially suitable by the Government for new nuclear power stations. Developers will be able to apply for development consent for these sites from the Infrastructure Planning Commission (IPC)³. Each application from the developer for consent to build a new power station will need an Environmental Statement with a detailed Environmental Impact Assessment (EIA). The sites included in the revised draft Nuclear NPS will also be subject to other regulatory and licensing requirements.

The revised draft Nuclear National Policy Statement

- 1.4 The revised draft Nuclear NPS sets out the need for sites that are potentially suitable for the development of new nuclear power stations by 2025. The Government used an SSA to assess the potential suitability of nominated

¹ Main AoS Report <http://www.energynpsconsultation.decc.gov.uk>

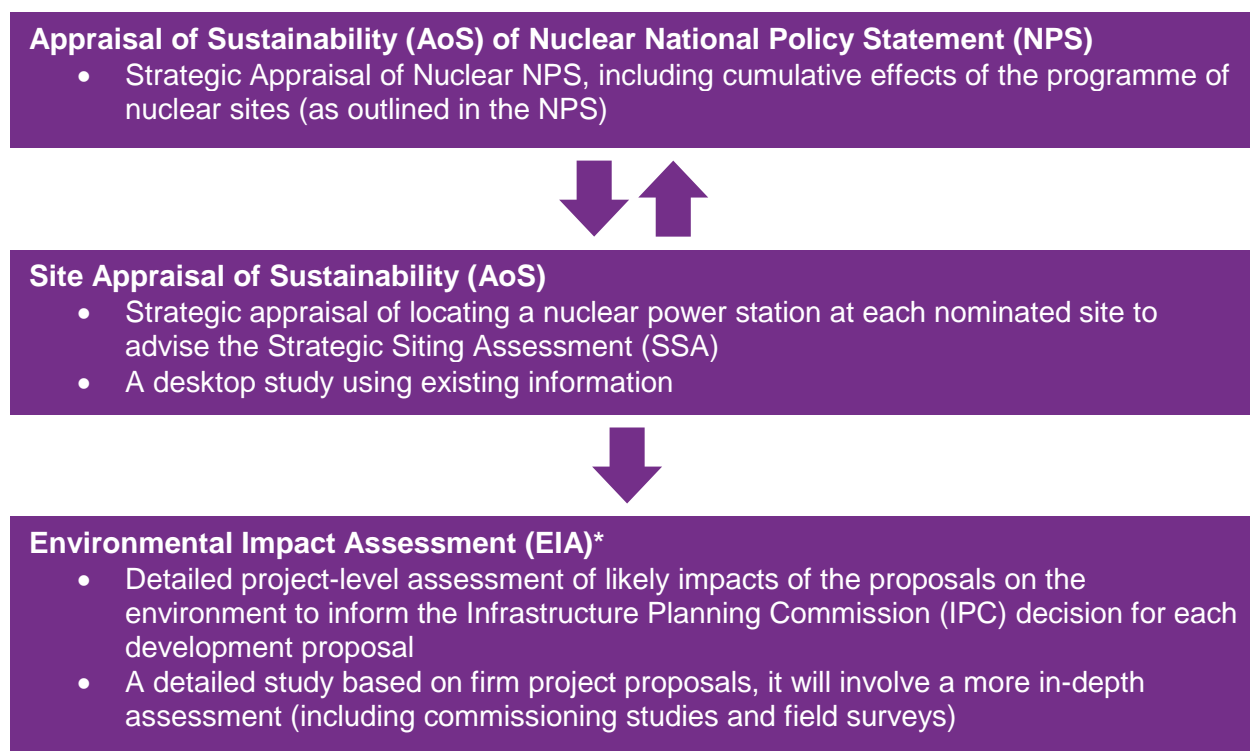
² Revised Draft Nuclear NPS <http://www.energynpsconsultation.decc.gov.uk>

³ The Government announced in June 2010 its intention to amend the Planning Act 2008 and abolish the IPC. In its place, the Government envisages that a Major Infrastructure Planning Unit (MIPU) will be established within the Planning Inspectorate. Once established, the MIPU would hear examinations for development consent and would then make a recommendation to the Secretary of State. It would not itself determine applications and decisions would be taken by the relevant Secretary of State. These proposed reforms require primary legislation. Until such time as the Planning Act 2008 is amended, the IPC will continue as set out in that Act. As a result, the NPSs will provide the framework for decisions by the IPC on applications for development consent for major infrastructure projects, and under the new arrangements will provide the framework for recommendations by the MIPU to the Secretary of State.

sites. This SSA process⁴ drew on the emerging findings of the site AoSs and the Habitats Regulations Assessment (HRA)⁵.

Appraisal of Sustainability incorporating Strategic Environmental Assessment

- 1.5 The Planning Act (2008)⁶ requires an AoS for all National Policy Statements. The purpose of an AoS is to consider the social, economic and environmental implications of the policy and to suggest possibilities for improving the sustainability of the NPS. The AoS incorporates the requirements of the European Strategic Environmental Assessment Directive⁷ which aims to protect the environment and to promote sustainable development during preparation of certain plans and programmes. This is set out in more detail in the Main AoS Report of the revised draft Nuclear NPS.
- 1.6 The purpose of this AoS is to assess environmental and sustainability impacts on the Hartlepool site. This AoS also identifies the significance of those effects, and to suggest possible ways of mitigation. The AoS for Hartlepool site fed into the Strategic Siting Assessment (SSA) and the preparation of the revised draft Nuclear NPS. There would be further detailed studies at the EIA stage of any construction project. The following diagram explains the relationship between the Main AoS Report, the Site AoS Report and an EIA.



⁴ Towards a nuclear national policy statement : Government response to the consultation on the Strategic Siting Assessment process and criteria, January 2009, URN 09/581 <http://www.berr.gov.uk/files/file47136.pdf>

⁵ Hartlepool HRA Report <http://www.energy-nps-consultation.decc.gov.uk>

⁶ Planning Act 2008

⁷ Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, implemented through *The Environmental Assessment of Plans and Programmes Regulations 2004*

*as required by European Directive 85/337/EEC and *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999*

Appraisal of Sustainability Methods

- 1.7 In undertaking the AoS of each nominated site, a wide range of information was considered including, the Scoping Report⁸, the Environmental Study⁹, the Update Report¹⁰, information from other Government departments, the statutory consultees and regulators, information from the nominators and other published reports. If additional local information was available, for example, an EIA scoping report or a locally relevant Strategic Flood Risk Assessment, it has been used to inform the appraisal where appropriate and referenced as footnotes.
- 1.8 The methods used for AoS/SEA are detailed in the main AoS Report. The AoS uses objectives as a means of identifying and appraising the potential significant effects on the environment and communities of building new nuclear power stations. The sustainability objectives that have been agreed for the appraisal of the revised draft Nuclear NPS are detailed in Annex E of the Environmental Study and the main AoS Report. Appendix 1 of this AoS Site Report sets out the guide questions that are used with each sustainability objective to help focus the appraisal in a more systematic way. The sustainability objectives used in the Environmental Study were grouped into themes for sustainable development in order to help focus on the key issues for appraisal. This is set out in the following table:

Table 1.1: Sustainable Development Themes and AoS/SEA Objectives

Sustainable Development Theme	AoS/SEA Objective (Numbers refer to Scoping Report ¹¹ and Environmental Study ¹²)
Air Quality	to avoid adverse impacts on air quality (12)
Biodiversity and Ecosystems	to avoid adverse impacts on the integrity of wildlife sites of international and national importance (1) to avoid adverse impacts on valuable ecological networks and ecosystem functionality (2) to avoid adverse impacts on Priority Habitats and Species including European Protected Species (3)
Climate Change	to minimise greenhouse gas emissions (13)
Communities: population, employment and viability	to create employment opportunities (4) to encourage the development of sustainable communities (5) to avoid adverse impacts on property and land values and avoid planning blight (10)

⁸ BERR (March 2008) Consultation of Strategic Environmental Assessment for proposed National Policy Statement for new nuclear power, URN08/680

⁹ BERR July 2008 Environmental Study

¹⁰ BERR January 2009 Update Report

¹¹ BERR (March 2008) Consultation of Strategic Environmental Assessment for proposed National Policy Statement for new nuclear power, URN08/680

¹² BERR July 2008 Environmental Study

Sustainable Development Theme	AoS/SEA Objective (Numbers refer to Scoping Report ¹¹ and Environmental Study ¹²)
Communities: Supporting Infrastructure	to avoid adverse impacts on the function and efficiency of the strategic transport infrastructure (8) to avoid disruption to basic services and infrastructure (9)
Human Health and Well-Being	to avoid adverse impacts on physical health (6) to avoid adverse impacts on mental health (7) to avoid the loss of access and recreational opportunities, their quality and user convenience (11)
Cultural Heritage	to avoid adverse impacts on the internationally and nationally important features of the historic environment (22) to avoid adverse impacts on the setting and quality of built heritage, archaeology and historic landscapes (23)
Landscape	to avoid adverse impacts on nationally important landscapes (24) to avoid adverse impacts on landscape character, quality and tranquillity, diversity and distinctiveness (25)
Soils, Geology, Land Use	to avoid damage to geological resources (19) to avoid the use of greenfield land and encourage the re-use of brownfield sites (20) to avoid the contamination of soils and adverse impacts on soil functions (21)
Water Quality and Resources	to avoid adverse impacts on surface water hydrology and channel geomorphology (including coastal geomorphology) (15) to avoid adverse impacts on surface water quality (including coastal and marine water quality) and assist achievement of Water Framework Directive objectives (16) to avoid adverse impacts on the supply of water resources (17) to avoid adverse impacts on groundwater quality, distribution and flow and assist achievement of Water Framework Directive objectives (18)
Flood Risk	to avoid increased flood risk (including coastal flood risk) and seek to reduce risks where possible (14)

1.9 The AoS for each of the nominated sites considered the relevant policy context at a regional level, which helped to identify key sustainability objectives that need to be taken into account in the appraisal and potential cumulative effects that could arise as a result of this and other plans and projects. Policy context at the local government level is changing as a result of

the new planning system¹³. However, local planning policy will be required to conform to regional plans and programmes. Existing and emerging local policy documents were considered, where relevant, for the characterisation of baseline conditions and the appraisal of effects. The regional policy context and regional baseline information is set out in Appendices 3 and 4 respectively.

Background to Nuclear Power Stations

- 1.10 This section provides some wider context on nuclear power. Nuclear power works in a similar way to conventional electricity generation, insofar as it depends on the creation of heat to generate steam, which in turn powers a turbine.
- 1.11 This process needs to be carefully managed because of the energy released in the process. The process is controlled by the use of a “moderator”. All reactors have sufficient moderators to shut them down completely and fail-safes to ensure that this occurs in the event of any potential incidents. The early designs of nuclear power stations in the UK used graphite as a moderator. Later designs of nuclear power stations use water as a moderator. It is likely that any new nuclear power stations built in the UK would be water moderated.
- 1.12 The nuclear reactions that take place in nuclear power stations create a high level of radioactivity in the reactor. Radioactivity occurs naturally and is a normal part of our environment, but nuclear power stations create much higher intensities that require careful management while operating and after they have finished generating electricity.
- 1.13 The UK has strict, independent, safety and environment protection regimes for nuclear power. The Nuclear Installations Inspectorate (NII), a division of the Health and Safety Executive (HSE), and the Environment Agency (EA) regulate nuclear power stations in England and Wales. Any new nuclear power station will be subject to safety licensing conditions and will have to comply with the safety and environmental conditions set by the regulators. NII and the EA are currently assessing two new nuclear reactor designs through the Generic Design Assessment (GDA) process.
- 1.14 Generating electricity by nuclear power creates radioactive waste, some of which remains potentially hazardous for thousands of years. The storage and disposal of this waste is an important part of the nuclear fuel cycle and needs careful long-term management. In June 2008 the Government published the White Paper on Managing Radioactive Waste Safely¹⁴. This set the framework for managing higher activity radioactive waste in the long term through geological disposal, coupled with safe and secure interim storage and ongoing research and development. Geological disposal involves isolating

¹³ The Planning and Compulsory Purchase Act 2004 established a new system for plan making, including the replacement of Local Plans and Unitary Development Plans with Local Development Documents.

¹⁴ <http://www.defra.gov.uk/environment/radioactivity/mrws/pdf/white-paper-final.pdf>

radioactive waste deep inside a suitable rock formation, to ensure that no harmful quantities of radioactivity ever reach the surface environment. The White Paper also invites communities to express an interest in opening up without commitment discussions with Government on the possibility of hosting a geological disposal facility at some point in the future.

- 1.15 When a nuclear power station reaches the end of its life, it has to be dismantled (normally referred to as decommissioned). This process also needs careful management. While many parts of the power station are easily decommissioned, some parts will be radioactive because they were exposed to high levels of radiation. In the UK, the Nuclear Decommissioning Authority (NDA) is responsible for the existing nuclear legacy and is decommissioning 20 civil public sector nuclear sites.
- 1.16 Operators of new nuclear power are required to have secure funding arrangements in place to cover the full costs of decommissioning and their full share of waste management and disposal costs.

New Nuclear Power Station Designs

- 1.17 The HSE and EA are undertaking a process of Generic Design Assessment (GDA) of new nuclear reactor designs. GDA allows the assessment of the generic safety, security and environmental implications of new nuclear reactor designs, before an application is made for permission to build a particular design on a particular site.
- 1.18 Given the strategic level of information required for the SSA, and the information available at this early stage, it is not intended to consider the implications of different nuclear power station designs at each nominated site. It is considered that these are better addressed at the planning application stage. Therefore, in order to appraise the sites, the AoS has made a number of assumptions about the generic design characteristics of new nuclear power stations, which is discussed in more detail in the Main AoS Report.
- 1.19 To provide a standardised approach to the appraisal of the nominated sites, the assumptions about generic design characteristics have been summarised into a base-case. The base-case was used to guide the assessment for each site, except in cases where a nominator has provided further detail at variance to the base case. For example, if a nominator is proposing cooling towers instead of abstracting water for cooling, this has been considered in the assessment. The key assumptions used for the site level assessments are outlined in table 1.2, with the variations considered in the Hartlepool AoS provided in the right hand column.

