

Appraisal of Sustainability: Site Report for Hinkley Point

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

Preface:

Appraisal of Sustainability of the draft Nuclear National Policy Statement

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

This document is the Appraisal of Sustainability: Site Report for Sizewell of the draft Nuclear NPS and is subject to consultation alongside the draft Nuclear NPS for a period of a minimum of 12 weeks from the date of publication.

This report has been prepared by the Department of Energy and Climate Change (DECC) 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.

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Appendices to Hinkley Point 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 nomination of the site at Hinkley Point as a possible location for new nuclear power station(s). The purpose of this Appraisal of Sustainability Report is to assess environmental and sustainability impacts on the Hinkley Point site and surrounding area. 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 new nuclear power station at Hinkley Point are included in Section 6.

Summary of Key Findings

The Appraisal of Sustainability process has included recommendations to inform the development of the draft Nuclear National Policy Statement. This site report for Hinkley Point 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 Hinkley Point, 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 Hinkley Point will be similar across all the 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 Hinkley Point. These are discussed below:

Of particular note for the draft Nuclear National Policy Statement are potential negative effects on protected conservation sites, including the Severn Estuary and the Bridgwater Bay. There is the potential for adverse effects on water quality and migratory fish populations caused by the abstraction and release of cooling water, and a risk from coastal flooding. Existing flood defences are in place, but may need upgrading during the lifetime of the facility. Mitigation opportunities are likely to be available for the above following further study.

There is an existing nuclear power station at Hinkley Point, but a new power station would have additional adverse visual impact on views from the Quantock Hills Area of Natural Beauty (AONB) at a sub-regional level, which could not be fully mitigated.

There is the potential for very significant negative cumulative effects if two new power stations (Hinkley Point and Oldbury) and the Severn Barrage are all developed. These include the loss of nationally and internationally important estuarine habitats, where the possibility of full mitigation is unlikely.

There is also potential for positive cumulative effects associated with long term employment and enhanced prosperity for communities at the sub-regional level if both power stations are built in the Severn Estuary.

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.

1 Introduction

This Appraisal of Sustainability Report

- 1.1 This report considers the site at Hinkley Point 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 Hinkley Point. 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 the deployment of 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 draft Nuclear National Policy Statement² (NPS). The Main AoS Report for the 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 draft Nuclear NPS lists sites that have been assessed by the Government to be potentially suitable for new nuclear power stations. Developers will be able to apply for development consent for these sites from the Infrastructure Planning Commission (IPC). 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 draft Nuclear NPS will also be subject to other regulatory and licensing requirements.

The Draft Nuclear National Policy Statement

- 1.4 In the White Paper on Nuclear Power³, the Government set out its policy on the role that new nuclear power stations could play alongside other low-carbon sources in the UK's future energy mix. The 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 sites. This SSA process⁴ drew on the emerging findings of the site AoSs and the Habitats Regulations Assessment (HRA)⁵.

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

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

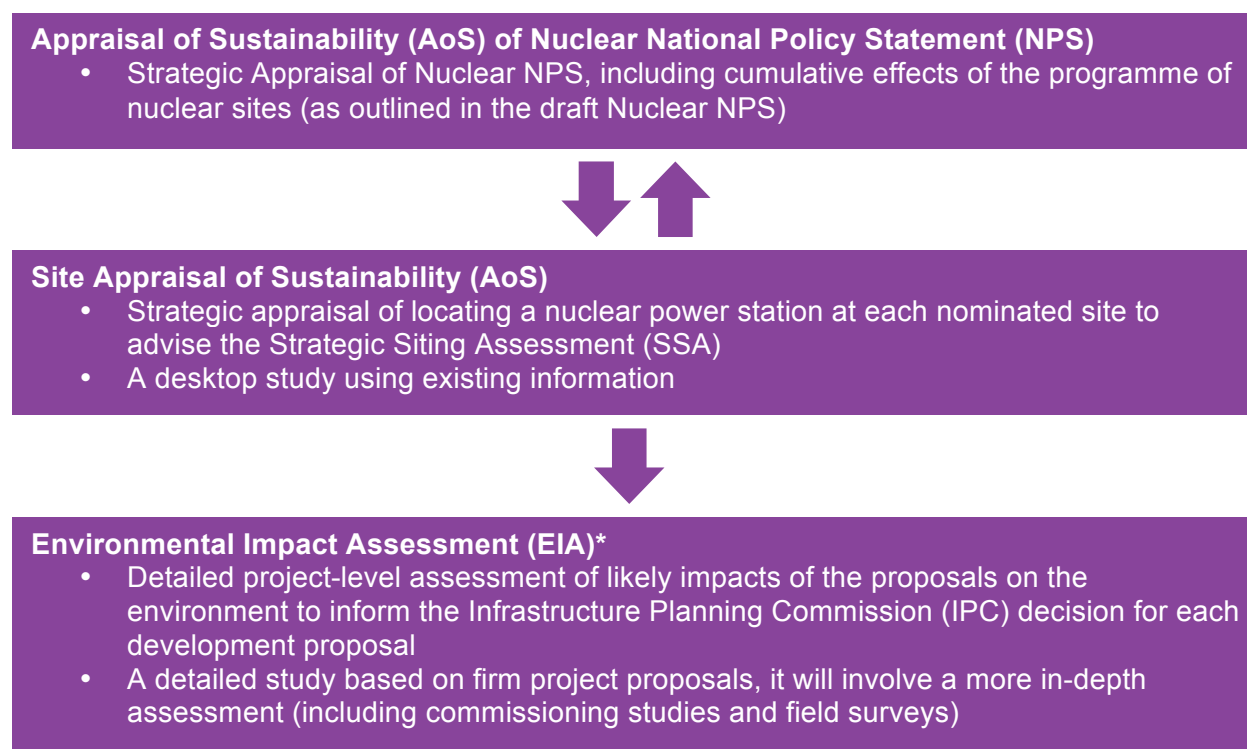
³ BERR (Jan 2008) Meeting the energy challenge: a white paper on nuclear power, URN 08/525

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 Hinkley Point HRA Report <http://www.energynpsconsultation.decc.gov.uk>

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 draft Nuclear NPS.
- 1.6 The purpose of this AoS is to assess environmental and sustainability impacts on the Hinkley Point site. This AoS also identifies the significance of those effects, and to suggest possible ways of mitigation. The AoS for Hinkley Point site fed into the Strategic Siting Assessment (SSA) and the preparation of the 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.



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

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*

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 in the 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 of building new nuclear power stations on the surrounding environment and communities. The sustainability objectives that have been agreed for the appraisal of the draft Nuclear NPS are detailed in Annex E of the Environmental Study and the main AoS Report. Appendix I of this AoS 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 Report¹¹ and Environmental Study¹²)
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)
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)

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 Report¹¹ and Environmental Study¹²)
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 with other plans and projects. Policy context at the local government level is changing as a result of the new planning system.¹³ 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

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.

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, and the Environment Agency 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. The NII and the Environment Agency 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 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.

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

- 1.15 When a nuclear power station reaches the end of its operating 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 the 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 Hinkley Point AoS provided in the right hand column.

Table 1.2: Base Case Assumptions and Variations Considered for Hinkley Point

Base Case	Variations considered for Hinkley Point
1 nuclear reactor	2 nuclear reactors
Technology neutral (i.e. unknown reactor type)	
A requirement for cooling water abstraction	Nomination states preference for direct cooling using seawater
Site boundary as indicated on nomination form	
Discharges of cooling water	

Base Case	Variations considered for Hinkley Point
<p><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 years¹⁵</p>	
<p><u>No. of employees:</u> Construction: approx 4,000 (around 50% from within region) Operation: approx 500 Decommissioning: range of 400 – 800 at key phases¹⁶ Associated employment creation: 2,000</p>	
<p>Coastal flood and protection measures (where relevant)</p>	<p>Land raising, flood defence improvements and coastal protection measures</p>
<p>Infrastructure for transporting reactor (for example, jetty, landing facility)</p>	
<p>Interim radioactive waste storage facilities will be capable for at least 160 years</p>	
<p>Highway improvements, access routes</p>	
<p>Associated transmission infrastructure</p>	
<p>Radioactive discharges will be within legal limits</p>	

¹⁵ The site lifetime of 166 assumes 6 years for construction, 60 years for operation and 100 years for interim storage of spent fuel after the last defueling. It is therefore 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. However, this is based on some conservative assumptions and there are a number of factors that could reduce or potentially increase, the total duration of onsite spent fuel storage.

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>)

2 The Site: Hinkley Point

- 2.1 The site at Hinkley Point is located in the South West Region of England on the Somerset coast, 10km to the south west of Highbridge and 13km to the north west of Bridgwater. It is located within the District of West Somerset, and is within close proximity (approximately 3km) to West Somerset's boundary with Sedgemoor District. The location of the nominated site is illustrated in Figure 1. Figure 2 shows the location of the nominated site in a sub-regional context to help address any implications for cumulative effects on biodiversity and on socio-economic factors.
- 2.2 The Hinkley Point site has supported nuclear power facilities since 1965. Hinkley Point A has twin Magnox reactors which ceased energy production in 2000 and are currently being decommissioned. Hinkley Point B is still operational and generates electricity from Advanced Gas-Cooled Reactors with a net electrical output of 860 MWe. It has an estimated decommissioning commencement date of 2016. In 1987, a planning application for a Hinkley Point 'C' station was submitted and, in 1988, was the subject of a Public Inquiry. The report of the Public Inquiry concluded that consent should be granted for the extension of the Hinkley Point nuclear power stations by the construction of an additional PWR generating station. Development consent was granted, but has now lapsed.
- 2.3 The site is bounded by the Severn Estuary to the north, the Quantock Hills to the south and west, and the Polden Hills to the east. The River Parrett lies to the north. The surrounding land is predominantly agricultural, and is sparsely populated. The village of Stolford is to the east of the nominated site, the villages of Stockland Bristol, Otterhampton and Coultings to the south-east and the villages of Stogursey, Burton, Shurton and Knighton to the south-west.
- 2.4 The nomination identifies land to the west and south of existing nuclear power stations. It outlines an area of approximately 94ha during the operational phase of the new nuclear power station, which would extend to 219ha during the construction phase and reflects the additional land needed for the temporary construction works. Offsite work relating to highway, rail and marine landing facilities is also identified as a requirement in the nomination.
- 2.5 The nomination is for a nuclear power station development incorporating:
- two nuclear reactors
 - construction of a sea wall along the coastal frontage of the nominated site
 - 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
- 2.6 The site at Hinkley Point was nominated into the Strategic Siting Assessment (SSA) process, in respect of which nominations closed on 31 March 2009. The Government is also assessing the environmental and sustainability

impacts of including the nominated site at Hinkley Point in the list of potentially suitable sites in the draft Nuclear NPS (through this site AoS report).

