

Appraisal of Sustainability Site Report for Dungeness

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

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

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

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

AoS Non-Technical Summary**Main AoS Report of revised draft Nuclear NPS**

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

Annexes to Main AoS Report: Reports on Sites

Site AoS Reports
Technical Appendices

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

This document is the Appraisal of Sustainability: Site Report for Dungeness of the revised draft Nuclear NPS.

This report has been prepared by the Department of Energy and Climate Change with expert input from a team of specialist planning and environmental consultancies led by MWH UK Ltd with Enfusion Ltd, Nicholas Pearsons Associates Ltd, Studsvik UK Ltd and Metoc plc.

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

Summary of Key Findings

The Appraisal of Sustainability has explored both adverse and beneficial potential effects of building a new nuclear power station at Dungeness. 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 Infrastructure Planning Commission), during project level assessments.

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

There are likely significant negative effects on several national and internationally protected nature conservation sites, including the Dungeness Special Area of Conservation (SAC), the Dungeness to Pett Level Special Protection Area (SPA), the Dungeness, Romney Marsh and Rye Bay proposed Ramsar (pRamsar) and the Dungeness Site of Special Scientific Interest (SSSI). The adverse effects would include direct loss of vegetated shingle habitat, which is internationally recognised for its ecological importance. It is considered unlikely that these adverse effects could be fully mitigated.

The Appraisal of Sustainability has also identified adverse effects on water quality and fish populations in nearby coastal waters due to the abstraction and release of sea water for cooling. These effects are significant, but mitigation opportunities are likely to be available following further study.

Parts of the nominated site are at high risk from coastal and fluvial flooding, and coastal erosion. There are existing flood defences in place at the nominated site, but continual management is required to replenish shifting shingle deposits. Flood

defences and erosion management plans may require significant upgrading to protect against sea level rise and coastal erosion for the full life time of a new power station.

A new nuclear power station would be set in the context of the existing power station at Dungeness, but the surrounding area is a predominantly flat and undeveloped landscape. A new nuclear power station would have additional adverse visual impacts on parts of the High Weald and Kent Downs Areas of Outstanding Natural Beauty (AONB) and the Dover to Folkestone Heritage Coast.

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

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

1 Introduction

This Appraisal of Sustainability Report

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

The revised draft Nuclear National Policy Statement

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

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

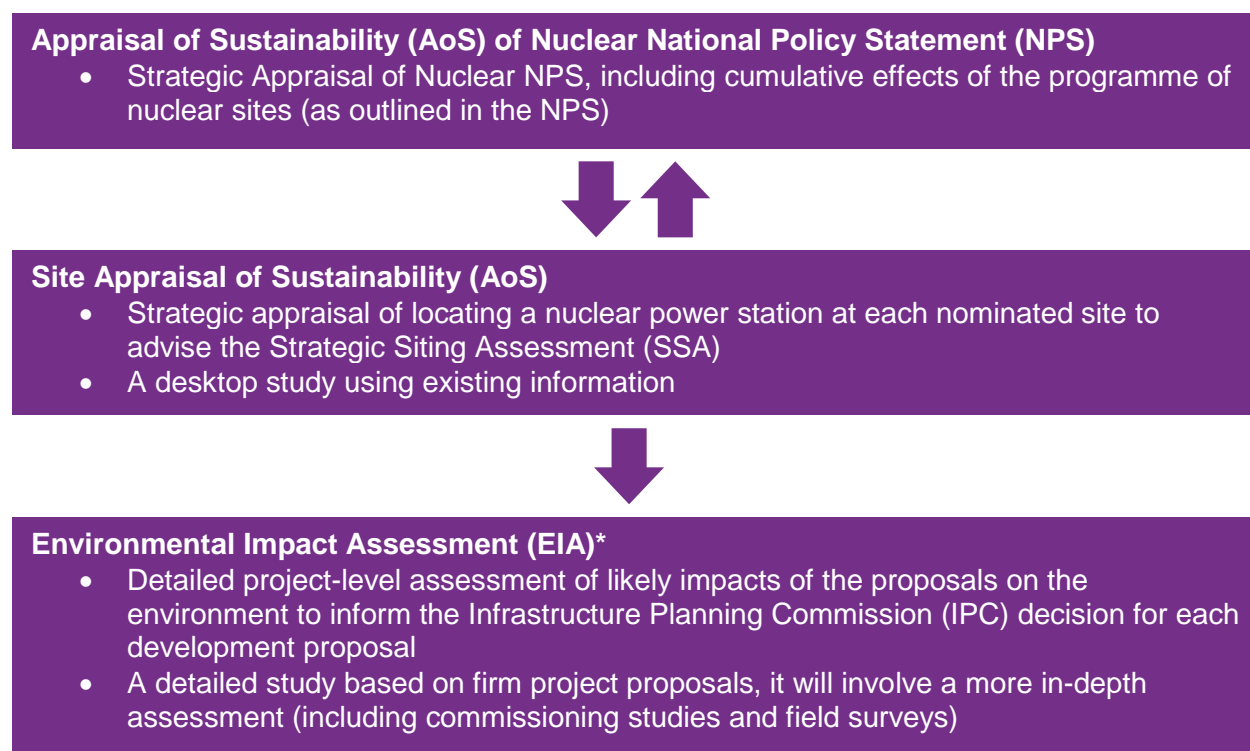
² revised draft Nuclear NPS <http://www.energynpsconsultation.decc.gov.uk>