Table 1.2: Base Case Assumptions and Variations Considered for Hartlepool

Base Case	Variations considered in AoS of Hartlepool (as proposed in nomination)
1 nuclear reactor	At least 1 reactor
Technology neutral (i.e. unknown reactor type)	
A requirement for cooling water abstraction	The nominator's preference is for direct cooling with seawater abstraction
Discharges of cooling water	
Site boundary as indicated on nomination form	
<u>Timescales:</u> Construction: approximately 5-6 yrs Operation: approximately 60 years (life extension, which is subject to regulatory approval, could mean that the operating lifetime is longer) Decommissioning: approximately 30 years Lifetime of site: approximately 166 years ¹⁵	
<u>No. of employees:</u> Construction: approx 4,000 (around 50% from within region) Operation: approx 500 Decommissioning: range of 400 – 800 at key phases ¹⁶ Associated employment creation= 2000	
Coastal and flood protection measures (where relevant)	The nominator has indicated that he expects to provide measures such as land raising, flood defence improvements and strengthening of coastal defences to protect the nominated site from flooding.
Infrastructure for transporting reactor (for example, jetty, landing facility)	

¹⁵ The site lifetime of 166 years assumes 6 years for construction, 60 years for operation and 100 years for interim storage of spent fuel after the last defueling. It is possible to envisage a scenario in which onsite interim storage might be required for around 160 years from the start of the power station's operation, to enable an adequate cooling period for fuel discharged following the end of the power station's operation. In making its assessment that onsite interim storage might be needed for 160 years, the Government took a conservative approach, to ensure that local communities are aware that it is possible that onsite interim storage might be required for this length of time. Following the public consultation, the Government has revised its position. The Government recognises that onsite interim storage might be required beyond 2130, particularly in the event that a GDF is not available to take the waste, but the Government does not expect onsite interim storage to be required for as long as 160 years. Further detail is set out in The Government Response to the consultation on the draft National Policy Statements for Energy, DECC, 2010, www.energynpsconsultation.decc.gov.uk.

¹⁶ Estimates for existing nuclear power stations entering the decommissioning phase indicate up to 800 full time equivalent staff for defueling, then a minimal workforce (less than 50) during the care and maintenance phases, and a second peak of up to 600 for the final demolition and site clearance (source: <http://www.nda.gov.uk/sites>)

Base Case	Variations considered in AoS of Hartlepool (as proposed in nomination)
Interim radioactive waste storage facilities will be capable for at least 160 years	
Highway improvements, access routes	
Associated transmission infrastructure	
Other associated infrastructure/plant, where identified by nominator shown in the next column	
Radioactive discharges will be within legal limits	

2 The Site: Hartlepool

- 2.1 The site at Hartlepool is located in the North East Region of England, in a coastal location that has supported nuclear power facilities since 1969, when construction of the facility began. The location of the nominated site is shown in Figure 1, on the north side of the River Tees estuary between the conurbations of Hartlepool, Stockton on Tees, Middlesbrough and Redcar. Figure 2 shows the location of the nominated site at Hartlepool in a sub-regional context to help address any implications for cumulative effects on biodiversity and on socio-economic factors.
- 2.2 The existing Hartlepool Power Station is located to the south of Hartlepool, at the mouth of the River Tees on the north-east coast of England. It is owned and operated by British Energy Generation (part of British Energy Group plc, a wholly owned subsidiary of EDF S.A), and currently employs approximately 700 full-time staff, including contractors. It has two advanced gas-cooled (AGR) type reactors with a net electrical output of 1190 MW and a capability to supply over 1.5 million households. It currently generates approximately 3% of Britain's energy. It was built between 1969 and 1984 and started generating power on 1 August 1983¹⁷. It currently has an estimated decommissioning date of 2014.
- 2.3 The site surrounds the existing Hartlepool nuclear power station and is located at the mouth of the River Tees, on the north bank of Seaton Channel, opposite Seal Sands. The Teesmouth area is predominantly industrial with an established oil and chemicals industry. Teesmouth and Cleveland Coast is designated as a Special Protection Area for birds and a Ramsar¹⁸ wetland site. The protected areas extend along the coast to north and south of the nominated site and part of the site lies within the designated areas. The total area of the nominated site is approximately 140 ha. The nominator expects that the main development will be to the centre or south of the site, with the northern area being used for cooling water infrastructure.
- 2.4 The nomination is for a nuclear power station development incorporating:
- At least one nuclear reactor
 - Improvement of coastal defences and/or land raising to protect the nominated site from flooding
 - construction stage areas and facilities
 - infrastructure and facilities related to the operation of a nuclear power station
 - new access road; transmission and cooling water infrastructure
 - interim waste storage facilities

¹⁷ www.british-energy.com

¹⁸ Ramsar sites are wetlands of international importance designated under the Ramsar Convention, first designated in the UK in 1976. The initial emphasis was on selecting sites of importance to waterbirds within the UK, and consequently many Ramsar sites are also SPAs, however non-bird features have been increasingly taken into account

- 2.5 The site at Hartlepool was nominated into the Strategic Siting Assessment (SSA) process, in respect of which nominations closed on 31 March 2009¹⁹. The Government is also assessing the environmental and sustainability impacts of including the site in the list of potentially suitable sites in the revised draft Nuclear NPS (through this AoS Site Report).
- 2.6 The SSA required the site nominator to supply an annotated Ordnance Survey map at 1:10,000 scale showing the boundary of the nominated site which is provided in Figure 3.

¹⁹ SSA process and criteria

3 Policy Context

Introduction

- 3.1 The main AoS Report sets out the national policy context in relation to nuclear power stations, energy, climate change mitigation, use of natural resources, environmental protection and sustainability of communities. During the scoping²⁰ stage, a review of national plans was undertaken to help identify key sustainability objectives that need to be met and contribute to the development of the AoS Framework of objectives for appraisal.
- 3.2 This section considers the policy context at the regional levels relevant to the potential new nuclear power station at Hartlepool and its surroundings. It aims to identify any key significant policy objectives that need to be considered for this strategic appraisal of the nominated site. This also contributes to addressing the potential interactions and cumulative effects that may arise from development and operation of a new nuclear power station on the nominated site. This is covered in Section 5 of the Site AoS Reports and Section 8 of the Main AoS Report.

What are the other Key Sustainability Objectives that need to be considered?

- 3.3 The relevant policy documents are reviewed in Appendix 3 of this report and are as follows:
- Regional Spatial Strategy for the North East to 2021, Government Office for the North East (July 2008)
 - Regional Economic Strategy for the North East 2006-2016, One North East (2006)
 - Regional Housing Strategy for the North East, Regional Housing Board – Part of North East Assembly (July 2007)
 - Climate Change Action Plan for North East England, North East Assembly (May 2008)
 - Sustainable Communities in the North East, Office of the Deputy Prime Minister (2005)
 - North East Strategy for the Environment, North East Environment Forum (March 2008)
 - Northumbria River Basin Management Plan, Environment Agency (2009)
 - North East Regional Renewable Energy Strategy, North East Assembly (2005)
 - North East Biodiversity Action Plan 1999 - Tees Valley Biodiversity Action Plan, Joint Nature Conservation Committee (1999)
 - Towards a Waste Management Strategy for the North East 2003, North East Assembly (2003), revoked July 2010²¹
 - Hartlepool Local Plan 2006, Hartlepool Borough Council (April 2006)

²⁰ BERR (March 2008) Scoping Report

- Tees Valley Strategic Flood Risk Assessment, Stockton-on-Tees Borough Council (2007)
- Shoreline Management Plan 2, River Tyne to Flamborough Head, North East Coastal Authorities Group (2007)

3.4 The key objectives for sustainability from these regional policy documents can be summarised as follows:

- Protecting and enhancing biodiversity
- Mitigating and adapting to effects of climate change
- Protecting and enhancing landscape, recreation and cultural heritage
- Protecting water quality and resources
- Increasing provision of affordable homes
- Preventing inappropriate development in flood plains
- Reducing the amount of waste produced, increase recycling and make better use of resources
- Ensuring good local air quality for all

3.5 The plans that are still in place may have indirect and/or cumulative interactions and this is discussed further in Section 5: Interactions and Cumulative Effects with Other Plans and Projects.

4 Site Characterisation

Introduction

- 4.1 A general description of the nominated site at Hartlepool and its location is provided in Section 2.
- 4.2 This section describes the general characteristics of the nominated site at Hartlepool and its surrounding area relative to the key sustainability themes identified in section 3. Information regarding the local and regional environment and communities has been obtained and reviewed from publicly available sources and comparisons have been made with equivalent regional and national data sources where relevant and available. This information is summarised in Appendix 4. Key strategic networks for transport are shown in Figure 2 and key environmental constraints in Figure 4.
- 4.3 The Scoping Report identified the national baseline information that would be used to inform the AoS of the revised draft Nuclear NPS. It also set out the types of regional and local baseline information that should be collated to inform each Site AoS following the nomination of sites, but recognised that this process would be refined at the site nomination stage. Therefore, following site nominations, the relevant regional and local baseline data has been sourced. This has enabled a more detailed, but still strategic, assessment to be undertaken. As this AoS is a strategic study, data that would typically be collated to inform an EIA (i.e. very site-specific data or data requiring the execution of surveys) has not been gathered. However, where relevant, information from available published reports of any previous detailed studies has been referenced to inform this strategic assessment. The scope of baseline data gathered for the AoS for Hartlepool is presented in Table 4.1 below.

Table 4.1: Summary of Scope of Baseline Data Collated for Hartlepool

Sustainable Development Theme	Scope of baseline data collated in this AoS
Air Quality	<ul style="list-style-type: none"> • Regional air quality index • Location of Air Quality Management Areas
Biodiversity and Ecosystems	<ul style="list-style-type: none"> • Location and description of Special Protection Areas, Special Areas of Conservation, Ramsar Sites, Sites of Special Scientific Interest, National Nature Reserves, Local Nature Reserves, Local Wildlife Sites, Local Biodiversity Action Plans, Legally Protected Species
Climate Change	<ul style="list-style-type: none"> • Regional precipitation and temperatures; • Greenhouse gas emissions – regional, county and local.

Sustainable Development Theme	Scope of baseline data collated in this AoS
Communities and Supporting Infrastructure: Population Employment Community Viability Transport Waste and Minerals Energy	<ul style="list-style-type: none"> • Location of major settlements and areas of population • Age structure of population • Employment/unemployment and economic activity rates • Employment profile by industry • Socio-economic classification of population • Energy from low-carbon/ renewable resources: regional • Transport networks • Waste management facilities
Human Health and Well-Being	<ul style="list-style-type: none"> • Index of Multiple Deprivation • Age profile • General health • Life expectancy • Infant mortality • Proximity to medical services
Landscape and Cultural Heritage	<ul style="list-style-type: none"> • Location and description of National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts • National landscape Character Areas • Local landscape character areas / types • Location and description of World Heritage Sites, Scheduled Monuments, Historic Battlefields, Historic Parks and Gardens, Designated Protected Wrecks, Conservation Areas, Listed Buildings.
Soils, Geology, Land Use	<ul style="list-style-type: none"> • Agricultural land classification • Soil types • Geological SSSIs • Geological risks • Environmental hazards • Historic land use
Water: Hydrology Quality Resources Flood Risk	<ul style="list-style-type: none"> • Location of areas at risk of flooding • State of surface and ground waters: in river basin district and catchment • Predicted water demand and availability by Water Resource Zone • Designated waters under EU Directives

Air Quality

- 4.4 Air quality in the North East Region of England is generally good. The combined air quality indicator, used to compare the English regions, places the North East as the third best region. This is based on the proportion of Lower Super Output Areas (LSOAs), which are in the worst 20% of all SOAs in England²¹.
- 4.5 There are seven Air Quality Management Areas (AQMAs) in the North East region of England, none of which are in the Hartlepool Borough Council catchment area²².
- 4.6 The average number of days with moderate or higher air pollution has varied annually. Significant peaks were experienced in 2003 and 2006. These can be associated with particularly hot, dry weather conditions experienced across the UK as a whole. At two locations in the region, results greater than the UK average have been observed since 2002. However in recent years the results have fallen to levels quite close to the UK average.
- 4.7 The EA assesses that non-radioactive aerial emissions (sulphur dioxide, nitrogen oxides and volatile organic compounds) from nuclear power stations are extremely low compared to other regulated industries. The EA's most recent available assessment of radioactive aerial emissions for regulated nuclear power stations indicates that all fall within authorised limits.²³
- 4.8 The UK nuclear industry is highly regulated. All nuclear power stations require a licence to operate provided by the HSE/NII. The licence deals with all consents and changes from initial application to decommissioning and beyond.