- 2.7 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.

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 scoping¹⁷ 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 Hinkley Point 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:
- South West Climate Change Action Plan 2008 - 2010, South West Regional Assembly (2008)
 - Draft Regional Spatial Strategy for the South West 2006-2026, South West Regional Assembly (2007 - 2008)
 - Regional Economic Strategy for the South West 2006-2015, South West RDA (May 2006)
 - Creating Sustainable Communities in the South West, Government Office for the South West (2005)
 - South West Biodiversity Action Plan, UK Biodiversity Action Plan (1997)
 - Draft River Basin Management Plans (South West, Wales, Severn) Environment Agency (2008)
 - Bridgwater Bay to Bideford Shoreline Management Plan, Halcrow (1998)
 - Our Environment: Our Future -The Regional Strategy for the South West Environment 2004-2014, South West Regional Assembly
 - From Rubbish to Resource: The South West Regional Waste Strategy 2004-2020, South West Regional Assembly (2004)
 - Rural Development Programme for England 2007-13, Department for Environment, Food and Rural Affairs (December 2007)
 - Strategic Flood Risk Assessment, Scott Wilson for West Somerset Council and Exmoor National Park Authority (March 2009)

¹⁷ BERR (March 2008) Scoping Report

- Shoreline Management Plan 2 – Hartland Point to Anchor Head, Halcrow for North Devon and Somerset Coastal Advisory Group (January 2009)
- 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
 - Reducing flood risk: fluvial and coastal
 - Protecting and enhancing landscape, recreation, cultural heritage
 - Maintaining the rural economy: agriculture, tourism, employment
 - Improving sustainable transport and accessibility
 - Protecting water quality and resources
 - Accommodating increased population growth
 - Increasing provision of affordable homes
- 3.5 These 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 Hinkley Point and its location is provided in Section 2.
- 4.2 This section describes the general characteristics of the nominated site at Hinkley Point 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 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 Hinkley Point is presented in Table 4.1 below.

Table 4.1: Summary of Scope of Baseline Data Collated for Hinkley Point

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.
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 • CPRE Tranquil Areas and Light Pollution mapping • 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 hazards • 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 Compared to the rest of England, air quality in the South West Region is generally good¹⁸, with low levels of sulphur dioxide, nitrogen dioxide and

¹⁸ South West Observatory State. State of the South West 2008 [online] available: <http://www.swo.org.uk/observatory/links-1/state/state-of-the-south-w-1.shtm> [accessed 13 February 2009]

particulates. However, there are pockets of poor air quality in the larger urban industrial areas, such as Bristol. Air quality in the region is improving, with the number of days of moderate or higher air pollution in urban areas decreasing since 1993, mainly due to a reduction in particulate and sulphur dioxide emissions.

- 4.5 There are 31 Air Quality Management Areas (AQMA) in the region, 26 of these were established due to high levels of nitrogen dioxide (NO₂) as a result of traffic. There are no AQMAs in the West Somerset District, however, the Sedgemoor AQMA is 13km to the south east in nearby Bridgwater.
- 4.6 The main cause of pollution in the regions rural areas is ozone, although it is noted that in the South West ozone levels are naturally high due to the proximity to the coast and high altitudes. Pollution levels for all key pollutants (sulphur dioxide, nitrogen dioxide and particulates) in the rural area around Hinkley Point are typically low, and there are no other major industrial sites in the area other than Hinkley Point A (undergoing decommissioning) and Hinkley Point B (operational)¹⁹. Emissions from these existing operations are licensed and monitored to ensure they meet acceptable regulatory standards.
- 4.7 The Environment Agency assesses that non-radioactive aerial emissions (sulphur dioxide, nitrogen oxides and volatile organic compounds) from nuclear power stations are extremely low compared to other regulated industries. The Environment Agency's most recent available assessment of radioactive aerial emissions for regulated nuclear power stations indicates that all fall within authorised limits.²⁰
- 4.8 The UK nuclear industry is highly regulated. All nuclear power stations require a licence to operate provided by the Health and Safety Executive (HSE)/Nuclear Installations Inspectorate (NII). The licence deals with all consents and changes from initial application to decommissioning and beyond.

Biodiversity and Ecosystems

- 4.9 There are a wide range of biodiversity interests surrounding the nominated site, including the nationally designated Bridgwater Sites of Special Scientific Interest (SSSI) and National Nature Reserve (NNR), adjacent to the nominated site. Further information on the European designated sites and their current condition is given in the separate HRA Report for Hinkley Point. The Hinkley Point site also borders the Severn Estuary, which is designated to be of European nature conservation importance as a Special Protection Area (SPA) and Ramsar wetland site. It is also a candidate for Special Area of Conservation (cSAC) status. The Severn Estuary is protected for its intertidal mudflats, sandflat and saltmarsh habitats and its various bird and marine species.

¹⁹ AEA Energy (2007) Air Quality in the UK

²⁰ Measuring Environmental Performance: Sector Report for the Nuclear Industry (Environment Agency, Nov 2005)

- 4.10 There are nine County Wildlife Sites (CWS) present within 3km of the nominated site. Protected species likely to be on, or within close proximity to, the nominated site include badgers, dormice, great crested newts, various bat species, water voles and otters.
- 4.11 The land and shore to the East of Hinkley Point is used for high-tide and low-tide roosting areas by several bird species, including over-wintering bird species designated to the Severn Estuary SPA.

Climate Change

- 4.12 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 of this report on Flood Risk.
- 4.13 CO₂ emissions from the South West account for 8% of the UK total, with 27% from transport, 33% from homes and 36% from industry and commerce. The South West Regional Spatial Strategy (RSS)²¹ has set a series of ambitious and positive targets to reduce emissions at least by 30% by 2026 and 60% by 2050 through addressing both energy efficiency and accelerating the use of renewable energy sources, including:
- Achieving zero carbon housing within 10 years, and zero carbon non-domestic buildings by 2019
 - Improved energy efficiency for existing building stock
 - Concentrating growth in larger or 'Strategically Significant Cities and Towns' (SSCTs)
 - Improved public transport and demand management
 - Producing more energy locally and from renewable sources
- 4.14 There are 4 power stations within 80km radius of the nominated site. The power stations have a combined capacity of 1152 MW of which 11.6 MW is wind power. Currently the existing power station at Hinkley Point B produces 1250 MW.

Communities: Population, Employment and Viability

- 4.15 The population in the South West has steadily increased over the past 30 years and is currently estimated at 5 million. Between 1981 and 2006, the region's population increased by 16.9%, which is a greater increase than for any other UK region. This is mostly attributable to migration, mainly from London and the South East. West Somerset has seen a yet higher percentage increase in population between 1981 and 2006 at 19.7%.
- 4.16 West Somerset is the most sparsely populated Local Authority area in the South West Region, with 49 people per km², which is significantly less than the County level of 150 per km².

²¹ <http://southwest-ra.gov.uk/media/SWRA/RSS%20Documents/Final%20Draft/draftrssfull.pdf>

- 4.17 Compared to other Local Authorities in the South West, West Somerset has the lowest percentage of the population which is economically active²² (68.7%), which may be attributable to its older population. The unemployment rates in West Somerset are low compared to the national average. However, there is a high seasonal variation due to the cyclical nature of local industry.

Communities: Supporting Infrastructure

- 4.18 Transport: Strategic road transport routes in Somerset cross from the north-east to south-west of the county and include the M5 (Bristol to Exeter) and A303 (M3 to Exeter). The site at Hinkley Point is surrounded by minor roads and is approximately 6km away from the A39. The A39 is recognised as a County Freight Route providing access to the M5, a National Freight Route.
- 4.19 Bridgwater is the closest railhead to the nominated site within approximately 16km, located on the Bristol to Taunton line.
- 4.20 There is also existing port access at Combrich on the River Parrett and the potential to construct a temporary wharf facility at the nominated site itself.
- 4.21 Conventional Waste²³: Total municipal waste in the South West has increased by approximately 11% since 2000/01 to slightly below 3 million tonnes in 2006/07. Somerset County Council was in the top 3 performing waste disposal unitary authorities in the country, with a 43.7% recycling and compost rate. Landfill remains the principal method of waste disposal in the South West, with 1.8 million tonnes (62%) of municipal waste sent to landfill in 2006/07.

Human Health and Well-Being

- 4.22 The nominated site at Hinkley Point is within the Super Output Area (SOA) known as West Somerset 004C²⁴. Indices of deprivation show that the West Somerset SOA is a reasonably deprived area with income and living environment deprivation and barriers to housing and services greater than average. The age profile for this SOA shows that there are slightly fewer children under sixteen but considerably 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.
- 4.23 The most recent data (2001), shows people within the West Somerset SOA generally reported good or fairly good health. This is reflected in a life expectancy greater than the English average and higher than that of the population of the South West Region. Infant mortality is slightly higher than the English and regional average.
- 4.24 With regard to mental health, the Health Profile 2008²⁵ for West Somerset shows that estimates of the number of people of people claiming incapacity

²² Office for National Statistics – Economic Activity Rate 2006/07 for those of working age.

²³ Conventional waste means 'controlled waste', i.e. waste controlled under Part II of the Environment Act 1990.

²⁴ 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

²⁵ <http://www.apho.org.uk/resource/view.aspx?RID=50213>

benefit for mental illness in the area (26.7 per 1000 population) are not significantly different to the English average (27.5 per 1000 population). Despite the deprivation figures referred to above, pupils in the West Somerset area perform better in their GCSE equivalent examinations than their peers in the rest of England.