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

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

Appraisal of Sustainability incorporating Strategic Environmental Assessment

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



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

5 Dungeness HRA Report <http://www.energyngpsconsultation.decc.gov.uk>

6 Planning Act 2008

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

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

Appraisal of Sustainability Methods

- 1.7 In undertaking the AoS of each nominated site, a wide range of information was considered including, the Scoping Report⁸, the Environmental Study⁹, the Update Report¹⁰, information from other Government departments, the statutory consultees and regulators, information from the nominators and other published reports. If additional local information was available, for example, an EIA scoping report or a locally relevant Strategic Flood Risk Assessment, it has been used to inform the appraisal where appropriate and referenced as footnotes.
- 1.8 The methods used for AoS/SEA are detailed in the Main AoS Report. The AoS uses objectives as a means of identifying and appraising the potential significant effects of building new nuclear power stations on the environment and communities. The sustainability objectives that have been agreed for the appraisal of the revised draft Nuclear NPS are detailed in Annex E of the Environmental Study and the Main AoS Report. Appendix 1 of this AoS 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)

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

9 BERR July 2008 Environmental Study

10 BERR January 2009 Update Report

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

12 BERR July 2008 Environmental Study

Sustainable Development Theme	AoS/SEA Objective (Numbers refer to Scoping Report ¹¹ and Environmental Study ¹²)
Communities: 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)
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. However, local planning policy will be required to conform to regional plans and programmes. Existing and emerging local policy documents were considered, where relevant, for the characterisation of baseline conditions and the appraisal of effects. The regional policy context and regional baseline information is set out in Appendices 3 and 4 respectively.

Background to Nuclear Power Stations

- 1.10 This section provides some wider context on nuclear power. Nuclear power works in a similar way to conventional electricity generation, insofar as it depends on the creation of heat to generate steam, which in turn powers a turbine.
- 1.11 This process needs to be carefully managed because of the energy released in the process. The process is controlled by the use of a “moderator”. All reactors have sufficient moderators to shut them down completely and fail-safes to ensure that this occurs in the event of any potential incidents. The early designs of nuclear power stations in the UK used graphite as a moderator. Later designs of nuclear power stations use water as a moderator. It is likely that any new nuclear power stations built in the UK would be water moderated.
- 1.12 The nuclear reactions that take place in nuclear power stations create a high level of radioactivity in the reactor. Radioactivity occurs naturally and is a normal part of our environment, but nuclear power stations create much higher intensities that require careful management while operating and after they have finished generating electricity.
- 1.13 The UK has strict, independent, safety and environment protection regimes for nuclear power. The Nuclear Installations Inspectorate (NII), a division of the Health and Safety Executive, 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. 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 Safely¹³. 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

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

harmful quantities of radioactivity ever reach the surface environment. The White Paper also invites communities to express an interest in opening up without commitment discussions with Government on the possibility of hosting a geological disposal facility at some point in the future.