Biodiversity and Ecosystems

- 4.9 The biodiversity interest around the nominated site at Hartlepool is high and includes a number of internationally and nationally designated sites, which are primarily designated for their valuable coastal habitats and important bird assemblages. The northern part of the nominated site is within the Teesmouth and Cleveland Coast, which is designated as a Special Protection Area (SPA) for birds and a Ramsar²⁴ wetland site. Seven ecological Sites of

21 *State of the Region Report for North East England 2008*; North East Regional Information Partnership. [available online]:

http://www.nerip.com/reports_briefing.aspx?id=564 [accessed 03 March 2009]

22 UK Air Quality Archive (online) available:

<http://www.airquality.co.uk/archive/laqm/laqm.php> [accessed 03 March 2009]

23 *Measuring Environmental Performance: Sector Report for the Nuclear Industry* (Environment Agency, Nov 2005)

24 Ramsar sites are wetlands of international importance designated under the Ramsar Convention, first designated in the UK in 1976. The initial emphasis was on selecting sites of importance to waterbirds within the UK, and consequently many Ramsar sites are also SPAs, however non-bird features have been increasingly taken into account

Special Scientific Interest (SSSIs) form component parts of the SPA and Ramsar site, including Seal Sands SSSI and Seaton Dunes and Common SSSI. The Teesmouth National Nature Reserve (NNR) lies close to the nominated site and supports the only regular breeding colony of common or harbour seals on the north east coast. A new RSPB reserve has recently opened at Saltholme, less than 4km from the nominated site. The Teesmouth and Cleveland Coast SPA supports significant numbers of breeding Little Tern and internationally important populations of migratory species, including Ringed Plover, Sandwich Tern, Red Knot and Common Redshank. Further information on the European designated sites and their current condition is given in the separate HRA Report for Hartlepool.

- 4.10 Other significant designated areas within close proximity of the nominated site include the Northumbria Coast SPA and Ramsar site; and the Durham Coast Special Area of Conservation (SAC). These areas support important coastal and intertidal habitats, and support important bird species, including Little Tern, Turnstone, Common Redshank, Red Knot and Purple Sandpiper.
- 4.11 Of local importance, the nominated site also occupies a Site of Nature Conservation Importance and part of a Local Nature Reserve.
- 4.12 Existing monitoring data with regard to the existing power station and its effects on estuarine and coastal fish populations has shown a decrease in the abundance of species and individuals, although it is recognised that a more robust method of monitoring is required to confirm this decline.

Climate Change

- 4.13 The potential effects of climate change on the nominated site, such as storm surges, coastal erosion, sea level rise and flooding, are explored in the sections on Flood Risk.
- 4.14 In 2000, the Tees Valley's greenhouse gas emissions were around 20.5 million tonnes of CO₂ equivalent from all sectors.
- 4.15 The UK's 2008 Climate Change Act²⁵ sets a legally binding target of at least an 80 percent cut in greenhouse gas emissions by 2050, to be achieved through action in the UK and abroad. The Act also sets a target to reduce emissions by at least 34 percent by 2020. Both targets are against a 1990 baseline.
- 4.16 The Tees Valley Climate Change Strategy has set a target for reducing CO₂ equivalent from 2000 levels for the period 2006-2012 by 8.75% (minimum) and 14% (aspirational). This equates to an average 1.25% annual reduction target for this period²⁶.

²⁵ http://www.decc.gov.uk/en/content/cms/legislation/cc_act_08/cc_act_08.aspx

²⁶ [http://www.redcar-cleveland.gov.uk/main.nsf/538ABBD98045B32E802571B7004C8F96/\\$FILE/TVCCP%20Strategy%20\(designated%20version%202\).pdf](http://www.redcar-cleveland.gov.uk/main.nsf/538ABBD98045B32E802571B7004C8F96/$FILE/TVCCP%20Strategy%20(designated%20version%202).pdf)

- 4.17 Five other power stations with a combined capacity of approximately 2.6 GW are located within 72km of the nominated site (four within 16km). These include a mixture of gas-powered, waste to energy, Combined Cycle Gas Turbine (CCGT) and coal-fired power stations. A Combined Heat and Power (CHP) plant (Thor Cogeneration) with capacity of 1 GW is due to start operation in 2012. This indicates that the region has the potential to accommodate transmission and transport activities without necessarily requiring the construction of additional infrastructure, which would have otherwise contributed to an increase in greenhouse gases. The location of the nominated site also offers opportunities for further development of sea transport for the purposes of construction, fuel transport and decommissioning.

Communities: Population, Employment and Viability

- 4.18 The proposed Hartlepool site is located within the ward of Seaton. Seaton ward has a population of over 6000, with Hartlepool a population of nearly 90,000. The population in the North East of England has decreased over the past 25 years and now totals approximately 2.6 million. According to the Office for National Statistics, the region's population fell between 1981 and 2006 by 3.1%. The region's population is also ageing, although it currently has a large proportion of working age people compared to those at retirement age. The change in the population structure of the region is generally considered to be as a result of both migration and natural change.
- 4.19 The age profile for the area immediately surrounding the nominated site at Hartlepool shows that there are slightly fewer children under sixteen and significantly more senior citizens (males over 65 and females over 60) than the average for England. Therefore, there are fewer people of working age in the area than might be expected.
- 4.20 The North East of England has amongst the lowest levels of employment when compared to other English Regions. It has a rate of 66.2% compared to the UK rate of 70.7%. Regional unemployment rates are above the national average and are significantly higher at the Hartlepool Borough and Tees Valley District level, particularly amongst men. From January 2009 to December 2009, 60.3% of the population of the Hartlepool Borough Council area were employed. This number compares unfavourably with figures for the North East region and England as a whole²⁷.

Communities: Supporting Infrastructure

- 4.21 Transport: Hartlepool is generally well served by transport links. The A19(T) through the west of the borough provides a major north-south trunk road through the region connecting Hartlepool to Durham and Tyne and Wear to the north and the rest of the Tees Valley and North Yorkshire to the south. The A19(T) is connected to the main urban area of Hartlepool via the A689 and A179 principal roads. These roads also provide the major north-south road link for local trips within the town.

²⁷ Official Labour Market Statistics. <https://www.nomisweb.co.uk/reports/lmp/la/2038432076/report.aspx>

- 4.22 Traffic levels and congestion on the A66 east-west corridor are high at certain times of the day. Principal freight routes are the A689 and A179, in addition to the A1053(T) and A174(T). Future growth associated with regeneration is being taken forward in partnership with the Highways Agency
- 4.23 Existing locations already witnessing congestion include the A19 (T) Tees Flyover and adjacent interchange with the A66, the junction of the A19(T) and A174(T), and sections of the A66 around Darlington and through Middlesbrough and Stockton.
- 4.24 The nomination site itself is located within a busy industrial estate with only one major road in and out.
- 4.25 Based on current growth trends, and ongoing modelling work undertaken by the Tees Valley Joint Strategy Unit (VJSU), parts of the network are likely to reach or exceed capacity at certain times of the day by the end of 2011. A Highway Network Management Plan for Hartlepool is being developed and is predicted to have a positive impact on greenhouse gas emissions.
- 4.26 The Durham Coast railway line from Sunderland to Thornaby serves the borough with stations at Hartlepool and Seaton Carew and is operated as part of the Northern Rail Franchise. As well as providing direct regional links to Newcastle, Sunderland, Stockton and Middlesbrough, the line is also used for rail freight.
- 4.27 Hartlepool North Dock was once the UK's fourth busiest port, handling coal exports and timber imports. However, the impact of containerisation and the increased use of nearby deep water and modern facilities of PD Ports²⁸ at Teesport, have reduced shipping at Hartlepool.
- 4.28 Conventional waste²⁹: In the Hartlepool region, waste is managed through the Tees Valley Joint Waste Management Group. An Energy from Waste (EfW) plant is currently operational at Haverton Hill, in the Borough of Stockton-on-Tees. Reprocessing facilities for recyclables currently exist within the Waste Management Group region (paper, glass, metals, wood, plastics and green wastes).
- 4.29 Hartlepool Borough Council currently delivers a proportion of its residual waste stream to the EfW plant at Haverton Hill, and is committed to do so until 2020. Over 50% of the residual waste streams generated in the region are treated at the EfW plant, whilst approximately 22% are sent to landfill.
- 4.30 A number of landfill sites are currently used for the disposal of residual wastes, both within and outside the Waste Management Group region, such as the Cowpen Bewley landfill site situated in Billingham (approximately 17km from the proposed site). One hazardous waste facility (Seaton Meadows) is

²⁸ PD Ports is a UK ports business which owns and operates the Ports of Tees and Hartlepool (Teesport)

²⁹ Conventional waste means waste controlled under Part II of the Environment Act 1990

currently operational within the region, situated approximately 8km from the proposed site.

Human Health and Well-Being

- 4.31 The nominated site is within the Super Output Area (SOA) known as Hartlepool 001D³⁰. Indices of deprivation show that is a deprived area although several of the individual indices of deprivation are less than the English average (i.e., income, living environment and education deprivation, barriers to housing and services and crime levels). The age profile for this SOA shows that there are slightly fewer children under sixteen but significantly more senior citizens (males over 65 and females over 60) than the English average. The profile also shows that there are slightly fewer working age people in the area than average.
- 4.32 The most recent census (2001) found that people within the Hartlepool SOA generally reported good or fairly good health although the number reporting poor health was higher than the English average. Overall, health statistics show a mixed picture within the area as life expectancy for males and females is below the English average but infant mortality is also below the regional and national averages.
- 4.33 With regard to mental health, the Health Profile 2008³¹ for Hartlepool shows that estimates of the number of people claiming incapacity benefit for mental illness in the area (49.0 per 1000 population) is considerably higher than the English average (27.5 per 1000 population).
- 4.34 Pupils in the Hartlepool 001D area perform better in their GCSE equivalent examinations than their peers in the rest of England.
- 4.35 Housing stock within Hartlepool Borough Council's area is generally good with a much smaller percentage of unfit housing³² than the region or country average.
- 4.36 Contrary to the crime index of deprivation referred to above, figures from the Audit Commission for 2005³³ suggest that the level of certain crimes in the area is significantly higher than the English average.
- 4.37 The economic well-being of the area is slightly negative as can be seen from the local employment figures³⁴ (see 'Communities: Population, Employment and Viability' above – noted here as a measure of economic well-being). From July 2007 to June 2008, 67.5% of the population of the Hartlepool Borough Council area were employed. This number compares unfavourably with

³⁰ An SOA is a geographical unit, of roughly equivalent population size and smaller than a district council area, created in the UK by the Office of National Statistics to aid statistical analysis of data

³¹ <http://www.apho.org.uk/resource/view.aspx?RID=50213>

³² Dwellings not suitable for occupation as defined by various criteria in Section 604 of the Housing Act 1985 (as amended)

³³ [http://www.areaprofiles.audit-commission.gov.uk/\(rkqonp45u4sp1o55bc5scf55\)/SingleAreaSearch.aspx](http://www.areaprofiles.audit-commission.gov.uk/(rkqonp45u4sp1o55bc5scf55)/SingleAreaSearch.aspx)

³⁴ <https://www.nomisweb.co.uk/reports/lmp/la/2038431858/report.aspx?pc=IP164UR>

figures for the East of England region (70.8%) and England as a whole (74.5%).

- 4.38 Local access to medical services is good with three general practitioner (GP) practices within 5km of the nominated site. There are also approximately sixty GP practices within 10km of the nominated site and a local hospital, though without an accident and emergency department, at Sandwell Park (6.8km). The nearest accident and emergency department is at the University Hospital in Holdforth Road, Hartlepool (8.0km), whilst the nearest mental health hospital is the Sandwell Park hospital referred to above.
- 4.39 One of the wider determinants of health and well-being is access to local recreational facilities. In this regard, the nominated site is well served, with at least nineteen leisure centres within 20km of the nominated site. In addition, the countryside and coastal areas around Hartlepool offers good potential for outdoor recreational activities, such as walking, cycling, sailing and water sports as the area includes a number of local nature reserves and the 'Blue Flag' beach at Seaton Carew.
- 4.40 The existing nuclear power station at Hartlepool has been in operation since 1983. Therefore, the necessary data exist to enable a comparative study between the incidence of cancer reported around this nominated site and the average incidence of cancer in the UK population as a whole.
- 4.41 The Committee on Medical Aspects of Radiation in the Environment (COMARE), a scientific advisory committee providing independent authoritative expert advice on all aspects of health risk to humans exposed to natural and man-made radiation, has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites starting with the Sellafield site in 1986.
- 4.42 COMARE has published a series of reports on topics related to exposure to radiation. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.
- 4.43 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear sites. The results for the power generating stations supported the conclusion that *'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'*.
- 4.44 In its eleventh report COMARE examined the general pattern of childhood leukaemia in Great Britain and concluded that many types of childhood cancers 'have been shown not to occur in a random fashion'. It is also stated that *'The results of analyses ... suggest that there is no general clustering around nuclear installations.'*
- 4.45 Following the KiKK study on childhood leukaemia around German nuclear power plants, COMARE requested that a reanalysis of the UK childhood

cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as possible. This reanalysis - the Bithell paper - was published in December 2008. It showed that the conclusions of the COMARE tenth report remained valid when applying the KiKK methodology and did not support the findings of the KiKK study.

- 4.46 The KiKK study gave the results on childhood cancer in the vicinity of 16 German nuclear power plants from a dataset established by the German Childhood Cancer Registry, which included over 1500 childhood cancer cases from 1980 to 2003. In comparison, the dataset used for COMARE's tenth report and the subsequent Bithell paper contained over 32,000 cases of childhood cancer from 1969 to 1993. This is a verified national database and is believed to be the largest national database on childhood cancer in the world. The size of the database used by COMARE therefore gives considerable confidence in the results of the tenth report.
- 4.47 COMARE is currently undertaking a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. This will be published as COMARE's 14th report later this year.
- 4.48 Radioactive monitoring carried out in 2008³⁵ found generally low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples taken around the existing Hartlepool nuclear power station. From this sampling, the estimated total dosage levels to the public from all sources within the Hartlepool area were assessed as being less than 3% of the dose limit for members of the public of 1mSv per year as specified in The Ionising Radiations Regulations 1999.