- 4.25 Housing stock within West Somerset Council's area is slightly inferior to the South West and England as a whole, with a slightly higher percentage of unfit dwellings²⁶ than the region or country average.
- 4.26 Figures from the Audit Commission for 2005²⁷ suggest that the fact that the crime rate in West Somerset Council's area is much lower than the UK national average.
- 4.27 The economic well-being of the area is slightly negative when compared to the South West Region, as demonstrated by the local employment figures²⁸ (see 'Population, Employment and Viability' above - noted here as a measure of well-being). From July 2007 to June 2008, 74.3% of the population of the West Somerset Council area was employed. This number compares unfavourably with figures for the South West Region (78.5%), but is similar to that of England as a whole (74.5%).
- 4.28 Local access to medical services is not particularly good, with no general practitioner (GP) practices within 5km of the nominated site. There are however, two GP practices health centres within 10km of the nominated site and a local hospital, albeit without an accident and emergency department, at Burnham-on-Sea (10.3km). The nearest accident and emergency department is at Weston-Super-Mare (17.1km), whilst the nearest mental health hospital is the Little Court Day Hospital (10.6km).
- 4.29 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 eight leisure centres within 20km of the nominated site. In addition, as West Somerset is in a rural and coastal location, the area offers good potential for outdoor recreational activities, such as walking, cycling and water sports since the district includes Exmoor National Park, the Quantock Hills, Brendon Hills and many beaches, including Kilve, Doniford, Dunster, Minehead and Porlock Weir.
- 4.30 A nuclear power station at Hinkley Point has been in operation since 1965 and Hinkley Point B power station remains in operation. Therefore the necessary data exist to enable a comparative study between the incidence of cancer in the area and the average incidence of cancer in the UK population as a whole.
- 4.31 The Committee on Medical Aspects of Radiation in the Environment (COMARE), a scientific advisory committee providing independent

²⁶ Dwellings not suitable for occupation as defined by various criteria in Section 604 of the Housing Act 1985 (as amended)

²⁷ [http://www.areaprofiles.audit-commission.gov.uk/\(rkqonp45u4sp1o55bc5scf55\)/SingleAreaSearch.aspx](http://www.areaprofiles.audit-commission.gov.uk/(rkqonp45u4sp1o55bc5scf55)/SingleAreaSearch.aspx)

²⁸ <https://www.nomisweb.co.uk/reports/lmp/la/2038431858/report.aspx?pc=IP164UR>

- 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.
- 4.32 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.
- 4.33 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'.
- 4.34 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.'
- 4.35 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.
- 4.36 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. In this context, the HPA and the German Commission on Radiological Protection have commented on the very low levels of radiation around nuclear power stations.
- 4.37 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. COMARE hope that the outcome of their review will be available at the start of 2010.
- 4.38 Radioactive monitoring carried out in 2007²⁹ found low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and

²⁹ Food Standards Agency (2007). Radioactivity In Food and the Environment (RIFE 13) report.

seafood samples taken around the existing Hinkley Point nuclear power stations. From this sampling, the estimated total dosage levels to the public from all sources within the Hinkley area were assessed as being less than 4% of the dose limit for members of the public of 1mSv per year as specified in The Ionising Radiations Regulations 1999.

- 4.39 Local concerns³⁰ regarding the effects on public health of radioactive discharges into the Severn Estuary from the existing nuclear power stations at Hinkley Point have prompted a number of studies since the 1990s. A study by the South West Cancer Intelligence Service³¹ found no evidence of increased risk of cancer linked to radiation exposure in the areas investigated. These findings were later endorsed by the Committee on Medical Aspects of Radiation in the Environment (COMARE), who concluded there was no evidence of a general excess risk of cancer in the vicinity of Hinkley Point. The analysis in COMARE's 10th report (2005) included Hinkley Point and found that there was no indication of any effect on the incidence of childhood cancer by the nuclear power station within 25 km of the site. A later study by Green Audit³² in 2007 showed an apparent excess in infant mortality in areas downwind of the power station. This report was subsequently reviewed by the South West Public Health Observatory³³, which found no increase in the risk of infant mortality in this area. There is no clear, widely accepted evidence that local residents have more physical ill health/higher levels of risk to their health from existing doses of radiation arising from radioactive substances released into the environment from the existing power stations, although there remains concern amongst some local groups.

Cultural Heritage

- 4.40 There are more than 1,000 listed buildings, 197 Scheduled Monuments and 5 Historic Parks and Gardens within West Somerset District. Within 5km of Hinkley Point there are three Scheduled Ancient Monuments (Stogursey Castle, Village Cross, and Wick Barrow Pixies' Mound) and one Registered Park and Garden (Fairfield).
- 4.41 The Wick Barrow Pixies' Mound (Long Barrow) Scheduled Ancient Monument (SAM) is immediately adjacent (less than 100m) to the south of the existing Hinkley power stations. It is known that this SAM lies within an area of Roman settlement as a possible Roman farmstead has been identified to the west of the existing plant.
- 4.42 Other Scheduled Monuments are noted within 5km the nominated site; these include St Sidwell's Well³⁴, a Medieval holy well, and Wick Manor enclosure³⁵,

³⁰ Responses from Stop Hinkley and Parents Concerned about Hinkley to the July 2008 DECC consultation on SSA Process and Siting Criteria for New Nuclear Power Stations <http://www.decc.gov.uk/consultations/>

³¹ South West Cancer Intelligence Service (SWCIS) 2003. Cancer Incidence in Burnham North, Burnham South, Highbridge and Berrow 1990-99. <http://www.swpho.nhs.uk/resource/>

³² Busby C, de Messieres Mireille, and Morgan S. Infant and Perinatal Mortality and Stillbirths near Hinkley Point Power Station in Somerset 1993-2005

³³ South West Public Health Observatory. Infant and Perinatal Mortality in Somerset <http://www.swpho.nhs.uk/resource/browse.aspx?RID=35852>

³⁴ English Heritage (EH) National Monument Register (NMR) 191182, Somerset Historic Environment Records (SHER) 34064

³⁵ EH NMR 982137, SHER 34654

an undated enclosure visible as an earthwork. The presence of these features indicates historic activity in the area immediately surrounding the existing facility, including immediately offshore. As such the area is likely to be considered of high archaeological importance.

Landscape

- 4.43 Hinkley Point is surrounded primarily by agricultural land, and is situated within the Vale of Taunton and Quantock Fringes National Character Area (NCA). This NCA is characterised by scattered settlements, a lowland mixed farming landscape and open and windswept coast with low cliffs. Located within 5km of the nominated site, to the west and south west, is the Quantock Hills Area of Outstanding Natural Beauty (AONB), which covers 99km², from the vale of Taunton Deane to the Bristol Channel Coast. The AONB consists of large amounts of heathland, oak woodlands, ancient parklands and agricultural land. The existing Hinkley power station is clearly visible from parts of this nationally designated landscape.
- 4.44 The nominated site is immediately adjacent to the existing power station at Hinkley Point, which is visible from Wales, across the Bristol Channel.
- 4.45 The Countryside Agency/CPRE county tranquillity map identifies the nominated site as lying within one of the most tranquil parts of the South West of England.

Soils, Geology and Land Use

- 4.46 The majority of West Somerset is classed as Grade 3 agricultural land, with Hinkley Point being located on Grade 3-4 agricultural land, which is not of high value. The soils are noted to be of a slowly permeable, calcareous, clayey nature.
- 4.47 Hinkley Point lies on the southern margin of the Bristol Channel sedimentary basin. Rocks of the Devonian and Carboniferous age are exposed in the Quantock Hills in the south west and to the north. To the east, the Lower Lias cliff line gives way to the flat low-lying ground of the River Parrett estuary and Somerset Levels.
- 4.48 The land use surrounding the existing power stations is primarily farmland and moorland, and is sparsely populated. Farms in the vicinity produce a range of produce, including beef and dairy cattle and sheep. A small sewage treatment works is located to the south of the existing nuclear power stations.
- 4.49 There is an historical landfill site located at the eastern section of the nominated site, referred to as Hinkley Point Power Station Landfill. This landfill ceased operation in 1990. The waste types received included inert and special (hazardous waste). There are also two historical landfills located to the northeast and southeast of the nominated site. These closed landfills are regulated under the Waste Management Licensing Regulations (now Environmental Permitting Regulations). In addition, an active Registered Waste Transfer site to the southeast of the nominated site is operated as part of the existing power station. Further information regarding the identified

waste sites, including extent, nature and quantities of waste will be obtained and assessed as part of a site specific EIA.

- 4.50 No mineral abstraction sites have been identified locally.
- 4.51 British Geological Society (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 to low risk

Water Quality and Resources

- 4.52 Hinkley Point is located in the South West (SW) River Basin District (RBD). Within this RBD, only 24 % of rivers (by length) meet the requirements for good ecological status (GES) or good ecological potential (GEP). In total, 2% of all surface waters are designated as artificial and 18% of all surface waters are designated as heavily modified.
- 4.53 82% of groundwater bodies in the RBD meet the requirements for 'good' status. 48% of estuaries and transitional and coastal waters and 23% of lakes meet the requirements for GES or GEP. 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.
- 4.54 Although the RBD has approximately 40% of the total designated bathing waters for England and Wales and 33 designated shellfish waters, a number of estuaries have failed good status due to elevated levels of nitrogen.
- 4.55 The nominated site at Hinkley Point is located within the South and West Somerset catchment of the SW RBD. Of the 1,100km of rivers within this catchment, only 80km by length achieves GES, mostly due to pressures such as phosphate and dissolved oxygen. Many of the rivers in this catchment are heavily modified or artificial water bodies. The nearest watercourse to the nominated site is the Stogursey Brook which has been assessed as having moderate ecological quality, but its chemical quality has not been assessed.
- 4.56 There are no identified Shellfish Waters in close proximity to the nominated site. The nearest identified Bathing Waters are at Burnham Jetty and Berrow to the east, and at Blue Anchor West to the west. There are also Eutrophic Waters identified in the Rivers Brue, Sheppey and Alham catchment which discharges into the sea at Burnham. There are no identified Shellfish Waters or Bathing Waters on the opposite bank of this reach of the Bristol Channel (the area covered by EA Wales).
- 4.57 As the main source of drinking water, groundwater is an important resource in the RBD, but is under pressure from abstraction and nitrate and pesticide contamination, mainly from agriculture. Over the next 20 years, demand for