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

New Nuclear Power Station Designs

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

Table 1.2: Base Case Assumptions and Variations Considered for Dungeness

Base Case	Variations Considered for Dungeness
1 nuclear reactor	1 or more reactors
Technology neutral (i.e. unknown reactor type)	The nominated site was identified as a potential site for one of a planned series of Pressurised Water Reactor (PWR) power stations
A requirement for cooling water abstraction	Nomination states preference for direct cooling using seawater
Discharges of cooling water	
Site boundary as indicated on nomination form	Possible construction of coastal defences and Marine Off-Loading Facilities (MOLF) beyond the site boundary
<u>Timescales:</u> Construction: approximately 5-6 yrs Operation: approximately 60 years (life extension, which is subject to regulatory approval, could mean that the operating lifetime is longer) Decommissioning: approximately 30 years Lifetime of site: approximately 166 years ¹⁴	
<u>No. of employees:</u> Construction: approx 4,000 (around 50% from within region) Operation: approx 500 Decommissioning: range of 400 – 800 at key phases ¹⁵ Associated employment creation: 2,000	
Coastal and flood protection measures (where relevant)	
Infrastructure for transporting reactor (for example, jetty, landing facility)	MOLF and inlet and outfall pipe-work may be required in the coastal areas, beyond the boundary of the nominate site

¹⁴ The site lifetime of 166 years assumes 6 years for construction, 60 years for operation and 100 years for interim storage of spent fuel after the last defueling. It is possible to envisage a scenario in which onsite interim storage might be required for around 160 years from the start of the power station's operation, to enable an adequate cooling period for fuel discharged following the end of the power station's operation. In making its assessment that onsite interim storage might be needed for 160 years, the Government took a conservative approach, to ensure that local communities are aware that it is possible that onsite interim storage might be required for this length of time. Following the public consultation, the Government has revised its position. The Government recognises that onsite interim storage might be required beyond 2130, particularly in the event that a GDF is not available to take the waste, but the Government does not expect onsite interim storage to be required for as long as 160 years. Further detail is set out in The Government Response to the consultation on the draft National Policy Statements for Energy, DECC, 2010, www.energynpsconsultation.decc.gov.uk

¹⁵ Estimates for existing nuclear power stations entering the decommissioning phase indicate up to 800 full time equivalent staff for defueling, then a minimal workforce (less than 50) during the care and maintenance phases, and a second peak of up to 600 for the final demolition and site clearance (source: <http://www.nda.gov.uk/sites>)

Base Case	Variations Considered for Dungeness
Interim radioactive waste storage facilities will be capable for at least 160 years	
Highway improvements, access routes	
Associated transmission infrastructure	
Radioactive discharges will be within legal limits	

2 The Site: Dungeness

- 2.1 The site is located at Dungeness on the Kent coast in the South East Region. The site lies near the county of Sussex and on a shingle cusped foreland projecting into the English Channel. The nearest town is Lydd, 6km to the northwest. The site is in the civil parish of Lydd within Shepway District and the County of Kent. The location of the site is illustrated in Figure 1. Figure 2 shows the location of the site in a sub-regional context to help address any implications for cumulative effects on biodiversity and on socio-economic factors.
- 2.2 Dungeness has supported nuclear power facilities since 1965. Dungeness B, a twin-reactor Advanced Gas-Cooled (AGR) power station with net electrical output of 1090 MWe, is capable of supplying over 1.5 million homes. It commenced operation in 1983 and is expected to operate until at least 2018. Further east is Dungeness A, a twin-reactor Magnox power station, which operated from 1965 to 2006 and is now undergoing decommissioning.
- 2.3 The site is located in the relatively flat and low-lying coastal strip to the south of the South Downs in Kent. It lies at the edge of Denge Beach, an area of vegetated shingle ridges to the seaward side of the Romney and Denge marshes. The surrounding land includes agricultural land and low-lying reclaimed marshland. The village of Dungeness lies to the north, the village of Lydd-on-Sea lies to the northeast, and the town of Lydd is 6km to the northwest, with Lydd (London Ashford) Airport lying to the west of Lydd town.
- 2.4 The nomination identifies a site located to the west of Dungeness B. It outlines an area of approximately 91ha during the operational phase of the new nuclear power station. The area used for operational facilities could vary depending on the design of the power station and the type of cooling water system selected. The area of land needed would likely increase temporarily throughout the construction phase, but specific details have not been provided in the nomination documents. The nomination specifies that it will be necessary to construct cooling water intake and outfall structures and possibly also coastal defences and marine off-loading facilities beyond the nominated site boundary.
- 2.5 The nomination is for a nuclear power station development incorporating:
- one or more reactors
 - construction of cooling water intake and outfall structures
 - cooling water infrastructure
 - possible construction of coastal defences and marine off-loading facilities beyond the nominated site boundary
 - construction stage areas and facilities
 - infrastructure and facilities related to the operation of a nuclear power station
 - interim waste storage facilities