Cultural Heritage

- 4.49 There is one scheduled monument, Claxton Medieval Moated Site, and 54 listed buildings within 5km of the nominated site, although none within or immediately adjacent to it. There are three Conservation Areas within 5km of the existing nuclear power stations, the nearest being Seaton Carew, which is approximately 1.9km to the north.
- 4.50 There is a protected wreck site, Seaton Carew, approximately 2.5km to the north of the nominated site.
- 4.51 An area of undesignated historic landscape is located close to the boundary of the existing power station facility and archaeological in the form of 20th century military buildings are known close by. Layers of palaeo-environmental potential may also be present.

³⁵ Food Standards Agency (2008). Radioactivity In Food and the Environment (RIFE 14) report.

Landscape

- 4.52 The site is located approximately 20km to the north of the North York Moors National Park (NP); 16km south of the Durham Heritage Coast and 18km northwest of the North Yorkshire and Cleveland Heritage Coast.
- 4.53 The site is situated within the Tees Lowlands National Character Area (NCA 23) on the north side of the river Tees estuary between the conurbations of Hartlepool, Stockton on Tees, Middlesbrough and Redcar. This landscape is characterised by the broad low lying plain of gently undulating, predominantly arable farmland with wide views to distant hills with the meandering river Tees flowing through the heart of this industrial area. Extensive urban and industrial development is concentrated along the lower reaches of the Tees, the estuary and coast. Large-scale chemical and oil refining works, dock facilities and other heavy plants along the Tees estuary form a distinctive skyline by day and night. Overhead transmission lines and pylons, motorway corridors, railway lines and other infrastructure elements are widespread features. Extensive areas of mud flats, saltmarsh wetlands and dunes at the mouth of the river Tees support valuable wildlife habitats.
- 4.54 The site is also situated within the Hartlepool Landscape Assessment (2000) area that identifies detailed Landscape Character Types (LCTs) which would need to be considered at project level EIA stage.

Soils, Geology and Land Use

- 4.55 The nominated site is located on non-agricultural land. The soils are noted to be Made Ground over Tidal Flat Deposits. The local Geology is Sherwood Sandstone Group and Mercia Mudstone Group.
- 4.56 A number of potential geological risks have been identified associated with the Tidal Flat Deposits. These potential risks relate to: Compressible Ground Stability Hazards, Landslide Ground Stability Hazards, Running Sand Ground Stability Hazards, and Shrinking or Swelling Clay Ground Stability Hazards.
- 4.57 In addition to the existing power station, there are a number of historic industrial land uses within the vicinity of the nominated site which may have given rise to historical contamination. These include chemical production and shipyards. Part of the site near to the chemical works is currently being investigated and may be designated under Part IIA of the Contaminated Land Regime.
- 4.58 There are two closed landfills located at the nominated site regulated under the Waste Management Licensing Regulations (now Environmental Permitting Regulations). The landfill site located to the immediate northeast of the existing power station occupied the central part of the nominated site. This landfill ceased operation in 1985. The Leathers Chemical landfill site, which ceased operation in 1990, occupied the eastern section of the nominated site. Two additional historical landfills have also been identified to the west and northwest of the nominated site. Prior to 1977, the existing power station adjacent to the nominated site operated an incinerator which was a

Registered Waste Treatment site. A lagoon for the storage of contaminated water and calcium fluoride slurry was also present on the nominated site until 1979. The lagoon was a Registered Waste Treatment site. Further information regarding the identified landfill sites, including extent, nature and quantities of waste, will be obtained and assessed as part of a site specific EIA.

- 4.59 One mineral abstraction site is present locally; Seaton-On-Tees Channel is an opencast sand extraction at approximately 600m to the east of the nominated site for abstraction of beach sand and gravel.
- 4.60 British Geological Survey (BGS) has assessed geological risks in the local area, which include:
- Potential for Shrinking or Swelling Clay Ground Stability Hazard – very low risk
 - Potential for Landslide Ground Stability Hazards - very low risk
 - Potential for Running Sand Ground Stability Hazards – very low to moderate risk
 - Potential for Compressible Ground Stability Hazards – very low to moderate risk

Water Quality and Resources

- 4.61 The site at Hartlepool is located in the Northumbria River Basin District (RBD). Within this RBD, only 27% of rivers (by length) meet the requirements for good ecological status (GES) or good ecological potential (GEP).
- 4.62 89% of groundwater bodies in the RBD meet the requirements for good status, while 50% of estuaries and transitional and coastal waters meet the requirements for GES or GEP. However, the main estuaries in the RBD (i.e. the Tyne, Wear and Tees) all fail to achieve GEP mainly due to morphological conditions. The European Water Framework Directive sets a target of achieving good ecological and chemical status for all water bodies by 2015, therefore significant improvements in water quality in the RBD are required.
- 4.63 The site at Hartlepool is located within the Tees catchment of the Northumbria RBD on the Tees Estuary. Both the estuary and the coast candidate are Highly Modified Water Bodies (cHMWB).
- 4.64 There are no Shellfish Waters in close proximity to the site. The nearest identified Bathing Waters are at Seaton Carew North, Seaton Carew Centre and Seaton Carew North Gare. There are more Bathing Waters further to the east at Redcar. There are also Eutrophic Waters at Seal Sands on the Tees Estuary.
- 4.65 There are nine groundwater bodies within the RBD. The Magnesian Limestone groundwater body is the sole water source for the Hartlepool area, and has issues with respect to both quality and quantity. Particular issues are nitrates, groundwater pollution and potential abstraction pressures. However, the nominated site is located on a separate aquifer; the Sherwood Sandstone

Major Aquifer. This aquifer is classified at 'good' status for both quantity and quality.

- 4.66 There is no groundwater source protection zone located in close vicinity to the nominated site.
- 4.67 There are a number of water related SAC's, SPA's and SSSI's within or in close proximity to the site. The site itself is within the Teesmouth and Cleveland Coast SPA and Ramsar, with the Seaton Dunes and Common and Cowpen Marsh SSSIs nearby. It is also within close proximity to the Tees and Hartlepool Foreshore and Wetlands SSSI.
- 4.68 The nominated site is located within the Tees Catchment Management Abstraction Strategy (CAMS) area. The site is located just outside the eastern boundary of the Sherwood Sandstone Water Resource Management Unit (WRMU). The current resource availability status within this WRMU is classified as water available but with a target status in 2014 and 2020 as no water available.
- 4.69 There are a number of water related Special Areas of Conservation, Special Protection Areas or Sites of Special Scientific Interest in close proximity to the site. The nominated site itself is surrounded on three sides by the Teesmouth and Cleveland Coast SPA and Ramsar, with the Seaton Dunes & Common and Cowpen Marsh SSSIs nearby. Also within close proximity to the site is the Tees and Hartlepool Foreshore and Wetlands SSSI.
- 4.70 Water supply for Hartlepool is provided from the Magnesian Limestone Groundwater Management Unit (GWMU), which is located within the Wear CAMS area. The current resource availability status within this GWMU is classed as water available but with a target status for 2012 and 2018 of moving to no water available.
- 4.71 There are a number water related Special Areas of Conservation, Special Protection Areas or Sites of Special Scientific Interest within the Magnesian Limestone Groundwater Unit. These include Hell Kettles and Durham Coast SSSIs, the Castle Eden Dene and Durham Coast SPAs, as well as the Northumbria and Durham Coast SAC and Ramsar sites.
- 4.72 The nominated site is located with Anglian Water's supply area and in the Hartlepool Water Resource Zone (WRZ). Projections in Anglian Water's draft Water Resource Management Plan indicate that the Hartlepool WRZ will have a surplus of water available over the whole of the planning period to 2035.
- 4.73 The exact water requirements for the nominated site are not yet finalised. The existing nuclear power station operating at Hartlepool uses direct water cooling that involves abstracting sea water to cool the steam turbines and returning the water to the sea at a higher temperature. The nomination expresses a preference for employing similar direct water cooling technology with seawater abstraction for any new nuclear power station on the site.

- 4.74 The north east of England is subject to high energy wave conditions, dominated by north and north easterly winds. Alongshore transport of sediment (littoral or longshore drift) is achieved by waves and the currents they induce within the breaker zone. The direction is determined largely by the angle of wave approach, i.e. it is related to the dominant fetch and thus the general direction of transport is towards the south on the east coast of England.
- 4.75 Although exposure to waves is high and hence potential rates of sediment transport are high, the actual rates are likely to be low due to partial trapping of the sediments within the bays along the coast. It is suggested that very little beach sediment moves south out of Hartlepool Bay and Tees Bay and in fact these act as sediment traps.

Flood Risk

- 4.76 The site is located in Flood Zone 3 'High Probability', meaning it is at risk from coastal flooding with an annual probability of flooding of >0.5% in any one year.
- 4.77 The site of the present nuclear power station is protected against erosion and flooding by a seawall believed to have been built in the 1860s. The Seaton Sands dune ridges protect the site from flooding across the low-lying land to the north east.

5 Appraisal of Sustainability

Introduction

- 5.1 This section considers the potential sustainability effects of including the nominated site at Hartlepool in the list of suitable/potentially suitable sites in the revised draft Nuclear NPS. Whilst the Main AoS Report considers the sustainability effects that may arise from the construction of nuclear power stations in general, the site-level appraisal of sustainability looks specifically at the sustainability effects that could occur from constructing a new power station at Hartlepool, should the nominated site be listed as potentially suitable in the revised draft Nuclear NPS and should an application for development consent be successful.
- 5.2 In accordance with the strategic nature and intent of the AoS, this section focuses on potential effects that are considered to be strategically significant at the Hartlepool site and, where possible, suggests possibilities for mitigation. Where mitigation is uncertain or difficult, or where effects are likely to remain even after mitigation, this is made clear. Strategic significance is defined in Table 5.1.
- 5.3 The findings of the appraisal were used to help the SSA process to identify those sites that are potentially suitable for new nuclear power stations and will be listed in the revised draft Nuclear NPS. The detailed matrices are presented in Appendix 2 of this report and the key findings of the appraisal are discussed in Sections 5 and 6 of this report.

Table 5.1: The Assessment of Potential Significance in the Site-Level AoS

Local Effects
<p>The AoS Site Reports identify potentially significant benefits and disbenefits of locating a new nuclear power station at each of the nominated sites. Some of the effects identified are significant at the local level and are more appropriately addressed through the development consent process to the IPC. Applications for development consent will include EIA, undertaken by the developer. Such locally effects may include, for example, an adverse effect on a County Wildlife Site or disturbances to local communities arising from increased construction traffic during the construction phase. Effects of local significance are discussed in the detailed appraisal matrices set out in Appendix 2 of this AoS Report and are available to inform the IPC and others of issues that are likely to arise at the next stage of the planning and assessment processes.</p> <p>As with any major infrastructure project, there are likely to be effects during construction that have the potential for nuisance³⁶ and disturbance to local communities, demands on local services and supporting community infrastructure, and the risk of pollution and/or damage to environmental assets, such as biodiversity and water. The significance of such effects will be investigated at project level through the Environmental Impact Assessment process. These effects can often be minimised and controlled through careful design, working in accordance with good site practices, and managed through the use of Construction Environmental Management Plans, which will be agreed with, and monitored by, the environmental regulators and planning authorities.</p>
Strategic Significant Effects
<p>Other identified adverse or beneficial effects are more significant strategically as they have the potential to affect a matter of wider regional, national or even international importance. These may include, for example, an effect on biodiversity of national and international value (see also the site level HRA Reports). Where an effect is considered to have significant implications for the wider region for example, a benefit for the regional economy, this has been considered as a strategic significant effect. Effects which are better assessed at local or district level when more detailed site specific information is available have not been considered in this category. The significance of the potential strategic effects identified for each stage of the project (construction, operation and decommissioning) is summarised in Table 6.2.</p>

Air Quality

- 5.4 The construction of a nuclear power station on the nominated site is likely to have localised short-term adverse effects on air quality as a result of emissions from construction plant and traffic, particularly given the single suitable access road to the nominated site. However this can be appropriately

³⁶ During the construction, operation and decommissioning of energy infrastructure there is potential for the release of a range of emissions such as odour, dust, steam, smoke, artificial light and for infestation of insects. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990. For statutory nuisance effects section 4.21 of EN-1 applies.

mitigated through the development process (engineered mitigation measures, environmental permitting and control regimes) and is not considered to have a strategically significant effect. There are however potential effects on biodiversity, including European-designated wildlife sites, which is discussed in the Biodiversity and Ecosystems sections in this report.

- 5.5 Compared to other forms of thermal power generation, nuclear power plants do not emit significant quantities of carbon dioxide, sulphur dioxide nitrogen oxides or particulates. Therefore, significant air pollution leading to deterioration in local or regional air quality is unlikely to arise during normal operation of a nuclear power station. Construction and decommissioning impacts are potentially more problematic and will require control and management.
- 5.6 The construction of a nuclear power station on the nominated site is likely to have some localised adverse effects on air quality in the short term (5-6 years), including dust and emissions from construction vehicles, HGVs, and traffic movements generated by the construction workforce. This has the potential to affect residential properties along local access/haul routes in the immediate surrounding area. Similar local impacts may arise during the decommissioning phase of the project, at the end of the plant's operational life.
- 5.7 During operation, the traffic generated by the operational workforce has the potential to create longer-term adverse effects on air quality. Traffic and air quality assessments will be undertaken as part of the detailed EIA process, and likely mitigations may include highway improvements, traffic and construction management plans and the use of rail and port facilities where possible.
- 5.8 Whilst important at a local level, impacts on air quality arising from construction and increased traffic movements during operation and decommissioning are not considered to be of strategic significance. 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. This is discussed further in the Biodiversity and Ecosystems Section.
- 5.9 Radioactive releases to air, which could have a detrimental effect on local and regional air quality (in the event of a significant release), are strictly controlled in accordance with limits laid down in permits issued under the Environmental Permitting (England and Wales) Regulations 2010³⁷ and subject to monitoring and reporting. Further consideration of the control of radioactive discharges to air is given in Section 7 of the Main AoS Report.
- 5.10 There is a very low risk of an accidental release of radioactive emissions from the nominated site at Hartlepool, which could have a significant strategic effect on air quality. The HSE/NII and the EA will consider this matter during their risk assessments, which will be carried out as part of the consenting

³⁷ The Radioactive Substances Act 1993 still applies in Scotland and Northern Ireland

process to ensure that risks to public health and safety through accidental release of emissions is within acceptable limits. Whilst the risk is very low, the potential for a significant urban and rural population to be adversely affected means that, at this stage of assessment, the potential for strategic adverse sustainability effects has been identified.