- groundwater is predicted to increase in the SW RBD by around 5%, generally due to household demand.
- 4.58 There are no major aquifers present at the nominated site. Hence, groundwater quality and availability has not been assessed.
 - 4.59 There are no groundwater source protection zones located in the immediate vicinity of the site.
 - 4.60 Hinkley Point is located within the West Somerset Streams Catchment Management Abstraction Strategy (CAMS) area. Hinkley Point is located at the very eastern edge of WRMU7 Kilve. WRMU7 resource availability status is classed as water available. The Stogursey Brook to the south of Hinkley Point is located within the Parret Catchment CAMS area; resource availability in this area that has not yet been assessed.
 - 4.61 There are no water related Special Areas of Conservation, Special Protection Areas or Sites of Special Scientific Interest at or in close proximity to the site.
 - 4.62 Hinkley Point is located within Wessex Water's West Water Resource Zone (WRZ). There are no water supply deficits in this zone under existing conditions. However, it is unclear from the Wessex Water draft Water Resource Plan what the predicted situation to the 2034/2035 planning horizon is for this zone.
 - 4.63 The exact water requirements for the nominated site are not yet finalised. The existing Hinkley Point A and B power stations have both used direct water cooling sourced from the Bristol Channel. The nomination expresses a preference for employing similar direct water cooling technology for any new nuclear power station on the nominated site.
 - 4.64 Hinkley Point is situated on a rock platform with an extensive rock outcrop in front of the site and towards the east within the inter-tidal zone. The rock outcrop offers a measure of protection from erosion by tidal currents and storms. The shale beds within the mudstone formation offer little resistance to erosion and the cliff line and shoreline show evidence of active erosion. The cliffs are heavily protected by sea defences but Hinkley Point is exposed to tidal and wave action within the Bristol Channel and is being actively eroded.
 - 4.65 The Severn Estuary has the second highest tidal range in the world. Locally, the tidal range increases eastwards as far as Hinkley Point, where the highest recorded ranges have been up to 15m. Adverse weather conditions can raise water levels by more than 2m above predicted levels and the low-lying coasts on the southern side of the Bristol Channel are particularly vulnerable due to the very high tidal range.
 - 4.66 The tidal currents in the Bristol Channel generally exceed 1.5 m/s at spring tides for long periods and over wide areas. At times, a tidal bore forms in the Severn Estuary which can be up to 2m high. The shoreline is subject to strong winds, powerful waves and substantial storm surges. The general geomorphological context is one of on-going marine transgression with the

inner Bristol Channel undergoing enlargement. The rate of marine transgression is very uncertain, however, but an advance (of the estuary) north eastwards along the Severn Vale of up to the order of 20km over the last few millennia may give some indication of change. This process can only accelerate as sea level rises into the future, putting increased pressure on the existing embankments and other defences.

- 4.67 In a highly dynamic environment such as the Bristol Channel, the strong tidal currents ensure that sediment is permanently in suspension. Sand is carried in suspension with the flood and ebb motion of the tide. Convergences or divergences of this transport will cause accretion and erosion respectively. This is one of the primary mechanisms for shoreline erosion.

Flood Risk

- 4.68 The nominated site lies partially within Flood Zone 3 (High Probability), as indicated on the Environment Agency's Flood map. With the existing flood defences in place, this means that there is greater than 0.5% risk of coastal flooding occurring on the site in any one year.³⁶ The existing defences afford a standard of protection for a one in two hundred year flood event; however, there is evidence at Hinkley Point that the flood defences are being seriously undermined by coastal erosion. The policy strategy as set out by the Shoreline Management Plan (Phase 1) in managing the existing defences is to 'hold the existing line of defence'.
- 4.69 The nominated site area is covered in the West Somerset Strategic Flood Risk Assessment and Shoreline Management Plan.
- 4.70 The draft policy in North Devon and Somerset's SMP2 for this policy unit is to 'hold the line', i.e. maintain the line of the existing defences (this is the same as the policy for management of coastal defences in SMP1).
- 4.71 Accelerated sea level rise could have significant impacts on the shoreline at Hinkley Point. Increased water levels would narrow the wide foreshore and reduce the significant wave attenuation which takes place across the sub-tidal and intertidal areas. This would lead to increased erosion potential and increased threat of inundation at the existing and nominated power station site. Under 'normal' wave conditions, the dominant longshore drift within the region is generally towards the east. The gravel foreshore to the east of Hinkley Point is fed by erosion of the intertidal platform and although the volume of gravel supplied is limited, greater water depths resulting from sea level rise might result in a reduced supply of material and a subsequent reduction in the volume of the foreshore, further increasing erosion potential at the site.
- 4.72 It is recommended that hydrodynamic and sediment transport surveying and modelling should be conducted as part of the detailed appraisal to determine baseline conditions. This data can then be used to determine an appropriate management strategy for combating the long term effects of climate change on the coastline.

³⁶ Planning Policy Statement 25: Development and Flood Risk

- 4.73 The nominated site is likely to require additional coastal defences and flood protection works (i.e. embankments, sea walls) to safeguard against future coastal erosion and coastal flooding. Mitigating for the flood risk using hard engineering solutions in addition to that already present at the two sites may alter the systems hydrodynamics. This in turn will be reflected in the positions of the channel banks and networks, so that mudflats, sand flats and saltmarshes can be expected to erode or accrete in response accordingly. In this instance, sediment transport and hydrodynamic modelling would be useful in determining the likely impacts of the engineering works on the coastal and estuarine system, and possibly explore alternative engineering solutions to combat the effects of sea level rise.

5 Appraisal of Sustainability

Introduction

- 5.1 This section considers the potential sustainability effects of including the nominated site at Hinkley Point in the list of potentially suitable sites in the 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 Hinkley Point, should the nominated site be listed as potentially suitable in the 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 Hinkley Point site and, where possible, suggests 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 below.
- 5.3 The findings of the appraisal were used to help the SSA process to identify sites potentially suitable for new nuclear power stations and will be listed in the 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 Significance in the Site-Level AoS

Local Effects
<p>The AoS Site Report has identified potentially significant benefits and disbenefits of a new nuclear power station at Hinkley Point. Some of the effects identified are significant at the local level and are more appropriately addressed through the development consent process by the IPC. Applications for development consent will include EIA, undertaken by the developer. Such locally significant effects may include, for example, potential effects on a nearby County Wildlife Site, and disturbances to local communities arising from increased traffic during the construction phase. These 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 nuisance³⁷ 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 HRA Report for Hinkley Point). Where an effect is considered to have significant implications for the wider region (in this case, the South West), 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 There is potential for air quality impacts during the construction, operation and decommissioning stages of developing new nuclear power stations. However, relative to some other forms of power generation, nuclear power plants do not emit significant quantities of carbon dioxide, sulphur dioxide nitrogen oxides or

³⁷ 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.

particulates. Therefore, significant air pollution leading to deterioration in local or regional air quality is unlikely to arise during normal operation of the new nuclear power station. Construction and decommissioning impacts are potentially more problematic and will require control and management.

- 5.5 The construction of a nuclear power station at Hinkley Point is likely to have localised adverse effects on air quality in the short term (5-6 years), including dust and emissions from construction vehicles, Heavy Goods Vehicles (HGVs), and traffic movements generated by the estimated construction workforce of 4,000. This has the potential to affect residential properties in the surrounding area and villages. In particular, traffic may need to be routed through Cannington and Bridgwater, potentially increasing emissions in these locations.
- 5.6 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 Ecosystem Sections.
- 5.7 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 authorisations issued under the Radioactive Substances Act 1993 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.
- 5.8 During operation, aerial emissions (radioactive and non-radioactive) will be regulated by the Environment Agency. The EA's most recent available assessment of radioactive aerial emissions for regulated nuclear power stations, including for the current generation of nuclear power from the existing facilities at Hinkley Point indicates that all fall within authorised limits³⁸. It is more likely that the traffic generated by the operational workforce will have longer-term adverse effects on air quality, including in Cannington and Bridgwater. 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. 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.
- 5.9 There is a very low risk of an accidental release of radioactive emissions from the nominated site at Hinkley Point, which could have a significant strategic effect on air quality. The Health and Safety Executive (HSE), the Nuclear

³⁸ Measuring Environmental Performance: Sector Report for the Nuclear Industry (Environment Agency, Nov 2005) http://maps.environment-agency.gov.uk/wiyby/queryController?topic=pollution&ep=2ndtierquery&lang=_e&layerGroups=1&x=321000.0&y=145900.0&extraClause=AUTHORISATION_ID~'AF7282'&extraClause=YEAR~2006&textonly=off&latestValue=&latestField=

Installations Inspectorate (NII) and the Environment Agency will consider this matter during their risk assessments, which will be carried out as part of the consenting 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 population to be adversely affected means that, at this stage of assessment, the potential for strategic adverse sustainability effects has been identified.

- 5.1 Strategic Effects on Air Quality: The AoS has identified that the potential exists for a significant urban and rural population to be affected by any significant accidental release of radioactive emissions from the Hinkley Point site. However, it is noted that there is a very low risk of such an event occurring. Prevention measures include existing risk assessment and regulatory processes. The nuclear regulatory bodies 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

- 5.10 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 disturbance and impacts on air and water quality, 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
- 5.11 The construction of a new nuclear power station on the nominated site together with associated infrastructure and coastal/flood defences may lead to direct loss and fragmentation of priority terrestrial habitats (including species-rich hedgerows and neutral grassland within the Severn Estuary SPA/ Bridgwater Bay SSSI) and wildlife corridors. It could also cause visual and noise disturbance to important bird populations associated with these designated sites. There may be direct loss of designated foreshore, inter-tidal and sub-tidal habitats if a new sea wall and other flood defences were to be constructed, as well as a potential marine offshore facility and cooling water culverts. Mitigation opportunities include careful site layout design and project planning, including temporal planning to avoid disruption of nesting birds. In some instances, habitat loss may be compensated for by new habitat creation within the wider area, and an ecological mitigation and management plan could assist in maintaining the connectivity of wildlife corridors for certain species around the nominated site.
- 5.12 Biodiversity would also be affected at a more 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.