- 2.6 The site at Dungeness was nominated into the SSA process in March 2009. The Government is also assessing the environmental and sustainability impacts of including the nominated site in the list of potentially suitable sites in the revised 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 scoping¹⁶ 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 and local levels relevant to the potential new nuclear power station at Dungeness 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 the 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:
- Draft Regional Spatial Strategy - A clear vision for the South East ,South East England Regional Assembly (March 2006)
 - The Regional Economic Strategy 2006 - 2016, South East England Development Agency (SEEDA) (October 2008)
 - Corporate Plan 2008 - 2011, South East England Development Agency (2008)
 - Rural Action Plan, South East England Development Agency (2008)
 - Adapting to Climate Change: a Checklist for Development, The South East Climate Change Partnership (SECCP) (2005)
 - Sustainable Communities Regional Economic Strategy Detailed Action Plan April 2008 – 2016 (2008)
 - Section D6 Waste and Minerals: South East Plan, South East England Regional Assembly (March 2006)
 - South East Biodiversity Strategy, South East England Biodiversity Forum (February 2009)
 - River Basin Management Plan for the South East , Environment Agency (2009)
 - Coastal South East: A Framework for Action, South East England Development Agency (SEEDA) (March 2008)
 - South East England Health Strategy, Government Office for the South East (February 2008)

¹⁶ BERR (March 2008) Scoping Report

- Water Resources Management Plan 2009, Veolia Water South East (September 2009)
- Folkestone to Rye Coastal Defence Strategy Study, Environment Agency (2001)

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 the 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 Regional Plans, Programmes and Projects.

4 Site Characterisation

Introduction

- 4.1 A general description of the nominated site at Dungeness and its location is provided in Section 2.
- 4.2 This section describes the general characteristics of the nominated site at Dungeness 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 indicators used for baseline data collation at the national scale (used in the Environmental Study). It also set out the indicators to be used for each Site AoS following the nomination of sites, but recognised that the baseline data collation process would be refined at the site nomination stage. Therefore, following site nominations, the relevant national, regional and local data has been sourced. This has enabled a more detailed, but still strategic, assessment to be undertaken than at national SEA scoping. 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 Dungeness is presented in Table 4.1 below.

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

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

Sustainable Development Theme	Scope of baseline data collated in this AoS
Communities and Supporting Infrastructure: Population Employment Community Viability Transport Waste and Minerals Energy	<ul style="list-style-type: none"> • Location of major settlements and areas of population • Age structure of population • Employment/unemployment and economic activity rates • Employment profile by industry • Socio-economic classification of population • Energy from low-carbon/ renewable resources: regional • Transport network and links • Landfill sites and 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 risks • Environmental hazards • Historic land use
Water: Hydrology Quality Resources Flood Risk	<ul style="list-style-type: none"> • Location of areas at risk of flooding • State of surface and ground waters: in river basin district and catchment • Predicted water demand and availability by Water Resource Zone • Designated waters under EU Directives

Air Quality

4.4 Air quality in the South East region is generally good to moderate. Areas of poor air quality tend to be concentrated around major route corridors (roads)

and congestion areas, whilst elevated levels of ozone have been an issue in the region, particularly in rural areas associated with busy/congested roads during the summer¹⁷.

- 4.5 There are 121 Air Quality Management Areas (AQMA) in the South East region of England, none of which are situated within the Shepway District Council area¹⁸, which contains the nominated site.
- 4.6 In 2006 there were 22 air pollution incidents deemed by the Environment Agency to have a 'serious' impact on air quality¹⁹.
- 4.7 Air quality in the South East Region has generally improved over the last decade. Levels of pollutants in rural and urban areas, such as sulphur dioxide and pollutants from regulated activities (benzene, lead, dioxins and furans), have reduced since the 1990s. Emissions of greenhouse gases and nitrogen oxide, however, have slowly been increasing in the South East Region since 1998. Levels of ozone have exceeded the National Air Quality Strategy objective levels and, in 2006, exceeded the 'alert threshold' at three monitoring sites in the region.
- 4.8 Pollution levels for all key pollutants (such as sulphur dioxide, nitrogen dioxide and particulates) in the area around Dungeness are typically low.²⁰ Other than the existing nuclear facilities at Dungeness A and B, there are no other major industrial sites in the area.
- 4.9 The Environment Agency (EA) assesses that non-radioactive aerial emissions (sulphur dioxide, nitrogen oxides and volatile organic compounds) from nuclear power stations are extremely low compared to other regulated industries. The EA's most recent available assessment of radioactive aerial emissions for regulated nuclear power stations indicates that all fall within authorised limits.²¹
- 4.10 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.