- 5.11 In terms of non-radioactive emissions, relative to some other forms of power generation, nuclear power plants do not emit significant quantities of carbon dioxide, sulphur dioxide, nitrogen oxides or particulates recognised as key greenhouse gases and air quality pollutants. Given the existing air quality within the area, and the likely emissions from the nominated site, it is not anticipated that new emissions would lead to a significant deterioration of air quality in the local or wider environment. In addition, an assessment of effects of the nominated site on national and local air quality standards will be undertaken at project level EIA stage.
- 5.12 **Strategic effects on air quality:** The AoS has identified the potential for a significant strategic negative impact on air quality from accidental releases of radioactive material. However, before granting a site licence, the HSE/NII will need to be satisfied that the risks associated with accidental releases of radioactive material to the atmosphere are as low as reasonably practicable and within the relevant radiological risk limits.

Biodiversity and Ecosystems

- 5.13 Throughout the construction, operation and decommissioning phases of a nuclear power station, the potential exists for the accidental release of pollutants into the environment, which could have significant impacts on biodiversity. However, the risks of accidental releases would be minimised by the existing risk assessment and regulatory processes that are referred to in the sections on Air Quality and Water. Construction activities, such as earthworks, new buildings and infrastructure could lead to direct habitat loss, increased noise, light and visual disturbance and impacts on air and water quality and quantity, which, in turn, could affect sensitive ecosystems. During operation, cooling and discharge of heated water and routine discharge of radioactive material could affect aquatic habitats and species, with noise and lighting impacts causing disturbance.
- 5.14 Of greatest concern are activities which might lead to detrimental effects on coastal, estuarine habitats associated with the Teesmouth and Cleveland Coast SPA/Ramsar and Northumbria Coast SPA/Ramsar sites and the species utilising these habitats, such as breeding Little Tern and internationally important migratory species, including Ringed Plover, Sandwich Tern, Red Knot and Common Redshank. Indirect impacts may also occur at a number of other SSSIs within close proximity to the nominated site, including Seal Sands SSSI, Seaton Dunes and Common SSSI, Cowpen Marsh SSSI, and South Gare and Coatham SSSI. Indirect impacts may also occur at Teesmouth National Nature Reserve (NNR), which supports the only regular breeding colony of common or harbour seals on the north east coast.

- 5.15 The land at the northern end of the site is included within the Teesmouth and Cleveland SPA/Ramsar Site and the Seaton Dunes and Commons SSSI. This land is likely to support the cooling structure and pipework which may lead to direct loss and fragmentation of habitat as well as exacerbating coastal squeeze.
- 5.16 Biodiversity could also be impacted at the local level if important habitats/species (for example UK Biodiversity Action Plan habitats/species or legally protected species) are present within or in close proximity to the nominated site.
- 5.17 Discharge of heated water and cooling water abstraction processes can lead to negative impacts on aquatic ecosystems, such as mortality of fish and invertebrates and alteration of habitats. Of particular concern would be any impacts to habitats and associated species within the Teesmouth and Cleveland Coast SPA and Ramsar complex. In particular, long term monitoring will need to address the potential impacts on estuarine and coastal fish populations. In addition, any groundwater extraction (although this is unlikely to be permitted by the EA due to the risk of saline intrusion) may affect groundwater supply to other valuable habitats within the area, which may be sensitive to hydrological changes. Further hydrological studies may be necessary to assess fully the effects on ecology of the discharge of heated water and cooling water abstraction, as well as groundwater abstraction (if required/permitted).
- 5.18 Any alterations to the current drainage system on the nominated site, such as new drainage infrastructure, could result in adverse impacts, for example terrestrial habitat loss (through construction of new drains) or increased runoff and sediment loading to watercourses/estuarine systems. The latter could impact upon aquatic ecosystems, altering composition of habitats and affecting hydrology and morphology. Of particular concern would be any changes to drainage that might affect the Teesmouth and Cleveland Coast SPA/Ramsar/SSSI Sites.
- 5.19 Further surveys may need to be undertaken on the Hartlepool site to determine a baseline for prediction of effects on habitats and species so that appropriate mitigation measures can be implemented. Mitigation measures should, in the first instance, seek to avoid and minimise loss of habitat and avoid disturbance of legally protected species. There may also be scope for compensation of biodiversity effects, including the creation of replacement habitats although the scope for compensation with regard to the Tees estuary is limited. Mitigation measures could be implemented through an ecological mitigation and management plan or similar process.
- 5.20 A separate report, documenting the Habitats Regulation Assessment (HRA) for Hartlepool³⁸ has been undertaken. This report should be referred to for further information relating to the effects of a new nuclear power station at Hartlepool on European-designated habitat sites.

³⁸ Habitat Regulations Assessment Hartlepool: HRA Screening and Appropriate Assessment Report

- 5.21 **Strategic Effects on Biodiversity and Ecosystems:** The potential for adverse effects on sites and species considered to be of UK-wide and European nature conservation importance (the Teesmouth and Cleveland Coast SPA/Ramsar site, the Seal Sands and the Seaton Dunes and Common SSSI, Coatham Sands SSSI, Cowpen Marsh SSSI and the Teesmouth NNR sites) means that significant strategic effects on the biodiversity cannot be ruled out at this stage of the appraisal. There is, however, potential for the mitigation or compensation of biodiversity effects, including the creation of replacement habitat for UK designated sites³⁹, although the scope for compensation with regard to the Tees estuary is limited. Detailed baseline studies will form part of the project level Environmental Impact Assessment. The Habitats Regulations Assessment for Hartlepool should be referred to for further details and advice for internationally designated sites.

Climate Change

- 5.22 The establishment of a new nuclear power station will contribute positively to climate change objectives at a local and national level. Short term increases in greenhouse gases during the construction and decommissioning phases of a new nuclear power station will be outweighed by the savings in overall emissions during the lifetime of the facility compared to fossil-fuel powered stations of equivalent output.
- 5.23 A new nuclear power station at the site could result in emissions from the transport of goods and labour throughout the construction, operation and decommissioning phases. However, the specific features of the site include extensive sea, rail and road transport infrastructure originating from the Hartlepool area's industrial and urban background, which, if employed, could avoid the increase in emissions.
- 5.24 Complementary carbon emissions mitigation measures should include sustainable design and construction, sustainable and low carbon technologies and transport, and potential increased investment in public transport and renewable energy services infrastructure.
- 5.25 **Strategic Effects on Climate Change:** A new nuclear power station on the nominated site would have positive long-term effects on climate change during the operational stage compared to conventional sources of energy, contributing positively to local and national climate change objectives.

Communities: Population, Employment and Viability

- 5.26 Whilst likely to bring significant benefits in terms of employment for local communities, there is some potential for short-term negative effects (influx of

³⁹ For European Sites, compensation measures, such as creation of replacement habitat, may only be considered if it has been established that there are no alternative solutions and the plan or project is necessary for imperative reasons of overriding public interest

construction workers). On a strategic regional level, impacts are considered to be slightly positive. However, some uncertainty has been identified, as the project may lead to a shortage of local construction workers to meet the needs of other industries and major projects within the region.

- 5.27 There is some potential for short-term negative effects on local communities due to the likely significant in-migration of workers to the area during construction. This could have consequent pressures on basic services, housing, crime and policing, and local traffic routes. However, these effects could be mitigated by the developer's plans to accommodate and provide support services for construction workers.
- 5.28 Job losses from closure of the existing power station adjacent to the nominated site are likely to be offset by labour demands from construction and operation of a new nuclear power station. However, the time lag between job losses and job creation and possible differences in skill requirements may require workers to seek temporary employment elsewhere.
- 5.29 Increased labour demand within the region could lead to improved provision of education and training for the local population. Upskilling of employees and contractors associated with the new nuclear power station would also be beneficial to the region as a whole.
- 5.30 Measures to maximise local benefits to the community could include the provision of training in relevant skills, enabling a higher proportion of construction and operational workforces to be locally based, and utilising local suppliers and contractors.
- 5.31 It is commonly perceived that proximity to a nuclear facility such as a power station would have an adverse effect on property values. However, the evidence for this is inconclusive and contradictory. A study of effects in America⁴⁰ found that property values were actually increased in the vicinity of nuclear facilities, although the authors caution that this finding is subject to several caveats including being based on a small sample and may be unrepresentative. It is suggested that in relatively poor areas, or where the local economy is depressed, the income generated by employment at a new nuclear facility may have a positive effect on local property values. For the present appraisal, any effect on property values is not considered to be strategically significant because it is limited to the local area.
- 5.32 **Strategic Effects on Communities: Population, Employment and Viability: There are likely to be positive local effects from employment generated by the development although the regional and national effects are considered to be marginal. Potential negative effects arising from shortages of construction workers are also considered to be marginal at the regional and national level.**

⁴⁰ Bezdek, R.H. and Wendling, R.M. (2006) 'The impacts of nuclear facilities on property values and other factors in the surrounding communities', Int. J. Nuclear Governance, Economy and Ecology, Vol. 1, No. 1, pp.122-144

Communities: Supporting infrastructure

- 5.33 Transport: There are no strategic transport links in the Hartlepool Transport Plan that would alleviate the additional local traffic burden. Traffic is particularly problematic on a number of local roads where capacity is being reached at peak times and in the Seaton Carew area, which is being tailored to attract increased local tourism. The limited access to the nominated site itself, within a busy industrial area, may cause particularly problems during the construction and decommissioning phases of the development, in terms of HGV movements, and also with the movement of any nuclear material on and off site during the operational phase. However, the effect of a nuclear power station can be mitigated by the production of a green travel plan, which encourages use of public transport, cycling and walking, the protection and enhancements to the green infrastructure network in the area, and consideration of alternatives to the transport of large loads, for example by transferring large freight to sea and rail.
- 5.34 Conventional waste: Waste material will be generated during the construction, operation and decommissioning of a development. Local impacts may be expected upon regional facilities however the scale of operation is not considered to be significant in the long/medium term. Waste management facilities will be available to deal with construction projects for the foreseeable future and waste/recycling sites should not be detrimentally impacted. Good site practices and the site-specific EIA should look to further mitigate these risks and many impacts may be positive, such as the generation of significant quantities of secondary aggregate during demolition.
- 5.35 Radioactive waste⁴¹: The operation of a new nuclear power station at the site would require the interim storage of spent fuel and intermediate level waste on site for a period of up to 100 years after operation has ceased. Nominators were asked that when nominating a site for the SSA, they make provision within the area of land nominated for the safe and secure storage of all the spent fuel and intermediate level waste produced through operation and decommissioning until it can be sent for disposal in a geological disposal facility. The detailed design and location of the storage facility within the nominated site boundary will be determined at the project level, within the design submitted by the developer. The generic process for dealing with all types of radioactive and hazardous waste arising from the operation and decommissioning of new nuclear power stations, (including gaseous and liquid radioactive discharges), are appraised in Chapter 7 of the Main AoS Report.
- 5.36 Electricity transmission: The development of a nuclear power station at Hartlepool 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).

⁴¹ Radioactive waste is waste regulated under Environmental Permitting (England and Wales) Regulations 2010. The Radioactive Substances Act 1993 still applies in Scotland and Northern Ireland.

- 5.37 **Strategic Effects on Communities: Supporting Infrastructure:** There may be some adverse impacts locally from additional traffic generated during construction. However, these effects can be mitigated through measures such as green travel plans and by consideration of transport alternatives, for example by transferring large freight from road to sea and rail transport. Locally adverse impacts may be expected upon waste facilities from non-radioactive waste produced at the site, but the scale of this activity is not considered to be significant in the long/medium term.

Human Health and Well-Being

Radiological Health Issues

- 5.38 Radiation occurs naturally in the environment. The Health Protection Agency (HPA) which regularly reviews the radiation exposure of the UK population, has calculated that the overall average annual dose to a member of the general public from all sources of radioactivity is 2.7 millisieverts (mSv, a measure of dose) per year, about 84% of which is from natural sources and about 15% is from medical procedures. The HPA calculates that the average dose to a member of the public due to radioactive discharges from the nuclear power industry is less than 0.01% of the annual dose from all sources.⁴²
- 5.39 By law, 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.⁴³ 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. 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.
- 5.40 The environment agencies run monitoring programmes to provide an independent check on the impacts of radioactive discharges. In 2009, they published a report covering 2008, showing that radiation doses to people living around nuclear sites remained below the statutory dose limit of 1mSv

⁴² Ionising Radiation Exposure of the UK Population: 2005 Review HPA-RPD-001

⁴³ 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>

per year.⁴⁴In England and Wales, the main regulatory bodies are the NII which is a division of the HSE and the EA. These agencies regulate radioactive discharges from nuclear power stations and have responsibilities for ensuring that workers, the general public and the environment are protected against exposure to radioactivity. Regulation of all disposals, including discharges to air, water and land, of radioactive waste off or on nuclear sites is regulated under the Environmental Permitting (England and Wales) Regulations 2010. This regulatory system will apply to a potential new nuclear power station at Hartlepool and should ensure that permitted radioactive discharges do not cause unacceptable risk to health.