- 5.13 During operation, cooling water abstraction may impact on important fish species (for example, species that are qualifying features of the Severn Estuary cSAC). It may be possible to mitigate this by including fish deterrent schemes within cooling water intake and adapting system design accordingly. However, further detailed study is required to determine the significance of impacts and mitigation options. Further assessment will be required on the biodiversity impacts of abstraction and current methods available to mitigate fish entrainment including small fish fry and eggs.
- 5.14 Discharge of heated waters into the Severn Estuary and Bridgwater Bay may affect aquatic ecology by raising water temperatures and decreasing oxygen available to aquatic species. Routine discharge of radioactive liquids during operation of a new power station on the nominated site, in addition to the discharges into the estuary from the current nuclear facilities at Hinkley Point, has the potential to adversely affect the Severn Estuary ecosystem. Further detailed study is required to assess the likelihood and significance of any adverse effects. Routine discharges are regulated by the Environment Agency to meet with their standards and targets for protecting public health and the environment. There is also a very low risk of accidental discharges of radioactive materials to the aquatic environment, including from stored radioactive waste. This is monitored by the Environment Agency.
- 5.15 The potential need to develop Combrich Wharf for transport of abnormal loads and aggregate will have a potential impact on special interest features of the SPA/Ramsar/cSAC, through disturbance, loss of habitat, and fragmentation. Such development may also affect migratory fish. These potential impacts should be subject to further study at the project EIA stage.
- 5.16 There are potential cumulative effects with other energy projects, including other proposals for nuclear power stations such as Oldbury in the Severn Estuary area, and a Severn Tidal Power project. The Government is carrying out a two-year feasibility study to determine whether the Government could support a tidal power project in the Severn Estuary. The Government is assessing a range of different schemes and the scope and scale of environmental effects is likely to vary widely between them. The Government is conducting separate environmental studies into these impacts and whether they could be mitigated. These environmental studies are not yet complete so the assessment in this report is based upon the potential effects outlined in the preliminary habitats screening report for Severn Tidal Power^[1]. This preliminary habitats screening report is not final and will be reviewed in the light of the feasibility study's findings. It covers all five options but does not distinguish between the individual options where environmental impacts will vary. There will be a further consultation on the Feasibility's study findings, likely in 2010.

^[1] This was published in January 2009. For more details see http://severntidalpowerconsultation.decc.gov.uk/supporting_documents

- 5.17 There is also a proposal to construct a Bristol Deep Sea Container Terminal (BDSCT). These cumulative effects could potentially include very significant losses of designated habitats and reduction in populations of species within the SPA/cSAC/Ramsar site.
- 5.18 Further studies carried out by the developer through the EIA process will be required in order to fully understand the potential effects on designated sites and on biodiversity in the area as a whole. Design and mitigation measures should in the first instance seek to avoid and minimise loss of habitat and avoid disturbance of legally protected species. Once defined, mitigation measures could be implemented through an ecological mitigation and management plan or similar document. Opportunities for biodiversity enhancement may be possible.
- 5.19 A separate report, documenting the Habitats Regulation Assessment (HRA) for Hinkley Point³⁹ has been undertaken. This report should be referred to for further information relating to the effects of a new nuclear power station at Hinkley Point on European-designated habitat sites.
- 5.20 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 Severn Estuary cSAC/SPA/Ramsar, River Wye SAC, River Usk SAC and Bridgwater Bay SSSI/NNR, Severn Estuary SSSI, River Wye (Lower Wye) SSSI and River Usk (Lower Usk) SSSI) means that significant strategic effects on biodiversity cannot be ruled out at this stage of appraisal. There is however, potential for the mitigation or compensation of biodiversity effects, including the creation of replacement habitat for UK designated sites. There are potential cumulative effects with other projects in the Severn Estuary area, including the Severn Tidal Power project. Detailed baseline studies will form part of the project level Environmental Impact Assessment. The Habitats Regulations Assessment for Hinkley Point should be referred to for further details and advice for the international designated sites.**

Climate Change

- 5.21 The establishment of a new nuclear power station will contribute positively to the South West region's climate change objectives. 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.
- 5.22 Given the relatively remote location of the nominated site and the lack of sustainable transport links, a new nuclear power station at Hinkley Point may result in emissions from the transport of goods and labour throughout the construction, operation and decommissioning phases. However, there is some potential for the developer to promote increased use of public transport through provision of appropriate transport links to the power station.

39 Habitat Regulations Assessment Hinkley Point: HRA Screening and Appropriate Assessment Report

- 5.23 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.
- 5.24 **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 the South West's climate change objectives. A lack of sustainable transport options to the nominated site may result in emissions from the transport of goods and labour, but these emissions could be partially mitigated with green travel plans and investment in public transport.**

Communities: Population, Employment and Viability

- 5.25 The construction and operation of a new nuclear power station at Hinkley Point is likely to have positive effects for employment, the economy and communities at the local level, with the significance of these effects reduced at a regional and national scale.
- 5.26 There is potential for short-term negative effects on local communities due to in-migration of workers to the area, especially during construction. This in-migration could bring pressure on basic services and housing, local traffic routes surrounding the nominated site and potential problems integrating with the local community. Due to limited public transport in the district, impacts on local roads may be greater than for some other nominated sites.
- 5.27 A potential though uncertain effect of strategic (regional) impact, may be the increased demand in construction labour, which could lead to a shortage of local construction workers to meet the needs of other industries.
- 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 Positive cumulative effects are also likely for the South West Region when considered with nominations for a second nuclear power station (at Oldbury) and the Severn Tidal Barrage project in the region. Together, these could contribute to the regional economy and employment.

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: Positive effects of regional economic significance may occur when the project is considered cumulatively with other energy projects in the South West. A potential negative effect of regional significance is the project leading to a shortage of local construction labour available to other industries.

Communities: Supporting Infrastructure

- 5.33 Transport: Negative effects at a local scale are likely due to increased pressure on basic services and infrastructure in West Somerset and Sedgemoor, including waste management facilities, wastewater treatment, electricity and on local transport networks. The significance of effects is dependent on the detailed timing of decommissioning of the existing facilities and construction of a new power station on the nominated site. For example, if substantial volumes of construction and decommissioning work were undertaken concurrently, it would place increased pressure on transport and waste networks. This is considered to be a local, rather than strategic effect.
- 5.34 There is the potential for significant effects on national road infrastructure through increased congestion and disruption of traffic on the M5 motorway and at junctions 23 and 24, which link to the A38. In isolation, this would not be considered significant. However, when considered with the decommissioning of Hinkley A and B and the cumulative effect of development in the region, including planned residential development at Bridgwater, this may lead to increased congestion. This can potentially be mitigated, provided the proposal includes transportation management plans, green travel plans and consideration of alternatives to road for the transport of large loads (for example, transport by sea). Nevertheless, further studies will be required.
- 5.35 At Hinkley, in order to transfer the huge amounts of aggregates needed for construction, the feasibility of constructing a new jetty at Hinkley Point and expanding or upgrading the existing wharf at Comwich is being explored.
- 5.36 Conventional waste: Waste material will be generated during construction, operation and decommissioning of a development. Local impacts may be

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

expected upon local 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.

- 5.37 Radioactive waste⁴¹: The operation of a new nuclear power station at the nominated 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.
- 5.38 Electricity transmission: The development of a nuclear power station at Hinkley Point 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).
- 5.39 Strategic Effects on Communities: Supporting Infrastructure: There is the potential for adverse effects on supporting infrastructure, including conventional waste, transport and basic services. These effects are of local significance. However, there is some potential for wider significant effects on national road infrastructure (the M5 motorway, including junctions 23 and 24 linking to the A38), when considered cumulatively with the proposed development at Bridgwater, although there is a range of mitigation options available.**

Human Health and Well-Being

Radiological Health Issues

- 5.40 Radiation occurs naturally in the environment. The Health Protection Agency (the 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

⁴¹ Radioactive waste is waste regulated under Radioactive Substances Act 1993.

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

- 5.41 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.
- 5.42 The environmental agencies run monitoring programmes to provide an independent check on the impacts of radioactive discharges. In 2008, they published a report covering 2007, showing that radiation doses to people living around nuclear sites remained below the statutory dose limit of 1 mSv per year.⁴⁴ In England and Wales, the main regulatory bodies are the Nuclear Installations Inspectorate (NII), a division of the Health and Safety Executive 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 Radioactive Substances Act 1993⁴⁵. This regulatory system will apply to a potential new nuclear power station at Hinkley Point and should ensure that permitted radioactive discharges do not cause unacceptable risk to health.

Regulatory Justification

- 5.43 Before the UK can adopt any new class or type of practice involving the use of ionising radiation, it must first be 'Justified', i.e. it must be demonstrated that any benefits resulting from its introduction outweigh the associated health detriment. European Council Directive 96/29/Euratom of 13 May 1996 (the Basic Safety Standards Directive)⁴⁶ requires Member States to ensure that, in

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>

⁴⁴ Radioactivity in Food and the Environment, 2007 RIFE-13, Environment Agency, Scottish Environment Protection Agency, Food Standards Agency, Northern Ireland Environment Agency 2008

<http://publications.environment-agency.gov.uk/pdf/GEHO1108BPBH-e-e.pdf?lang=e> (see Table S.1 "Radiation doses due to discharges of radioactive waste in the United Kingdom, 2007" of this publication).

⁴⁵ Radioactive Substances Act 1993 http://www.opsi.gov.uk/acts/acts1993/ukpga_19930012_en_1

⁴⁶ Council Directive 96/29/Euratom of 13 May 1996, laying down basic safety standards for the health protection of the workforce and general public against the dangers of ionising radiation. Official Journal of the European

advance of being first adopted or first approved, all new classes or types of practice resulting in exposure to ionising radiation are justified 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 is the Justifying Authority⁴⁷.