17 At ground level, ozone is formed as a result of reactions between sunlight and volatile organic compounds (VOCs) released as pollutants from mainly road vehicles.

18 UK Air Quality Archive (online) available: <http://www.airquality.co.uk/archive/laqm/laqm.php> [accessed 03 March 2009]

19 State of the Environment 2007: An Assessment of the Environment in South East England, Environment Agency (accessible online): <http://www.environment-agency.gov.uk/research/library/publications/34103.aspx> [accessed 03 March 09]

20 <http://www.kentair.org.uk/>

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

Biodiversity and Ecosystems

- 4.11 The biodiversity interest around the nominated site includes a number of nationally designated sites and European designated sites. Further information on the European designated sites and their current condition is given in the separate HRA Site Report for Dungeness.
- 4.12 There are two Natura 2000 designated sites within 20km of the nominated site; Dungeness Special Area of Conservation (SAC) and Dungeness to Pett Level Special Protection Area (SPA). A new Ramsar site is also proposed within 20km of the nominated site (the Dungeness, Romney Marsh and Rye Bay proposed Ramsar (pRamsar))²² and this is currently the subject of a public consultation being carried out by Natural England (see paragraph 4.16 below).
- 4.13 The Dungeness SAC includes the Dungeness foreland, with its very extensive and well-developed shoreline, and is so designated on the following grounds²³:
- It is one of only two examples of annual vegetation of drift lines on the south coast of England;
 - Dungeness is the largest shingle structure in the UK, with a total area of exposed shingle covering approximately 1,600ha, and Europe's most diverse and most extensive examples of stable vegetated shingle. The shingle beach also contains a number of natural wetlands, referred to as Open and Fossil Pits, which are thought to be unique in the UK; and
 - Its waterbodies host a large and viable population of Great Crested Newts which are a European protected species.
- 4.14 The nominated site boundary includes land from the Dungeness SAC (see Figure 4.1).
- 4.15 The Dungeness to Pett Level SPA is designated because of its shingle beaches, wetland and open water habitats, which provide important sites for over wintering Bewick's Swans and other migratory and internationally important assemblages of breeding (Common Tern, Little Tern and Mediterranean Gull), wintering (Shoveler) and passage (Aquatic Warbler) bird species.
- 4.16 In September 2010, Natural England launched a public consultation on proposals to extend the existing area of the Dungeness to Pett Level SPA (almost 1,500 ha) to cover over 4,000 ha of the Dungeness Romney Marsh and Rye Bay SSSI²⁴ and to change the name to the Dungeness, Romney

²² Ramsar sites are wetlands of international importance designated under the Ramsar Convention, first designated in the UK in 1976. The initial emphasis was on selecting sites of importance to waterbirds within the UK, and consequently many Ramsar sites are also SPAs, however non-bird features have been increasingly taken into account

²³ Joint Nature Conservation Committee:

<http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013059>

²⁴ http://www.naturalengland.org.uk/regions/south_east/ourwork/dungenessconsultation/default.aspx

Marsh and Rye Bay SPA to reflect the changes. Natural England also propose to add seven new bird species (breeding marsh harrier, avocet and sandwich tern, wintering bittern, hen harrier, golden plover and ruff) and an assemblage of over 20,000 water birds to the qualifying interests. In the vicinity of the nominated site, the potential SPA area would extend from Camber Sands past Broomhill Sands, to within approximately 2.5km of the nominated site to the west, it would include additional areas (long pits and open pits) adjacent to the section of the access road included in the nominated site boundary and would include a large area of the coast to the north east of the nominated site extending from the Dungeness foreland (less than 1km east of the nominated site) to St Mary's Bay. Shingle is currently extracted from parts of this latter section of coastline and transferred to the west of Denge Marsh to compensate for material protecting the existing power stations that has been lost to erosion.