Regulatory Justification

- 5.41 European Council Directive 96/29/Euratom of 13 May 1996 (the Basic Safety Standards Directive) requires Member States to ensure that all new classes or types of practice resulting in exposure to ionising radiation are justified in advance of being first adopted or first approved by their economic, social or other benefits in relation to the health detriment they may cause. This process is known as Regulatory Justification and the Secretary of State for Energy and Climate Change, after public consultation, has decided that two nuclear reactor designs, Westinghouse's AP1000 and Areva's EPR, should be Justified⁴⁵.
- 5.42 The Government believes that the regulatory regime will effectively limit and minimise the radiation dose and release of radioactivity from new nuclear power stations, until they have been fully decommissioned, to very low levels, and that the health detriments associated with the operation of new nuclear power stations will be very low.

Construction and Operational Effects

- 5.43 During the operation of a nuclear power station, there is a risk of unplanned radioactive discharges into the environment which could potentially lead to adverse health impacts. However, the risk of such an accident is judged to be very small because of the strict regulatory regime in the UK⁴⁶. The HSE site licensing process will also ensure that 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.
- 5.44 The transportation of radioactive materials to and from a nuclear power station increases the possibility of an accident resulting in an unplanned radioactive discharge. 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 2008

⁴⁴ Radioactivity in Food and the Environment, 2008 RIFE-14, Environment Agency, Scottish Environment Protection Agency, Food Standards Agency, Northern Ireland Environment Agency 2009
<http://www.food.gov.uk/science/surveillance/radiosurv/rife/rife08/>

⁴⁵ www.decc.gov.uk

⁴⁶ [White Paper Website Ref](#)

showed that of the recorded 913 events associated with the transport of radioactive materials no 'significant dose events' were associated with the nuclear power industry⁴⁷.

- 5.45 The scale of construction work associated with a potential new nuclear power station at Hartlepool may result in higher risk of health and safety incidents at the site. Construction would be subject to the Construction (Design and Management) Regulations and other relevant regulations applicable to construction.
- 5.46 During the operation of a potential nuclear power plant at Hartlepool, activities will be regulated in accordance with the Health and Safety at Work Act 1974, Nuclear Installations Act 1965 and the Ionising Radiations Regulations 1999. The potential operator must have a Nuclear Site Licence from the HSE/NII prior to the construction commencing and this 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 the NII to monitor safety risks throughout the lifetime of the project.
- 5.47 It is possible that the proposed power station will require an upgrade to existing electricity transmission lines or additional transmission lines to link its output to the National Grid. The potential impact of new power lines will be considered in a separate Electricity Networks National Policy Statement, due to be published by the Government in autumn 2009. 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 advice⁴⁸, a precautionary approach is adopted to the routing of any required power lines.
- 5.48 The presence of, and more particularly the construction of, a new nuclear power station at the Hartlepool site will increase community disturbance to some degree. Such disturbance may include noise and vibration, dust in the construction phase and increased traffic in all phases. To mitigate construction phase disturbances an environmental management plan should be developed, implemented and monitored for effectiveness throughout the construction period. Potential traffic issues in all the project's phases can be mitigated through the adoption of a transport plan aimed at minimising community disturbance whilst also promoting 'green' travel.
- 5.49 Noise emissions have the potential to arise during the construction, operational and decommissioning phases. Construction noise will emanate from plant, site activity and transportation noise sources. Similarly, during operation noise will arise from fixed installations, on-site mobile plant sources and off-site transport sources. 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

⁴⁷ <http://www.hpa.org.uk/HPA/Publications/Radiation/HPARPDSeriesReports/>

⁴⁸ http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733817602

of noise controlled plant and equipment and noise and vibration monitoring. These would be strategically and operationally managed through implementation of a formal construction/environmental management plan and associated procedures.

- 5.50 Minimisation of operational noise emissions would require consideration at the design/ layout stage of the scheme. In particular, significant benefits would arise if potential noise emitting sources could be mitigated by a combination of engineering design, the location of plant within the overall facility (at high or low level and in relation to local noise sensitive locations) and careful selection of trafficking routes and access points. Particular emphasis would need to be taken of any low frequency and constant emission sources. Overall, noise background and prediction assessment following relevant International (ISO) and British (BS) standards would need to be applied so that the noise impact of the proposals could be determined for planning purposes. However, given the distance of the nominated site from sensitive residential receptors, it is considered that, during operation, noise and vibration impacts would not be a significant constraint to development.

Local Health and Recreation

- 5.51 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. This review could comprise a Health Impact Assessment (HIA). However, whilst this may be considered good practice it is noted that HIA is not a statutory requirement for current energy applications. The applicability of an HIA may be considered on a case by case basis.
- 5.52 With regard to recreation, there is a potential impact associated with coastal access⁴⁹, which may be impeded 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.
- 5.53 It is possible that the presence of a nuclear power plant may lead to increased stress levels in certain individuals, due to potential perception of risk associated with living or working near a power station. 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.

⁴⁹ The nearby section of coastline might in future form part of an English coastal route, in accordance with the objectives of the Marine and Coastal Access Act 2009.

- 5.54 The existing power station in Hartlepool and the area's long history of major industry, particularly the chemical industry, have the support of the local population in terms of the economic benefits, and consequently the health benefits, they bring to the area. It is probable that building, operating and decommissioning a new nuclear power station at Hartlepool will lead to an increase in employment, community wealth, housing stock and other associated neighbourhood infrastructure. These positive effects on the community are likely to be much more significant than any potential negative consequences of the project assuming there are no adverse effects on the health of the local population.
- 5.55 **Strategic Effects on Human Health and Well-Being: The rigorous system of regulation of routine discharges from the proposed nuclear power station at Hartlepool should ensure that there are no unacceptable risks to the health of the local population when the plant is operating normally. There is also a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. It is possible that the presence of a nuclear power plant may lead to increased stress levels in certain individuals although this is less likely at this site where there is a history of nuclear power generation. Overall, the likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.**

Cultural Heritage

- 5.56 The main effects of the development of a new nuclear power station at the nominated site would be local and within the facility itself. This includes pipework into the estuary which may impact upon marine archaeology. The construction of flood defences may also impact upon buried archaeology. In addition, a new nuclear power station could have a detrimental impact on the setting of scheduled monuments, conservation areas, listed buildings and historic landscape of regional or national importance, depending on distance and sight lines. However, this could be mitigated by placement of the new station adjacent to existing nuclear facilities and through appropriate planning and design of construction activities and operational facilities, including adherence to the principles of good design⁵⁰. Detailed assessment, including consultation of the County Historic Landscape Characterisation, will be required at the project level EIA stage.
- 5.57 In addition, there may be potential off-site effects on cultural heritage assets caused by an increase in traffic and the development of new infrastructure. Detailed assessment will be required at the project level EIA stage.
- 5.58 There are potential effects on the Seaton Carew wreck site from flood defence works, but these could be avoided through the appropriate siting of flood defence infrastructure.

⁵⁰ Adherence to good design is outlined in Planning Policy Statement 1: Delivering Sustainable Development

- 5.59 Twentieth century activity is evident close to the existing power station in the form of military buildings, and an unknown archaeological (buried) resource including palaeo-environmental deposits, is potentially present on the site. Detailed investigations (including consultation with the Local Authority Archaeologist, geophysical survey, trial trenching etc.) may be required to inform the project level EIA. Depending on the results this may lead to an excavation prior to construction and/or watching brief during the construction phase (during ground preparations and excavations).
- 5.60 **Strategic Effects on Cultural Heritage: The main effects of the development of a new nuclear power station at the nominated site would be local and within the nominated site boundary. A new nuclear power station could adversely impact the setting of scheduled monuments or other cultural heritage sites of regional or national importance depending on distance and sight lines. Further detailed assessment at project level will be required.**

Landscape

- 5.61 Due to the predominately industrial character of the land surrounding the mouth of the River Tees estuary, there are likely to be cumulative landscape and visual impacts during construction, operation and decommissioning of the proposed power station. Potential adverse impacts on visual amenity are likely to be perceptible from the North York Moors National Park, Durham Heritage Coast, the North Yorkshire and Cleveland Heritage Coast and designated Conservation Areas. However, the new power station would be seen in the context of existing power station facilities, prior to decommissioning.
- 5.62 Direct impacts would be at a local level and may include land raising both within the nominated site and with regard to associated infrastructure and transmission lines, the loss of trees, field hedgerows, pasture, salt marsh and/or mudflats, which could largely be compensated for. Indirect impacts are likely to result from increased onshore and offshore traffic, which may have a negative visual impact on nearby Conservation Areas, the landscape and seascape. A landscape and visual assessment and seascape assessment should be used to inform detailed proposals at project level EIA stage.
- 5.63 The existing power station is a prominent built feature from local viewpoints and is visible from some long-distance viewpoints, particularly from areas of high ground and potentially from the North York Moors National Park, the Durham Heritage Coast and the North Yorkshire and Cleveland Heritage Coast. Further development is likely to lead to a perceptible deterioration in some views, which could not be mitigated. However, given the industrial character of the surrounding landscape, further development would not have an overall significant impact on visual amenity.
- 5.64 Indirect, cumulative landscape and visual effects may be evident in combination with other major developments near to the nominated site,

including the ConocoPhillips LNG/CHP developments and the Able UK TERRC facility.

- 5.65 The decommissioning of the facilities may allow some landscape restoration of previously developed areas, but in the long term future land use of restored areas is difficult to predict. This leads to the view that the precautionary principle ought to be applied when it comes to assessing the significance of impacts at this stage.
- 5.66 Given the scale of the likely development, fully effective mitigation of local level landscape and visual impacts during the construction and operational phases is unlikely. Improvements to green infrastructure, recreation and access and adherence to the principles of good design⁵¹ could be incorporated to mitigate landscape and visual impacts at a local level. The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long term, which could be delivered and monitored through the use of an Integrated Land Management Plan. However, long term land uses for the restored areas remain difficult to predict.
- 5.67 **Strategic Effects on Landscape: The AoS has identified potential adverse visual effects and some localised impacts on landscape and the seascape character. Potentially these include some perceptible adverse indirect landscape and visual impacts on the surrounding area, including from parts of the North York Moors National Park, the Durham Heritage Coast and the North Yorkshire and Cleveland Heritage Coast and designated Conservation Areas. Overall, the new power station would be seen in the context of existing power station facilities and industrial setting, prior to any decommissioning. However, further development is still likely to lead to a perceptible deterioration in some views, which would not be able to be fully mitigated, given the scale of possible new buildings. At a local level, there is also the potential for long term adverse effects on existing wet grassland, field hedgerows, trees, saltmarsh and/or mudflat. Any increase in the height or extent of sea defences and the incorporation of a new marine landing platform could also give rise to adverse impacts on the appearance of the existing shoreline. Given the scale of the nominated site it is unlikely that the above effects could be mitigated entirely. However, further detailed design at project level will be required to ensure that attempts are made to avoid and reduce any adverse effects.**

Soils, Geology and Land Use

- 5.68 The development of the nominated site at Hartlepool and associated infrastructure (including transmission lines/towers) could lead to the direct loss of soil structure. This may include impacts on soils that maintain terrestrial habitats, including designated nature conservation sites. This is considered further in the Biodiversity and Ecosystems sections of this report. Effects

⁵¹ Adherence to good design is outlined in Planning Policy Statement 1: Delivering Sustainable Development

could be mitigated by limiting the extent of the development, thereby reducing the area of soils affected.

- 5.69 Part of the site near to the chemical works is being investigated and may be designated under Part IIA of the Contaminated Land Regime. As such, any development within this area will need to address the contamination issue to prevent the pollution of controlled waters.
- 5.70 The development of the nominated site may result in the increased risk of pollution and potential contamination of soils and controlled waters. These risks can be mitigated by the use of Environmental Management Plans during the construction and decommissioning stages of the site redevelopment. Any decommissioning would be required to meet specific clean-up criteria approved by the regulators.
- 5.71 Blight of land is a likely effect of the development of a new nuclear power station on the nominated site, but is considered of local or district significance. Likewise, effects on existing land uses, including surrounding tourist areas value are considered to be of local impact.
- 5.72 **Strategic Effects on Soils, Geology and Land Use: The AoS has identified potential, adverse, indirect effects on soils that are important for biodiversity sites. However, there is potential for mitigation through careful planning of construction and operational facilities. Any development will also need to address the contamination issue to prevent the pollution of controlled waters.**

Water Quality and Resources

- 5.73 The nominated site is surrounded by areas which are shown on EA maps as being at risk of flooding from rivers and sea without defences. During the lifespan of the proposed nuclear power station, and as a result of potential sea-level rises, the nominated site is likely to require the construction of new flood defences. These defences would be designed to counteract the effects of existing fluvial and coastal processes, but are likely to have the secondary effect of impacting the movement of sediment in the river system and along the coast. The effects of the construction and long-term presence of upgraded coastal defences on coastal process, hydrodynamics and sediment transport along the coast could be reduced or possibly eliminated by the adoption of suitable, environmentally-friendly designs.
- 5.74 Potentially significant effects on ecology in the estuary and coastal waters could result from the return of cooling water to the Tees Estuary at elevated temperatures. Direct water cooling is the option preferred by the nominator if it can be achieved satisfactorily. A more detailed appraisal is required at the project EIA level to assess the implications of this thermal discharge on water quality and coastal processes, including sediment transport. However, there are already existing discharges from the current Hartlepool power station and the nomination suggests that the discharged peak cooling load of the existing plant is approaching that of a modern PWR. Any future thermal discharge will

require an Environmental Permit⁵² from the EA and will need to meet existing regulatory standards and the requirements of the Water Framework Directive including the objective of no deterioration in ecological status (whichever is the most stringent). In addition to the thermal effects from direct cooling, there are other potential water quality issues, for example from discharge of radioactive or non-radioactive materials, such as anti-fouling agents, associated with the cooling water process. These discharges will also be subject to permitting by the EA.