- 5.44 The basic safety standards for the protection of the workforce and general public against the dangers of ionising radiation set out in the Directive are further enforced before, during and after operation of nuclear power stations, including the management and disposal of waste by the UK's regulatory framework. This aims to reduce potential health impacts to acceptable levels and ensure that radiation doses are within internationally agreed limits.

Construction and Operational Effects

- 5.45 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 UK⁴⁸. 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.
- 5.46 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 showed that of the recorded 913 events associated with the transport of radioactive materials no 'significant dose events' were associated with the nuclear power industry⁴⁹.
- 5.47 The scale of construction work associated with a potential new nuclear power station at Hinkley Point 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.
- 5.48 During the operation of a potential nuclear power plant at Hinkley Point, activities will be regulated in accordance with the Health and Safety at Work Act 1974, Nuclear Installations Act 1965 and the Ionising Radiations

Communities (OJ L 159, 29.6.1996, p.1)

http://ec.europa.eu/energy/nuclear/radioprotection/doc/legislation/9629_en.pdf

⁴⁷ Completion of the Regulatory Justification process is not dependent on consent being granted by the IPC and similarly there is no need for the IPC to wait for completion of the Regulatory Justification process before granting consent.

⁴⁸ [White Paper Website Ref](#)

⁴⁹ <http://www.hpa.org.uk/HPA/Publications/Radiation/HPARPDSeriesReports/>

Regulations 1999. The potential operator must have a Nuclear Site Licence from the Nuclear Installations Inspectorate (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.

- 5.49 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. 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 advice⁵⁰, a precautionary approach is adopted to the routing of any required power lines.
- 5.50 The presence of, and more particularly the construction of, a new nuclear power station at the Hinkley Point site will increase community disturbance to some degree. Such disturbance may include noise and vibration, dust in the construction phase and increased traffic during 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.
- 5.51 Noise emissions will arise from the nuclear power station construction, operational and decommissioning phases. Construction noise will emanate from plant, site activity and transportation sources. Similarly, during operation noise will arise from both fixed installations, on-site mobile plant sources and off-site NPS 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 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.
- 5.52 Noise emissions from nuclear power stations are relatively low. Minimisation of operational noise emissions would require consideration at the design/layout stage of the scheme. In particular, significant benefits would result if potential sources of noise emissions could be reduced through a combination of engineering design solutions. These could include the careful siting of noise emitting 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)

⁵⁰ http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733817602

standards would need to be applied so that the noise impact of the proposals could be determined for planning purposes. Given the relatively lightly populated locality, it is considered that noise and vibration impacts would not be a significant issue and pose a constraint to development at Hinkley Point.

Local Health and Recreation

- 5.53 With regard to recreation, there is a potential impact associated with the West Somerset Coast Path, which passes the nominated site. It is likely that this path may need to be closed during some phases of power station construction, but this effect will be temporary and can readily be mitigated by providing a bypass path around the nominated site.
- 5.54 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.
- 5.55 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.
- 5.56 It is probable that building, operating and decommissioning a new nuclear power station at Hinkley Point would 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 more significant than any potential negative consequences of the project, assuming there are no adverse effects on the health of the local population.
- 5.57 **Strategic Effects on Human Health and Well-Being: The rigorous system of regulation of routine discharges from the proposed nuclear power station at Hinkley Point 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

- 5.58 The Hinkley Point site is within an area of known archaeological value. However, the area has been disturbed through previous excavation and development (including the construction of the existing power stations). Generally, effects on cultural heritage would be local and within the footprint of the nominated site.
- 5.59 Nevertheless, implications could be of wider national significance, due to the location of the Wick Barrow Pixies' Mound Scheduled Ancient Monument (SAM) immediately adjacent to the existing nuclear facilities. Although previously excavated, this SAM has the potential to be directly affected by any construction works and the landscape setting of the SAM could be permanently lost. These effects will need to be avoided through the appropriate planning and design of construction activities and operational facilities. It may be possible to restrict the effects of the construction stage (which has a wider footprint) on the setting. Detailed assessment of the impact of this SAM and the setting of other above ground cultural assets will be required at the project level EIA stage and will include consultation of the County Historic Landscape Characterisation.
- 5.60 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. For example, Bronze Age and Roman activity is evident within the surrounding (immediate) area of the existing facility. There is also potential for new sea defences and wharf facilities to impact upon maritime archaeology. Although the designated and known sites can be avoided, unknown archaeological (buried) resources could potentially be present. 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 preparation and excavations).
- 5.61 Where new sea defences and potential works to construct wharf facilities are proposed, it will be necessary to undertake in-depth investigation techniques to establish their effect on any maritime archaeology that may be present. This will require early consultation with the Local Authority Archaeologist to inform the project level EIA.
- 5.62 **Strategic Effects on Cultural Heritage: The AoS has identified potential, adverse effects on the Wick Barrow Pixies' Mound Scheduled Ancient Monument (SAM), which is of national heritage significance. However, it is likely that these can be mitigated. Further detailed assessment at project level will be required.**

Landscape

- 5.63 During construction, operation and decommissioning, the main direct impacts on landscape would be at the local and district levels. In addition, though there are likely to be some long-lasting adverse landscape and visual impacts on the surrounding area, and potentially the setting of the Quantock Area of Outstanding Natural Beauty (AONB). There is likely to be limited potential for mitigation of the adverse impacts arising from new power station buildings given their scale. The existing power station is already feature from local viewpoints and is likely to be visible from some long-distance viewpoints from high ground inland (for example, the Quantock Hills). However, a new nuclear power station on the nominated site is still likely to lead to perceptible deterioration in some of these views. The main form of potential mitigation is the clustering of new and proposed reactor buildings to avoid broadening of the potential visual impact.
- 5.64 There appear to be significant opportunities to mitigate potential adverse effects on local views, and on the landscape features of the nominated site. For example, there appears to be potential for avoiding the majority of the screening woodland belts through the use of protective buffer areas during construction, and Local Authority policy support for increasing tree cover in the lowlands. Low impact design solutions for a marine landing platform and tunnelling techniques for water cooling infrastructure installation, may help to avoid adverse effects on the shoreline wave-cut platform. Detailed landscape and visual assessment will need to form part of the nominated site Environment Impact Assessment to identify the precise nature of effects and to inform a detailed mitigation strategy.
- 5.65 Given the likely scale of a new nuclear development, including the potential construction of two new reactors, and the fact that the existing Hinkley Point reactors would remain on site over the long term, effective mitigation of adverse effects during the construction and operational phases would be unlikely. The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long term. However, long-term land uses for the restored areas would be established at a later stage.
- 5.66 Strategic Effects on Landscape: The AoS has identified potential, adverse effects on the surrounding elevated local landscape and associated distant views. These include some potentially lasting adverse effects on the setting and views from within the Quantock AONB to the west. Direct adverse impacts on landscape character are generally at the local level, on and immediately around the nominated site. However, there appears to be opportunities for effective mitigation. There is also high potential to mitigate the impacts arising from the new power station on near views given the potential for strengthening the positive wooded characteristics of the lowland.**

Soils, Geology and Land Use

- 5.67 The construction of a nuclear power station at Hinkley Point and associated infrastructure, including transmission lines and towers, will lead to the direct loss of soil structure. This may include impacts on soils that maintain

terrestrial habitats, including designated nature conservation sites (the Severn Estuary SPA, cSAC and the Bridgwater Bay SSSI and NNR), with indirect effects on biodiversity. However, effects could be mitigated by limiting the footprint of the development, which would reduce the area of soils affected, and recognised best practice soil and water management measures during construction.

- 5.68 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.
- 5.69 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, are considered to be of local impact only.
- 5.70 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.**

Water Quality and Resources

- 5.71 Upgraded flood defences are likely to be required to counteract coastal retreat at the nominated site (see section on flood risk below). These defences have the potential to modify existing estuarine hydrodynamics and associated sediment movement, which may have secondary effects on estuarine and marine ecosystem structure and functioning. However, the use of an appropriate design and a full understanding of the hydrodynamics and sediment transport within the estuary could minimise the potential effects.
- 5.72 There are potential cumulative effects with other proposed projects, including a further nomination for a new nuclear power station at Oldbury in the Severn Estuary area. Options being considered for the Severn Tidal Power project could impact on estuarine hydrodynamics and associated sediment movement. These effects may be more significant than the potential effects of the development at Hinkley Point⁵¹.

⁵¹ The Government is carrying out a two-year feasibility study to determine whether the Government could support a tidal power project in the Severn Estuary. The Government is assessing a range of different schemes and the scope and scale of environmental effects is likely to vary widely between them. The Government is conducting separate environmental studies into these impacts and whether they could be mitigated. These environmental studies are not yet complete so the assessment in this report is based upon the potential effects outlined in the preliminary habitats screening report for Severn Tidal Power. This preliminary habitats screening report is not final and will be reviewed in the light of the feasibility study's findings. It covers all five options but does not distinguish between the individual options where environmental impacts will vary. There will be a further consultation on the Feasibility's study findings, likely in 2010.

- 5.73 The new Marine Management Organisation (MMO) set up under the forthcoming Marine and Coastal Access Bill will have a role in advising the IPC on conditions that should be imposed to mitigate any adverse impacts the development may have on the marine environment or other uses of the sea.
- 5.74 The return of cooling water to the estuary at elevated temperatures could have significant adverse effects on coastal processes and water quality, and particularly on aquatic biodiversity. Whilst a detailed appraisal at project EIA level will be required, evidence suggests that the existing power stations have, thus far, had little significant adverse effect on the designated sites of nature conservation importance in the estuary. Any future thermal discharge will be subject to discharge consent from the Environment Agency and will need to meet existing regulatory standards or to avoid any further deterioration (whichever is the most stringent).
- 5.75 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.
- 5.76 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 as 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 the nominated site. Similar comments apply to wastewater production from the nominated site, although there is likely to be a short-term effect of increasing wastewater production due to an increased population during the construction phase.
- 5.77 A minor impact could occur as a result of the effect of the development on the quality and quantity of groundwater at the nominated site. The aquifer underlying the nominated site is not currently used for water supply, but could be used locally for private water supplies. Discharges from this groundwater body may support local groundwater-dependent surface water aquatic ecosystems. Localised groundwater pathways are likely to exist, hence accidental discharges or construction disturbance at the nominated site could cause deterioration in groundwater quality and flow quantity. In addition, a large increase in water supply would probably need to be transferred from adjacent water resource zones, which could impact other catchments or groundwater bodies and water-dependent ecosystems.
- 5.78 **Strategic Effects on Water Quality and Resources: The AoS has identified potential, adverse, effects on water including on coastal processes, hydrodynamics and sediment transport. Adverse effects on**

water resources, including groundwater resources, could occur through increased demand, particularly during construction. Indirect effects on nationally and internationally designated habitats, including from the thermal impact of cooling water discharges have also been identified. This is of potential wider significance because of indirect effects on national and European designated habitat sites.