- 4.17 As the proposals to extend the boundaries of the Dungeness to Pett Level SPA are at the consultation stage and therefore not final, this assessment has been undertaken using the existing boundaries and qualifying interests of the SPA. The assessment also uses the current name – the Dungeness to Pett Level SPA.
- 4.18 The Dungeness National Nature Reserve (NNR), which is jointly owned by Natural England and the RSPB, is located within the SPA/SAC, to the north of Dungeness A and B power stations. Vegetated shingle is the major habitat at the reserve together with natural and artificial wetlands, and grazing marsh. The reserve has one of South East England's most important breeding colonies of gulls and terns. The reserve is also important for many migrating birds, including Bewick's swans, gadwalls and wintering smew. Dungeness has an important population of medicinal leech, which in the past were used to treat a variety of ailments and were collected in such numbers that they became extinct in many parts of the country.
- 4.19 One Site of Special Scientific Interest (SSSI) is situated within 20km of the nominated site; the Dungeness Romney Marsh and Rye Bay SSSI. This SSSI is nationally important due to its diverse range of biological and geological features, specifically the coastal geomorphology of Dungeness and Rye Harbour and the associated nationally important habitats: saltmarsh, sand dunes, vegetated shingle, saline lagoons, standing waters, lowland ditch systems, and basin fens.

Climate Change

- 4.20 The potential effects of climate change on the nominated site, such as storm surges, coastal erosion, sea level rise and flooding, are explored in the sections on Flood Risk.
- 4.21 The South East Region's per capita CO₂ emissions (tonnes carbon dioxide per resident) total 8.0, which is the second lowest of the 9 regions in

England²⁵. However, in light of its larger population, the South East accounts for over 12% of the UK's total emissions. There is, therefore, an opportunity to contribute to local initiatives to tackle greenhouse gas reductions across a number of sectors, such as transport, construction and energy use in the home and industry.

- 4.22 The UK's 2008 Climate Change Act²⁶ sets a legally binding target of at least an 80 percent cut in greenhouse gas emissions by 2050, to be achieved through action in the UK and abroad. The Act also sets a target to reduce emissions by at least 34 percent by 2020. Both targets are against a 1990 baseline.
- 4.23 The Energy Efficiency and Renewable Energy Strategy for the South East²⁷ states:
- By 2010 the South East region should generate at least 5.5% (620 MW) of its electricity from renewable sources and by 2026 at least 16% (1,750 MW)
 - Sub-regional targets: Kent is aiming to produce 111 MW by 2010 and 154 MW by 2016 from renewable.
- 4.24 There are currently five power stations within an 80km radius of the nominated site, with a combined capacity of 4785 MW. These are primarily wind, oil, gas and coal. The current nuclear power station at Dungeness B has a capacity of 1110 MW.

Communities: Population, Employment and Viability

- 4.25 Population in the South East Region has steadily increased over the past 25 years and the region now has approximately 8.2 million residents. According to the Office for National Statistics, the region's population grew between 1981 and 2006 by 14%. The forecasted total population for Shepway is set to decrease between 2006 and 2016 by 4%.
- 4.26 Shepway district has a population density of 2.70 persons per ha, which is below the English average of 3.77 persons per ha and significantly lower than the South East average of 4.20 persons per ha. 73% of the district is considered 'rural'.
- 4.27 In 2009, 74.5% of people of working age were employed in the South East, which is the highest of all UK regions. Employment levels in the Shepway

25 <http://www.defra.gov.uk/environment/statistics/globalatmos/download/regionalrpt/local-regionalco2statssumm06.pdf>

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

27 In July 2010 a number of regional plans were revoked, but the Energy Efficiency and Renewable Energy Strategy remains one of the most relevant source of climate change targets at the regional level at the time of writing.

district²⁸ (69.4%) are lower than the regional (74.5%) and national average (70.3%)²⁹.