- 5.75 The Marine and Coastal Access Act 2009 makes provision for the production of Marine Policy Statements. It is intended to produce a Marine Policy Statement (MPS) that, for the first time, brings together the policies for all UK administrations. The second stage in the new planning system will consist of a series of Marine Plans. The Marine Management Organisation (MMO) set up under the Marine and Coastal Access Act, is responsible for preparing marine plans for the English inshore and offshore regions according to the policies and objectives set out by the Government. Similar plans will be produced for Welsh marine waters. The MPS will interact with National Policy Statements and, in reaching its decisions, the IPC must have regard to the MPS but, subject to certain exceptions, must decide in accordance with the relevant National Policy Statements.
- 5.76 Tidal flows into and out of the estuary basin on which the nominated site sits are restricted due to the presence of a headland. This may present special conditions with respect to cooling water discharge to the receiving basin. As noted above, the nominated site is very close to a number of water based SSSI, SPA and Ramsar designated sites and the development of any mitigation measures will need to take this into account.
- 5.77 To maintain water quality standards, any future discharges from the power station will need to be considered as part of the environmental impact assessment for the proposed development. This process will include an assessment of the impacts of any discharges to the aquatic environment, including impacts on specific designated sites under both the Habitats and Shellfish Directives.
- 5.78 The development of a new nuclear power station on the nominated site may have the short-term effect of increasing water demand during the construction phase, due to an increased population. The potential magnitude and duration is dependent on the timing of new development in relation to the activities (operation or decommissioning) of the existing nuclear facilities. It is anticipated that, as the operation of a new nuclear power station on the nominated site is likely to have a similar or lower demand for water to the existing power station, no adverse long-term impacts are expected on water resources, although this will need to be confirmed as part of the planning for this site. Similar comments apply to wastewater production from the nominated site, although there is likely to be a short-term effect of increasing

⁵² The Environmental Permitting (England and Wales) Regulations 2010 came into force on 6 April 2010 and cover all water discharge activities. Water discharge consents will become Environmental Permits, and applications for new discharges will fall under the new regulations.

wastewater production due to an increased population during the construction phase.

- 5.79 No water abstraction from the Sherwood Sandstone aquifer would be permitted for the nominated site due to the risk of saline intrusion, and abstraction from the estuary would require a licence. Any increase in demand will need to be included within the assessment undertaken by Northumbrian Water, the EA and the Coal Authority on the migration of highly mineralised groundwater within the water supply aquifer.
- 5.80 The geology and hydrogeology at the nominated site do not provide any connectivity between activities at the site and major aquifers in the locality, hence accidental discharges or construction disturbance at the nominated site are unlikely to cause deterioration in groundwater quality and flow quantity.
- 5.81 Increased water supply would likely be derived from within the existing Hartlepool WRZ, with supply from the Magnesian Limestone Aquifer. Increased groundwater abstraction could lead to impacts on groundwater dependent surface water features and aquatic ecosystems, and also increase the risk of impacts from highly mineralised groundwater.
- 5.82 **Strategic Effects on Water Quality and Resources: The AoS has identified potential adverse effects on water on coastal processes, hydrodynamics and sediment transport, principally as a result of new coastal defence works that may be required (see Flood Risk below). Indirect effects on nationally and internationally designated habitats, including from the thermal impact of cooling water discharges have also been identified. This is reflected in the assessment of effects on biodiversity. There may also be adverse effects on water resources, including groundwater resources, which could occur through increased demand, particularly during construction.**

Flood Risk

- 5.83 Development of the nominated site is not likely to increase flood risk. However flood risk may increase as a result of climate change-induced sea level rise. As the nominated site is currently not defended, coastal flood defence works may become necessary over the lifetime of the proposed new power station. The nominated site is situated in an area that the EA considers to be at risk from coastal flooding. Accordingly, upgraded defences are likely to be required to counteract coastal retreat.
- 5.84 These defences have the potential to modify existing estuarine hydrodynamics and associated movement of sediment, which may have secondary effects on estuary and marine ecosystem structures and functioning. As the nominated site is situated next to numerous ecologically designated areas, mitigation measures will need to recognise these designations. The use of an appropriate design and a full understanding of the hydrodynamics and sediment transport within the estuary could minimise potential effects.

- 5.85 **Strategic Effects on Flood Risk:** The AoS has identified potential adverse effects relating to the measures that may be required to combat flood risk due to rising sea levels, especially during the later stages of operation and decommissioning. This is considered a wider national issue because of the potential impact on national energy supply and infrastructure. Possible secondary impacts on coastal processes, hydrodynamics and sediment transport from any necessary new or upgraded coastal defences have also been identified. Mitigation may be possible through appropriate design and construction of defences.

Key interactions between Sustainable Development Themes

- 5.86 Interactions and synergistic effects can occur between the different topics or sustainable development themes being appraised. A number of interactions and potential interactions have been identified for the AoS Site Reports. For example, rising sea levels and increased predictions for coastal flooding due to climate change will require new coastal defences. Construction of coastal defences could have adverse effects on water quality and biodiversity through changes to hydrology, sedimentation and loss of habitat.
- 5.87 Where applicable, key interactions have been considered in the topic-specific paragraphs above.

Interactions and Cumulative Effects with other Key Regional Plans, Programmes and Projects

- 5.88 Interactions and cumulative effects can occur between the plan or proposal being appraised and other key plans and policies. This AoS identified the other relevant plans and programmes with sustainability objectives that need to be considered. This is reported in Section 3 Policy Context and Appendix 3: Plans and Programmes Review. The key plans that might have significant interactions with cumulative effects for the revised draft Nuclear NPS and the nominated site at Hartlepool were identified as follows:
- North East Biodiversity Action Plan 1999 - Tees Valley Biodiversity Action Plan, Joint Nature Conservation Committee (1999)
- 5.89 Other key projects and developments that might have significant interactions with a new power station at Hartlepool were identified as follows:
- The existing nuclear facility at Hartlepool.
 - Tees Valley Metro – This £140 million scheme currently under consideration would utilise both existing rail lines and introduce new tracks to create a rapid transport route linking Tees Valley town centres with outlying estates and ongoing regeneration projects.
 - Victoria Harbour, Hartlepool – A 200-acre development to open up a new stretch of waterfront to the north of Hartlepool's marina. The scheme will

- include housing, leisure and business opportunities, as well as a proposed new school, planned open spaces, a new footbridge and coastal walk.
- Tees Barrage Tidal Power – A proposed new tidal renewable facility located at the Tees Barrage.
 - Other energy generation projects - A new CHP power plant with a capacity of 1,020 MW is currently being constructed 5km away. It is expected to start operating in 2012. A further CHP Plant and LNG Re-gasification Plant have also recently been granted development consent within close proximity to this site. In addition, there are plans for a coal-fired power plant to be established along the coast in Blyth.
 - Northern Gateway Container Terminal – now consented, this scheme will involve dredging within the main channel and disposal offshore, the construction of a 1000m quay face, reclamation works and local land raising, relocation of the existing riverside Roll-On Roll-Off facility, construction of a new intermodal rail terminal, installation of cargo handling equipment, modifications to the existing roads, new buildings and workshops, and the installation of services.
 - Able UK TERRC (Teesside Environmental Reclamation and Recycling Centre) shipyard – located directly adjacent to the nominated site, the shipyard imports, remediates and disposes of marine structures. The TERRC Ecological Advisory Group, comprising Able UK Ltd, English Nature, EA, Hartlepool Borough Council, INCA and RSPB, established in 1997 meets every 3 months. Since its inception, TEAG has considered that there has been no significant detrimental effect to the local ecology.
- 5.90 The appraisal of cumulative sustainability effects arising through interactions between the nominated site at Hartlepool and other key plans, programmes and projects is presented in Table 5.2.

Table 5.2: Interactions with Other Key Regional Plans, Programmes and Projects

AoS Sustainable Development Theme	Interactions and Cumulative Effects
Air Quality	<ul style="list-style-type: none"> • In line with targets to sustain the current downward trend in air pollution in the region, however a potential conflict exists concerning the effects of new developments and increased traffic levels on air quality, and effects on internationally designated nature conservation sites. • Potential for cumulative effects, during construction and operation, with other energy generation projects within the area, including direct emissions and emissions from associated transport.
Biodiversity and Ecosystems	<ul style="list-style-type: none"> • The area could be a focus for other high profile energy or development projects, such as tidal power generation at the Tees Barrage or the Able UK TERRC shipyard. The cumulative effects of disturbance on biodiversity could be significant. • Potential conflict with the North East Biodiversity Action Plan, which promotes the protection and enhancement of internationally and nationally important sites and species in the North East
Climate Change	<ul style="list-style-type: none"> • Reductions in greenhouse gas emissions, resulting from the cumulative benefits of a nuclear power program, will have positive long-term effects during the operational stage when compared to fossil fuel powered plants. • Potential effects in combination with other energy generation projects within the area.
Communities: Supporting Infrastructure	<ul style="list-style-type: none"> • Decommissioning of existing nuclear facilities at Hartlepool may coincide with construction of a new nuclear power station to create adverse effects on supporting infrastructure, in particular transport networks.
Human Health and Well-Being	<ul style="list-style-type: none"> • Enhanced prosperity and long-term employment benefits resulting from the plans are likely to have positive effects on health and well-being. • Potential conflict with the Tees Valley Coastal Arc Initiative, which aims to exploit the potential of the coast as an economic and tourism driver for the city-region in terms of the potential for increased business and commercial activity.
Landscape	<ul style="list-style-type: none"> • In-combination effects through associated off-site works carried out by National Grid with regard to transmission infrastructure. • Indirect, cumulative landscape and visual effects may be evident with other major developments near to the nominated site, including the ConocoPhillips LNG/CHP developments and the Able UK TERRC shipyard. This should be further investigated at EIA stage.
Water Quality and Resources	<ul style="list-style-type: none"> • In combination hydrological effects with the Tees Barrage, particularly with regard to thermal plumes associated with the discharge of cooling water.

6. Summary of Appraisal of Sustainability, Key Findings and Possible Mitigation

- 6.1 This Section summarises the key findings of the AoS assessment and explores possible mitigation which could be undertaken to reduce impacts. Table 6.1 presents a summary of the significance of potential effects and Table 6.2 provides a more detailed breakdown of the potential effects and possible mitigation.
- 6.2 The AoS has explored both adverse and beneficial potential effects of building a new nuclear power station at Hartlepool. Both beneficial and adverse effects were identified as potentially significant at the local level and it is recommended that these need to be further considered by the developer, regulators and the decision-maker (the IPC), during project level assessments.
- 6.3 The AoS process has included recommendations to inform the development of the revised draft Nuclear NPS. This Site Report for Hartlepool has helped to inform the decision-making for the Strategic Siting Assessment. It has included advice as to the strategic significant effects arising from the construction of a new nuclear power station at Hartlepool, and suggestions for how adverse effects may be mitigated, including proposed mitigation measures which could be considered as part of project level Environmental Impact Assessment.
- 6.4 A number of the strategic effects identified for Hartlepool will be similar across all the nominated sites, including positive effects for employment and well being. However a number of potential strategic effects have been identified that are of particular note for the nominated site at Hartlepool. These are discussed below.
- 6.5 There are potential negative effects on at least seven national and internationally protected conservation sites including Teesmouth and Cleveland Coast SPA/Ramsar, and the Seaton Dunes and Common SSSI; effects on water quality and migratory fish in the region due to the abstraction and release of sea water for cooling; and potential effects on coastal erosion and visual appearance principally as a result of new coastal flood defences that would be required to protect against sea level rise during the lifetime of the nominated site. These effects are significant, but mitigation opportunities could be available following further study at the project level, for example the creation of replacement habitat.
- 6.6 The development of a new nuclear power station will have a negative visual impact on the landscape and could potentially be seen from parts of the North York Moors National Park, the Durham Heritage Coast and North Yorkshire & Cleveland Heritage Coast. This impact could not be fully mitigated, however, the site is adjacent to an existing nuclear power station, in an area that is

already heavily industrialised, and so the additional impact on the landscape would be less significant at a regional level.

- 6.7 There are likely to be positive local effects from employment generated by the development, although the regional and national effects are considered to be marginal.
- 6.8 Hartlepool is not close to any other nominated site and therefore does not form part of a cluster. This means that regional cumulative impacts are not considered relevant for this site.
- 6.9 There remains some uncertainty relating to the significance of some effects and the most appropriate mitigation. It is expected that the mitigation measures will be refined iteratively as part of the development of the proposals for the Hartlepool site, and will be assessed further in the project level EIA.
- 6.10 The table on the following page provides an overall summary of the significance of the environmental and sustainability effects for the Hartlepool site. Each sustainable development theme and each development stage has been considered. The symbols and colours used are explained in the key.