Flood Risk

- 5.79 The site is in an area that the Environment Agency considers at risk from coastal flooding. Climate change is also likely to bring about a rise in sea levels during the operational lifetime of a new nuclear power station on the nominated site.
- 5.80 Flood risk is not likely to increase as a direct result of the construction of a new nuclear power station. However, to protect the power station from flooding and predicted sea level rise, existing coastal defences may need to be improved or new defences constructed. These defences have the potential to modify existing estuarine hydrodynamics and associated sediment movement, which may have secondary effects on estuarine and marine ecosystem structure and functioning. As discussed in the section above on Water Quality and Resources there is a potential for wider cumulative effects when construction is considered with the nomination for a new nuclear power station at Oldbury and the Severn Tidal Power project. The use of an appropriate design for coastal defences at Hinkley Point and a full understanding of the hydrodynamics and sediment transport within the estuary could minimise the effects. Any residual flood risks to the Hinkley Point site could be mitigated through the siting of the most vulnerable site infrastructure at the lowest levels of flood risk.
- 5.81 The Shoreline Management Plan being undertaken by WS Atkins for the Environment Agency provides a review of existing flood defences along the Severn Estuary. A coordinated approach by all parties involved towards flood risk is essential in this discipline area.
- 5.82 **Strategic Effects on Flood Risk: The AoS has identified potential, adverse effects relating to 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

- 5.83 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.

5.84 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

5.85 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 2 Plans and Programmes Review. The key plans that might have significant interactions with cumulative effects for the draft Nuclear NPS and Hinkley Point were identified as follows:

- Draft Regional Spatial Strategy for the South West 2006-2026, South West Regional Assembly (2007 - 2008)
- Draft River Basin Management Plans (South West, Wales, Severn) Environment Agency (2008)
- Rural Development Programme for England 2007-13, Department for Environment, Food and Rural Affairs (December 2007)
- Strategic Flood Risk Assessment, Scott Wilson for West Somerset Council and Exmoor National Park Authority (March 2009)
- Bridgwater Bay to Bideford Shoreline Management Plan, Halcrow (1998)

5.86 Other key projects that might have significant interactions with the proposals for new nuclear power station(s) at Hinkley Point were identified as follows:

- Decommissioning of existing Hinkley A and B Reactors
- Nominations for a new nuclear power station at Oldbury (upstream on the Severn Estuary in a rural location north of the Bristol conurbation – see Figure 1)
- Severn Tidal Power Feasibility Study (DECC, 2009)

5.87 The appraisal of cumulative sustainability effects arising through interactions between the Hinkley Point 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, both positive and negative
Biodiversity and	<ul style="list-style-type: none"> • Potential effects on biodiversity from the proposed

AoS Sustainable Development Theme	Interactions and Cumulative Effects, both positive and negative
Ecosystems	<p>development at Hinkley Point, combined with increased development growth proposed for the South West Region could place demands on sensitive ecosystems. However Regional Spatial Strategy offers possibilities for enhancing green infrastructure</p> <ul style="list-style-type: none"> • Potential adverse effects on Severn Estuary ecology from proposed development at Hinkley Point could add to the likely major significant effects from Severn Barrage tidal power generation proposals
Climate Change	<ul style="list-style-type: none"> • Proposed nuclear development at Hinkley Point combined with low carbon energy proposals including the Severn tidal power proposals, will lead to reduction in dependence on fossil fuels. • Proposed nuclear development at Hinkley Point and Oldbury combined with RSS targets for greenhouse gas production seek to minimise greenhouse gas emissions
Communities: Supporting infrastructure	<ul style="list-style-type: none"> • Decommissioning of existing nuclear facilities at Hinkley Point may coincide with construction of a new nuclear power station to create adverse effects on supporting infrastructure, in particular transport networks. • There is potentially a large cumulative impact associated with the generation of various waste streams in association with other major development schemes.
Communities: Population, Employment and Viability	<ul style="list-style-type: none"> • Proposed nuclear development at Hinkley Point and Oldbury in combination with tidal power proposals may enhance employment and skills hub for low carbon technologies.
Human Health and Well-Being	<ul style="list-style-type: none"> • Proposed nuclear development at Hinkley Point and Oldbury will contribute to enhanced prosperity and secure long term employment, as will increased development (facilitated through RSS) and tidal power proposals. This is likely to have synergistic positive effects on health and well-being.
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.
Water Quality and Resources	<ul style="list-style-type: none"> • Proposed development at Hinkley Point could have adverse effects on baseline water quality and ecological status; this could contribute to likely major significant effects from tidal power proposals. However, all proposals will need to meet with the requirements of the EU Water Framework Directive as implemented through the Severn and South West River Basin Management Plans

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 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 Hinkley Point. 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 Appraisal of Sustainability process has included recommendations to inform the development of the draft Nuclear NPS. This site report for Hinkley Point 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 Hinkley Point, 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 Hinkley Point will be similar across all the 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 Hinkley Point. These are discussed below:
- 6.5 Of particular note for the draft Nuclear NPS are potential negative effects on protected conservation sites, including the Severn Estuary and the Bridgwater Bay. There is the potential for adverse effects on water quality and migratory fish populations caused by the abstraction and release of cooling water, and a risk from coastal flooding. Existing flood defences are in place, but may need upgrading during the lifetime of the facility. Mitigation opportunities are likely to be available for the above following further study.
- 6.6 There is an existing nuclear power station at Hinkley Point, but a new power station would have additional adverse visual impact on views from the Quantock Hills AONB at a sub-regional level, which could not be fully mitigated.
- 6.7 There is the potential for significant negative cumulative effects if two new power stations (Hinkley Point and Oldbury) and a Severn Tidal Power scheme are all developed; and the effects of the latter project are more likely to be significant than two new nuclear power stations. These include the potential loss of nationally and internationally important estuarine habitats, where it may not be possible to mitigate fully. The Government is carrying out a two-

year feasibility study to determine whether the Government could support a tidal power project in the Severn Estuary. The Government is assessing a range of different schemes and the scope and scale of environmental effects is likely to vary widely between them. The Government is conducting separate environmental studies into these impacts and whether they could be mitigated. These environmental studies are not yet complete so the assessment in this report is based upon the potential effects outlined in the preliminary habitats screening report for Severn Tidal Power. This preliminary habitats screening report is not final and will be reviewed in the light of the feasibility study's findings. It covers all five options but does not distinguish between the individual options where environmental impacts will vary. There will be a further consultation on the Feasibility's study findings, likely in 2010.

- 6.8 There is also potential for positive cumulative effects associated with long term employment and enhanced prosperity for communities at the sub-regional level if both power stations are built in the Severn Estuary.
- 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 nominated 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 Hinkley Point 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 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.
- 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. Levels of mitigation can range from the highest (avoidance at source), through to minimisation, and lastly to compensation. 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.

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 draft Nuclear 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 and Ecosystems 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"> Encroachment into Severn Estuary cSAC, SPA, Ramsar, and Bridgwater Bay SSSI, NNR from power station and essential infrastructure 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Developer to commission further ecological surveys and impact assessments to define detailed mitigation measures Assess and mitigate cumulative effects

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
<ul style="list-style-type: none"> Disturbance to waterfowl and wading birds (SPA, SSSI) during construction 	<ul style="list-style-type: none"> Avoidance of the need to disturb sensitive areas Construction Environmental Management Plan to avoid/minimise disturbance to wildlife and habitat loss and to avoid water pollution Habitat retention and species protection measures onsite
<ul style="list-style-type: none"> Loss of priority habitats⁵² (terrestrial and marine) Loss of habitats used by priority species 	<ul style="list-style-type: none"> Habitat retention and species protection measures on site Habitat creation on site and wider estate to maintain ecological networks: Ecological Mitigation and Management Plan / Integrated Land Management Plan Monitoring programme to identify and manage effects on priority species and habitats
<ul style="list-style-type: none"> Harm to migratory fish (cSAC) from cooling water abstraction and discharges to the estuary 	<ul style="list-style-type: none"> Ensure fish protection in cooling water intake/system design
<ul style="list-style-type: none"> Discharge of heated water, routine discharge of radioactive liquids, and risk of accidental discharges to SPA/cSAC/SSSI 	<ul style="list-style-type: none"> Minimise routine radioactive discharges, avoid accidental discharges
Climate Change	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> Potential short term increases in greenhouse gas emissions during construction and decommissioning 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Monitor greenhouse gas emissions
<ul style="list-style-type: none"> A lack of sustainable transport options may result in 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 	

⁵² A Priority Habitat is one that has been listed as a priority for conservation action under the UK Biodiversity Action Plan

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
Communities: Population, Employment and Viability	
<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"> • Very positive effects for long term employment and sustaining communities in West Somerset, Sedgemoor and wider region-potential for increased significance with cumulative effects from other potential new nuclear power stations in Bristol Channel area. • 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 	
Communities: Supporting Infrastructure	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Potential for congestion and disruption on M5 and local transport network- potential cumulative effects with planned residential development at Bridgwater and the decommissioning of Hinkley A and B 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Transport Management Plans and Green Travel Plans to minimise effects • Physical improvements to road network • Consideration of port and rail transport options for large construction loads
<ul style="list-style-type: none"> • Potential for the generation of conventional or radioactive waste streams 	<ul style="list-style-type: none"> • Further studies of the potential waste streams and disposal routes will be required