Communities: Supporting Infrastructure

- 4.28 Transport: The Dungeness area is not well served by road transport links. It is accessible by B roads from the villages of Lydd and Lydd-on-Sea. The A259 and A2070 connect Lydd, Lydd-on-Sea and the surrounding dispersed villages to the main M20 (Folkestone to London) motorway, a national and strategic transport route carrying high volumes of international traffic and commuters.
- 4.29 There is no direct rail access to the nominated site, but there is a railhead on the site of the existing Dungeness nuclear power stations. This has been previously used by Magnox Electric and British Energy for the movement of fuel flasks. From the railhead, a single-tracked rail line runs to join the Ashford to Rye line at Appledore.
- 4.30 Lydd airport is located within 6km of the nominated site. The airport operates daily scheduled passenger services to France and chartered services throughout Europe (Lydd Air), as well as a number of freight operations to Europe. It has an annual passenger capacity of 30,000 passengers, but in 2008 served 1,673³⁰. The airport has one runway, one passenger terminal and one cargo terminal. Two planning applications, one to extend the existing runway and one to construct a new terminal, were submitted in December 2006³¹. The applications will now be considered by a public inquiry.
- 4.31 There are currently no hard structures for sea access in the vicinity of the nominated site. However, the site nomination identifies marine off-loading facility as a possible requirement of a new nuclear power station at Dungeness.
- 4.32 Future growth associated with regeneration is being taken forward in partnership with the Highways Agency. No other strategic development initiatives are focussing on access to the Dungeness area. British Energy is conducting transport impact studies to determine the need for additional roads, specific designated routes and travel plans.
- 4.33 Conventional waste³²: Kent County Council was ranked 59th for the highest residual waste per head among the 397 disposal or unitary authorities. In 2006/2007 Kent County Council had a 33.2% recycling and composting rate. Landfill remains the principal method of waste disposal in Kent. In total,

²⁸ As the AoS is a strategic level assessment, regional and district level employment levels have been reported in this assessment but the AoS has not looked to smaller areas than this.

²⁹ Official Labour Market Statistics (2009) <https://www.nomisweb.co.uk/reports/lmp/la/2038431812/report.aspx>

³⁰ CAA statistics for 2008

³¹ <http://www.ukplanning.com/ukp/findCaseFile.do?jsessionid=1189E4647B67F2B979ABAEDB74FDE1A3.wam2?appNumber=Y06%2F1648%2FSH&action=Search>

³² Conventional waste means 'controlled waste', i.e. waste controlled under Part II of the Environment Act 1990.

427,373 (53%) of municipal waste was sent to landfill in the region in 2006/2007, which was lower than the English average of 58%.³³

- 4.34 Municipal waste in the region is managed through the Kent Waste Partnership. An Energy from Waste (EfW) plant, capable of handling 349,000 tonnes of waste per year, in addition to a Materials Recycling Facility (MRF) are operational at the Allington Quarry site, approximately 64km from Dungeness. Waste diverted to landfill is disposed of at 5 sites across the region.³⁴

Human Health and Well-Being

- 4.35 The nominated Dungeness site is within the Super Output Area (SOA) known as Shepway 013B³⁵. Indices of deprivation show that the Shepway SOA is a reasonably deprived area, although crime is much lower than the average for England. The age profile for this SOA shows that there are fewer children under sixteen and significantly more senior citizens (males over 65 and females over 60) than the English average. The profile also shows that there are fewer working age people in the area than the English average.
- 4.36 The most recent census (2001) found that people within the Shepway 013B area generally reported good or fairly good health. The number reporting poor health was significantly higher than the English average. Overall, health statistics show a mixed picture within the area. Life expectancy for males and females is approximately the same as the English average but infant mortality is significantly higher than the regional and national averages.
- 4.37 With regard to mental health, the Health Profile 2008³⁶ for Shepway shows that estimates of the number of people claiming incapacity benefit for mental illness in the area (28.9 per 1000 population) does not differ significantly from the English average (27.5 per 1000 population).
- 4.38 Despite the deprivation figures referred to above, pupils in the Shepway 013B area perform significantly better in their GCSE equivalent examinations than their peers in the rest of England.
- 4.39 Housing stock within Shepway District Council's area is very poor with a much higher percentage of unfit dwellings³⁷ than the regional or national average.
- 4.40 Contrary to the crime index of deprivation referred to above, figures from the Audit Commission for 2005³⁸ suggest that the level of certain crimes in the area is higher than the English average.

33 Department for Environment, Food and Rural Affairs. Municipal Waste Management Statistics <http://www.defra.gov.uk/environment/statistics/wastats/bulletin07.htm>

34 Kent Joint Municipal Waste Management Strategy, Kent Waste Partnership, 2007 <http://www.kent.gov.uk/publications/environment/kent-joint-municipal-waste-management-strategy.htm>

35 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. For consistency, each site AoS report uses the Super Output Area that contains the relevant nominated site which is being appraised.