Table 6.1: Summary of the Significance of Potential Strategic Sustainability Effects

Sustainable Development Themes	Significance of potential Strategic effect at each Development stage:		
	Construction	Operation	Decommissioning
Air Quality	-	- ?	- ?
Biodiversity and Ecosystems	-- ?	-- ?	-- ?
Climate Change	-	++	- ?
Communities: Population, Employment and Viability	+ ?	+ ?	0
Communities: Supporting Infrastructure	- ?	- ?	- ?
Human Health and Well-Being	+	+	+
Cultural Heritage	- ?	- ?	- ?
Landscape	-	-	0 ?
Soils, Geology and Land Use	- ?	- ?	- ?
Water Quality and Resources	-	-	- ?
Flood Risk	-	-	-
Key: Significance and Categories of Potential Strategic Effects			
++	Development actively encouraged as it would resolve an existing sustainability		

	problem; effect considered to be of regional/national/international significance
+	No sustainability constraints and development acceptable; effect considered to be of regional/ national/international significance
0	Neutral effect
-	Potential sustainability issues, mitigation and/or negotiation possible; effect considered to be of regional/national/international significance
--	Problematical because of known sustainability issues; mitigation or negotiation difficult and/or expensive; effect considered to be of regional/national/ international significance
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 '?'

- 6.11 Potential environmental and sustainability effects considered to be of a wider strategic significance were also identified. These are summarised in Table 6.2. This table includes a summary of how the potential adverse effects may be mitigated and includes possible feasible suggestions for mitigation to be considered at the project level. Some of these mitigation options could be addressed by the HSE, EA, HPA and others when they consider the development consent application stage. Other mitigation options could be proposed by the developer as part of the project design process and through EIA. However, mitigation measures can in themselves produce impacts and these would need to be assessed at the project level.
- 6.12 At this strategic level of appraisal, there are some uncertainties on the significance of some impacts and the effectiveness of suggested mitigation measures. Further detailed studies should therefore be carried out by the developer and the regulators at the project level stage.
- 6.13 Mitigation measures should be considered in all stages of the project with the aim to develop a strategy that avoids impacts, and if they cannot be avoided, to reduce them. The suggested mitigation measures shown in Table 6.2 include examples from all levels of the mitigation hierarchy that comprises:
- Enhance
 - Avoid
 - Reduce
 - Repair
 - Compensate
- 6.14 Options for mitigating through project design or management should firstly consider avoidance, addressing impacts at source before considering impacts at the receptor, and ensuring that a commitment is made to implementing and monitoring the effectiveness of the proposed mitigation. For European Sites, compensatory measures to offset damage to biodiversity and ecosystems and ensure coherence of the Natura 2000 network may only be considered if it has been established that there are no alternative solutions and the plan or project is necessary for imperative reasons of overriding public interest.

Table 6.2: Summary of Potential Strategic Significant Effects and Mitigation Possibilities (for Adverse Effects)

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
Air Quality	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> • Potential for related effects on national and European-designated wildlife sites due to increase in airborne pollutants and nutrients during construction 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Please refer to mitigation measures contained in the biodiversity sections of this AoS Report
<ul style="list-style-type: none"> • Potential accidental release of radioactive emissions could have a significant strategic effect on air quality 	<ul style="list-style-type: none"> • The nuclear regulators will need to be satisfied that the radiological and other risks to the public associated with accidental releases of radioactive substances are as low as reasonably practicable and within the relevant radiological risk limit.
Biodiversity and Ecosystems	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> • Noise, visual and light disturbance during construction (and decommissioning) on fauna and protected species 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Nominator should ensure further studies to fully assess impacts; careful design of the nominated site to avoid encroaching on sensitive areas; Construction Environmental Management Plan; habitat replacement if required; Ecological Mitigation and Management Plan adopted
<ul style="list-style-type: none"> • Potential for related effects on national and European-designated wildlife sites due to increase in airborne pollutants and nutrients during construction 	<ul style="list-style-type: none"> • Sustainable transport plans, including use of non-road transport, monitoring, promotion of carbon-efficient transport and construction

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
<ul style="list-style-type: none"> Loss, damage or alteration of important habitats, including fragmentation and coastal squeeze – Teesmouth and Cleveland Coast SPA/Ramsar site is of particular concern 	<ul style="list-style-type: none"> Nominator to ensure further studies required to determine impacts Avoidance of sensitive sites, where possible Possible creation/enhancement, management and monitoring, reinstatement Use of sensitive construction techniques Ecological Mitigation and Management Plan
<ul style="list-style-type: none"> Discharge of heated water into, and abstraction of water from, aquatic habitats could alter ecosystems - Teesmouth and Cleveland Coast SPA/Ramsar and Northumbria Coast SPA/Ramsar sites are of particular concern 	<ul style="list-style-type: none"> Further studies to be commissioned by nominator to assess impacts. Suitable intake/outfall system design could be adopted, including fish protection measures and minimisation of effects on sedimentary processes or thermal regime. Appropriate construction measures (Construction Environmental Management Plan)
<ul style="list-style-type: none"> Construction and operation of new drainage infrastructure could affect ecosystems, watercourses affected through increased sediment loads - Teesmouth and Cleveland Coast SPA/Ramsar sites are of particular concern 	<ul style="list-style-type: none"> Nominator to ensure further studies on potential impacts required. Use of Sustainable Drainage Systems. Water quality monitoring required
Climate Change	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> Potential short term increases in emissions during construction and decommissioning 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Monitor greenhouse gas emissions

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
<ul style="list-style-type: none"> Emissions from the transport of goods and labour throughout construction, operation and decommissioning phases 	<ul style="list-style-type: none"> Green travel plans Further investment in public transport
<p>Beneficial Effects</p> <ul style="list-style-type: none"> A nuclear power station on the nominated site would result in lower greenhouse gas emissions during the operational stage compared to fossil fuel sources, with positive long-term effects on climate change 	
<p>Communities: Population, Employment and Viability</p>	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> Pressure on basic services from likely large scale in-migration of construction workers 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Measures to manage potential negative effects on local communities; enhance employment capacity through training; provision of services for staff and local community
<ul style="list-style-type: none"> Project may lead to a shortage of local construction workers to meet the needs of other industries and major projects in the region. 	<ul style="list-style-type: none"> Measures to address likely difficulties in sourcing labour and the effects of this on the local/regional construction industry
<p>Beneficial Effects:</p> <ul style="list-style-type: none"> Creation of temporary jobs during construction and permanent full time employment during operation New power station may offset job losses from decommissioning of the existing power station at the nominated site. However, time differences between decommissioning may require workers to seek employment elsewhere Provision of education, training, upskilling for employees and contractors in the region Positive multiplier effects as income from new population of workers will help support local economy Potential for property values to increase within vicinity of nominated site, based on previous studies 	
<p>Communities: Supporting Infrastructure</p>	
<p>Adverse effects:</p> <ul style="list-style-type: none"> Potential for congestion and disruption of local road traffic during construction 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Transport Management Plans and green travel plans to minimise effects Consideration of port and rail transport options

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
<ul style="list-style-type: none"> Potential for significant impacts regarding radioactive and conventional waste 	<ul style="list-style-type: none"> Conventional waste: good site practices, implementation of waste hierarchy (reduce, reuse recycle) and waste management Radioactive waste: appropriate storage and management
Human Health and Well-Being	
<p>Adverse effects:</p> <ul style="list-style-type: none"> Possibility of local and regional health risks from authorised discharges 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Adherence to the UK’s 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.
<ul style="list-style-type: none"> Possibility of local and regional health risks from accidental discharges 	<ul style="list-style-type: none"> Adherence to the Nuclear Installations Inspectorate (NII)’s regulatory regime for the safe operation of nuclear power stations, including the Nuclear Site licensing Safety Assessment Principles and the continual monitoring by NII of safety risks throughout the lifetime of the station.
<ul style="list-style-type: none"> The potential requirement for appropriate additional health service capacity for the influx of both construction and operational workers 	<ul style="list-style-type: none"> The nominator should carry out a review of local health provision to ensure it is adequate for the expected influx of power station workers
<ul style="list-style-type: none"> The construction and operation of the proposed nuclear power station may lead to unacceptable community disturbance 	<ul style="list-style-type: none"> The nominator should ensure a Construction Environmental Management Plan and an all-phase Travel Plan are produced, observed and monitored
<p>Beneficial Effects:</p> <ul style="list-style-type: none"> Likely positive effects on health via increase in employment, community wealth, additional housing and other associated neighbourhood infrastructure 	
Cultural Heritage	

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Immediately surrounding the nominated site, there may be potential effects on the settings of historic assets 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Use of appropriate landscape and planting schemes • Application of principles of good design in accordance with PPS1
<ul style="list-style-type: none"> • Potential effects on the Seaton Carew wreck site from flood defence works 	<ul style="list-style-type: none"> • Avoid damage to Protected Wreck Site through appropriate siting of flood defence infrastructure
Landscape	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Potential for longer-term minor adverse landscape character and visual impacts on the surrounding area, including distant viewpoints within the North York Moors National Park, the Durham Heritage Coast and the North Yorkshire and Cleveland Heritage Coast and nearby designated Conservation Areas within Hartlepool. However, all the above should be considered within the context of the existing power station facilities which are already prominent features in the local scene 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Some landscape and visual mitigation and enhancement may be possible including opportunities to further the aims and objectives of the Hartlepool Local Plan, Green Infrastructure/ Greenspace Strategies, Cleveland Community Forest Plans and Rights of Way Improvement Plans • Some potential for visual impact mitigation through sensitive siting, colouring and detailed building design, including application of principles of good design in accordance with PPS1. This is, however, limited given the necessary building scale • Also, rationalisation and reduction of unsightly clutter and infrastructure within the nominated site • Decommissioning may allow some landscape restoration of previously developed areas including removal of overburden derived from construction, reinstatement of prevailing topography, management of wet grassland and improvements to habitat connectivity with local wildlife sites
Soils, Geology and Land Use	

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Construction of power station and associated infrastructure may lead to direct loss of soil structure. This may include impacts on soils that maintain terrestrial habitats – Seaton Dunes and Common SSSI and Seal Sands SSSI 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Limitation of the footprint of the development, thereby reducing the area of soils affected. Avoidance of any soils within designated areas of ecological importance
Water Quality and Resources	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • See effects on aquatic ecosystems listed in the Biodiversity and Ecosystems sections of this report • Effects on coastal processes from the construction of new coastal defences 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Further investigations required • Selection of suitable designs, which may include SUDS • Selection of appropriate construction methods • Appropriate management of defences • Sediment transport modelling
<ul style="list-style-type: none"> • Thermal impact of cooling water discharges, potential indirect effects on nationally and internationally designated habitats 	<ul style="list-style-type: none"> • Further investigations required • Assessment of impact on Shellfish and Habitats Directive designated sites • Abstraction of water and thermal discharges will be subject to EA permitting
<ul style="list-style-type: none"> • Increased demand for water during construction stage. Magnitude and duration dependent on timing of activities at the existing nuclear power stations. Similar comments apply to wastewater production. 	<ul style="list-style-type: none"> • Further investigations required. • Appraisal of water resource options and alternatives • Detailed planning, study to determine that capacity of water and wastewater is adequate to meet estimated demand • Appropriate management

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the NPS and IPC
<ul style="list-style-type: none"> • Potential impact on local groundwater through construction disturbances and accidental discharges. • Increase in abstraction of water may have implications for local groundwater bodies 	<ul style="list-style-type: none"> • Further investigations into local groundwater bodies and potential pathways. Ongoing monitoring of impacts • Assessment of the potential migration of highly-mineralised groundwater (potential abstraction should be included in ongoing assessment being undertaken by Northumbrian Water, EA and the Coal Authority) • Suitable design to mitigate potential adverse effects

Abbreviations

AA	Appropriate Assessment
ALARP	As Low As Reasonably Practicable
AGR	Advanced Gas- cooled Reactor
AOD	Above Ordnance Datum
AoS	Appraisal of Sustainability
AoS Report	Report setting out environmental and sustainability effects of the Nuclear NPS. It will incorporate the requirements of the SEA Directive
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
BGS	British Geological Survey
CAMS	Catchment Abstraction Management Plan
CCGT	Combined Cycle Gas Turbine
CHMWB	Candidate for Highly Modified Water Bodies
CHP	Combined Heat and Power
CO ₂	Carbon Dioxide
COMARE	Committee on Medical Aspects of Radiation in the Environment
CPRE	Campaign to Protect Rural England
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
EMF	Electromagnetic fields
EU	European Union
GEP	Good Ecological Potential
GES	Good Ecological Status
GP	General Practitioner
GW	Gigawatt
GWMU	Groundwater Management Unit
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
IPC	Infrastructure Planning Commission.
LAQM	Local Air Quality Management
LCT	Landscape Character Types
LSOA	Lower Super Output Areas
MBT	Mechanical Biological Treatment
MRF	Materials Recycling Facility
mSv	Millisievert
MWe	Megawatt (electrical)
MWt	Megawatt (thermal)
NCA	National Character Area
NDA	Nuclear Decommissioning Authority
NEA	North East Assembly
NII	Nuclear Installations Inspectorate

Nuclear NPS	The proposed National Policy Statement for new nuclear power stations
NPS	National Policy Statement
OSPAR	Oslo and Paris Conventions
PWR	Pressurised Water Reactor
RAMTED	Radioactive Materials Transport Events Database
RBD	River Basin District
RSS	Regional Spatial Strategy
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SEA	Strategic Environmental Assessment
SMP	Shoreline Management Plan
SOA	Super Output Area
SPA	Special Protection Area
SRF	Solid Recovered Fuel
SSA	Strategic Siting Assessment
SSSI	Site of Special Scientific Interest
UKCIP	UK Climate Impacts Programme
VJSU	Tees Valley Joint Strategy
WDA	Waste Disposal Authority
WFD	Water Framework Directive
WRMP	Water Resources Management Plan
WRMU	Water Resources Management Unit

Appendices Available Separately

- 1 Sustainable Development Themes and AoS/SEA Objectives
- 2 Appraisal Matrices
- 3 Plans and Programmes Review (Regional)
- 4 Baseline Information (Regional and Local)

© Crown copyright 2010

URN: 10D/866

Office for Nuclear Development
Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.decc.gov.uk