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
Human Health and Well-Being	
<ul style="list-style-type: none"> • Possibility of local and regional health risks from accidental discharges 	<ul style="list-style-type: none"> • Ensure continuation of current programme of monitoring power station discharges and their effects on health
<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	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Potential for adverse effects on Wick Barrow Pixies' Mound SAM. Uncertain effects at this strategic stage of assessment 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • The location of construction facilities and access and operational facilities should be planned so as to minimise adverse direct effects on the SAM and its setting • Further detailed investigations may be required prior to construction, with a watching brief

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
<ul style="list-style-type: none"> Potential effects through development of new wharf facility and flood defence infrastructure on the settings of historic assets 	<ul style="list-style-type: none"> Further desk based studies and more detailed archaeological investigations (field evaluation, trial trenching etc.) will be required prior to confirming layout and construction, with an excavation and/or watching brief required during the construction phase (during ground preparation and excavations) A maritime Desk Based Assessment (DBA) for the nominated site will be required. Where any new sea defences and potential works to construct wharf facilities are proposed it will be necessary to undertake in depth investigation techniques to establish whether any maritime archaeology may be affected by them. This work should be carried out as early as possible to avoid potential complications later in the process
<ul style="list-style-type: none"> Immediately surrounding the nominated site, there may be potential effects (i.e. through traffic and development of new infrastructure) on the settings of historic assets. The significance will depend on distance, topography and the ability to mitigate 	<ul style="list-style-type: none"> A comprehensive historic landscape characterisation study should be undertaken for the proposed power station development to inform the process of identifying the most appropriate location for the developments. It may be possible to mitigate against potential adverse setting effects on heritage assets through appropriate landscaping/planting schemes
Landscape	

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Potential for longer-term adverse indirect landscape and visual impacts on the surrounding area including parts of the Quantock AONB 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Some visual impact mitigation may be possible by clustering of new and proposed buildings to avoid broadening of the potential visual impact • Decommissioning may allow some landscape restoration of previously developed areas in the long term • Using existing screening woodland and use of protective buffer zones.
<ul style="list-style-type: none"> • The Severn Estuary has one of the highest tidal ranges in the world. The tidal range has resulted in the development of an extensive intertidal area comprising mudflats, sandflats, rock platforms and islands. These intertidal areas provide extensive wildlife habitats supporting diverse plant and animal communities. The construction and operation of the power station would have an impact on these habitats 	<ul style="list-style-type: none"> • Potential for landscape/ecological mitigation and restoration and the potential for these to be delivered and monitored through an integrated Management Plan • Low impact design solutions for a marine landing platform and tunnelling for water cooling infrastructure installation to avoid adverse effects on shoreline wave-cut platform
<ul style="list-style-type: none"> • The existing power station is already a prominent built feature from local viewpoints and is visible from some long-distance viewpoints, particularly from areas of high ground. Further development is highly likely to lead to a perceptible deterioration in some views 	<ul style="list-style-type: none"> • Visual impact assessment to be completed to inform visual impact mitigation measures through location of buildings and landscaping
<ul style="list-style-type: none"> • The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long-term, however, the long-term land uses for restored areas is difficult to predict 	<ul style="list-style-type: none"> • Potential for landscape/ecological mitigation and restoration during decommissioning and the potential for these to be delivered and monitored through an integrated Management Plan

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
Soils, Geology and Land Use	
<p>Adverse effects:</p> <ul style="list-style-type: none"> The solid and superficial geology of the nominated site together with the sites intertidal mudflat geomorphology result in the site's rich geodiversity. 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Further assessment of the geology, soils and geomorphology will be required as part of the EIA process to identify important interrelationships supporting the geodiversity.
<ul style="list-style-type: none"> Construction combined with new infrastructure would impact on existing agricultural land uses and also sensitive parts of the intertidal geomorphological system, resulting in coastal squeeze, loss of intertidal land use and associated habitats. This may include impacts on soils that maintain terrestrial habitats, including designated nature conservation sites, the Severn Estuary SSSI/SPA/SAC/RAMSAR. 	<ul style="list-style-type: none"> Effects could be mitigated by careful planning of the development footprint thereby minimising disturbance to sensitive geomorphological processes and their associated landforms and habitats
Water Quality and Resources	
<p>Adverse effects:</p> <ul style="list-style-type: none"> New coastal defences and marine landing station potential effects on coastal processes, hydrodynamics and sediment transport, and potential indirect effects on nationally and internationally designated habitats (Severn Estuary cSAC, SPA, Ramsar, and Bridgwater Bay SSSI, NNR). Uncertain effects 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Further investigations required Detailed understanding of the hydrodynamics and sediment transport within the estuary used to inform appropriate design and location of coastal and fluvial flood defence works and marine landing station
<ul style="list-style-type: none"> Works to abstract and discharge cooling water- potential effects on coastal processes, hydrodynamics and sediment transport, and potential indirect effects on nationally and internationally designated habitats. Uncertain effects 	<ul style="list-style-type: none"> Further investigations required Selection of appropriate process design, construction methods and operation Abstraction of water will be subject to Environment Agency consent

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
<ul style="list-style-type: none"> Thermal impact of cooling water discharges, potential indirect effects on nationally and internationally designated habitats. Uncertain effects 	<ul style="list-style-type: none"> Further investigations required Thermal discharges will be subject to Environment Agency consent
<ul style="list-style-type: none"> Potential for large cumulative effects with other proposed projects, including a site for a new nuclear power station at Oldbury in the Severn Estuary. Options considered for the Severn Tidal Power Project could impact on the estuarine hydrodynamics and associated sediment movement. These effects may be more significant than the potential effects of the development at Hinkley Point 	<ul style="list-style-type: none"> The new Marine management Organisation (MMO) set up under the forthcoming Marine and Coastal Access Bill will have a role in advising the IPC on conditions that should be improved to mitigate any adverse impacts the development may have on the marine environment or other uses of the sea
<ul style="list-style-type: none"> Increased demand for water during construction stage. Magnitude and duration dependent on timing of activities on existing site. Similar comments apply to wastewater production 	<ul style="list-style-type: none"> Further investigations required Detailed planning, study to determine that capacity of water and wastewater is adequate to meet estimated demand
<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 Suitable design to mitigate potential adverse effects
Flood Risk	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> The nominated site is in an area that the EA considers to be at risk from coastal flooding Sea level rise could be a threat during the latter stages of the operational phase/ decommissioning phase 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Flood Defence barriers/Sea wall Further study by the developer required at the appropriate time

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the draft Nuclear NPS and IPC
<ul style="list-style-type: none"> To protect the power station from flooding and predicted sea level rise, existing coastal defences may need to be improved or new defences constructed. These defences have the potential to modify existing estuarine hydrodynamics and associated sediment movement, which may have a secondary effect on estuarine and marine ecosystem structure and functioning 	<ul style="list-style-type: none"> Any residual flood risks to the Hinkley Point site could be mitigated through the siting of the most vulnerable site infrastructure at the lowest levels of flood risk
<ul style="list-style-type: none"> There is a potential for wider cumulative effects when considered with the nomination for a nuclear power station at Oldbury and the Severn Tidal Power project 	<ul style="list-style-type: none"> The use of appropriate design for coastal defences at Hinkley Point and a full understanding of the hydrodynamics and sediment transport within the estuary could minimise the effects on the estuarine habitat areas

Abbreviations

AA	Appropriate Assessment
ALARP	As Low As Reasonably Practicable
AONB	Areas of Outstanding Natural Beauty
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
BAT	Best Available Techniques
BGS	British Geological Survey
BS	British Standards
CAMS	Catchment Abstraction Management Plan
CEMP	Construction Environmental Management Plan
CO ₂	Carbon Dioxide
COMARE	Committee on Medical Aspects of Radiation in the Environment
CoRWM	Committee on Radioactive Waste Management
CPRE	Campaign to Protect Rural England
cSAC	Candidate Special Area of Conservation
CWS	County Wildlife Site
DECC	Department of Energy and Climate Change
Defra	Department for the Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
EU	European Union
GDA	Generic Design Assessment
GEP	Good Ecological Potential
GES	Good Ecological Status
GIS	Geographical Information System
GP	General Practitioner
GW	Giga Watt
GWMU	Groundwater Management Unit
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
ISO	International Organization for Standardization
ILW	Intermediate Level Radioactive Waste
IMD	Index of Multiple Deprivation
IPC	Infrastructure Planning Commission.
LLW	Low Level Radioactive Waste
LNR	Local Nature Reserves
LPA	Local Planning Authority
MCA	Marine Consultation Area
MNR	Marine Nature Reserve
MRF	Materials Recycling Facility
mSv	Millisievert

MWe	Mega Watt (electrical)
MWt	Mega Watt (thermal)
NCA	National Character Area
NII	Nuclear Installations Inspectorate
NNR	National Nature Reserve
NO _x	Oxides of Nitrogen
NO ₂	Nitrogen Dioxide
Nuclear NPS	The proposed National Policy Statement for new nuclear power stations
NPS	National Policy Statement
NSA	National Scenic Area
OCNS	Office for Civil Nuclear Security
OSPAR	Oslo and Paris Conventions
PM10	Particulate Matter <10microns
PPS	Planning Policy Statement
RAMTED	Radioactive Materials Transport Events Database
RBD	River Basin District
RBMP	River Basin Management Plan
RDPE	Rural Development Programme for England
RIGS	Regionally Important Geological and Geomorphological Site
RSS	Regional Spatial Strategy
RTS	Regional Transport Strategy
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SEA	Strategic Environmental Assessment
SMP	Shoreline Management Plan
SO ₂	Sulphur Dioxide
SOA	Super Output Area
SPA	Special Protection Area
SSA	Strategic Siting Assessment
SSCT	Strategically Significant Cities and Towns
SSSI	Site of Special Scientific Interest
SW	South West
SWCCAP	South West Climate Change Action Plan
SWRA	South West Regional Assembly
UN	United Nations
WFD	Water Framework Directive
WHO	World Health Organisation
WRMU	Water Resources Management Unit
WRZ	Water Resources Zone

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)

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