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

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

- 4.41 The economic well-being of the area is negative, as demonstrated by the local employment figures³⁹ (see the section on Communities: Population, Employment and Viability above - noted here as a measure of well-being). In 2009, 69.4% of the population of the Shepway District Council area was employed. This number compares unfavourably with figures for the South East Region (74.5%) and England as a whole (70.3%).
- 4.42 Local access to medical services is not particularly good, with no general practitioner (GP) practices within 5km of the nominated site. There are, however, three GP practices within 10km of the nominated site and a local hospital, though without an accident and emergency department, at Rye (17.1km). The nearest accident and emergency department is at Kennington Road, Ashford (25.6km), whilst the nearest mental health hospital is the Rye Memorial Hospital (17.1km).
- 4.43 One of the wider determinants of health and well-being is access to local recreational facilities. In this regard, the nominated site is not well served, with only two leisure centres within 20km. However, Dungeness is in a rural and coastal location with remote countryside, nature reserves and a number of popular beaches, offering good potential for outdoor recreational activities, such as walking, cycling and water sports.
- 4.44 Dungeness has supported nuclear facilities since 1965 and Dungeness 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.
- 4.45 The Committee on Medical Aspects of Radiation in the Environment (COMARE), a scientific advisory committee providing independent authoritative expert advice on all aspects of health risk to humans exposed to natural and man-made radiation, has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites starting with the Sellafield site in 1986.
- 4.46 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.
- 4.47 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'*.

38 [http://www.areaprofiles.audit-commission.gov.uk/\(rkgonp45u4sp1o55bc5scf55\)/SingleAreaSearch.aspx](http://www.areaprofiles.audit-commission.gov.uk/(rkgonp45u4sp1o55bc5scf55)/SingleAreaSearch.aspx)

39 <https://www.nomisweb.co.uk/reports/lmp/la/2038431812/report.aspx>

- 4.48 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.*'
- 4.49 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.
- 4.50 The KiKK study gave the results on childhood cancer in the vicinity of 16 German nuclear power plants from a dataset established by the German Childhood Cancer Registry, which included over 1500 childhood cancer cases from 1980 to 2003. In comparison, the dataset used for COMARE's tenth report and the subsequent Bithell paper contained over 32,000 cases of childhood cancer from 1969 to 1993. This is a verified national database and is believed to be the largest national database on childhood cancer in the world. The size of the database used by COMARE therefore gives considerable confidence in the results of the tenth report.
- 4.51 COMARE is currently undertaking a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. This will be published as COMARE's 14th report later this year.
- 4.52 Radioactive monitoring carried out in 2008⁴⁰ found low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples taken around the existing Dungeness nuclear power stations. From this sampling, the estimated total dosage levels to the public from all sources within the Dungeness area were assessed as being approximately 40% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999.

Cultural Heritage

- 4.53 Shepway has approximately a thousand Listed Buildings and Scheduled Ancient Monuments. Over a hundred of these are the highest level Grade I and Grade II*, or Monuments.⁴¹
- 4.54 The existing nuclear facilities are located immediately adjacent to the west of the Dungeness Conservation Area, with the nominated site lying further away to the west. There are four listed (Grade II and II*) buildings in the area, including the Old Lighthouse, Lighthouseman's dwelling (1792) and the New Lighthouse, which was built in the late 1950s. The Dungeness Redoubt

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

41 http://consult.shepway.gov.uk/portal/core_strategy/csiob?pointId=1199449120885

monument (from 1798) lies within the footprint of the nominated site and the St Lawrence battery (also from 1798) lies within the immediate vicinity. A number of sunken ship remains have also been recorded in the area.⁴² The closest Scheduled Monument to the nominated site is Lade Fort, which lies 4km to the north east.

- 4.55 Other archaeological sites of post medieval date and layers of palaeo-environmental potential may be present within the nominated site. The nominated site area is likely to be considered of at least local to regional archaeological importance.

Landscape

- 4.56 The nominated site is situated within the Romney Marshes National Character Area (NCA 123), which has been designated because of its distinctive landscape character. The NCA contains Romney Marshes and the shingle coast around Dungeness. The area displays a diverse range of landscape features, including flat, open, agricultural land with distinctive drainage dykes, marshes and open skies and treeless, low-lying reclaimed marshland.
- 4.57 There are areas of high nature conservation value concentrated in the wet grazing marshes, dykes, mudflats and the less extensive but distinct sand dunes and shingle ridges of Dungeness. The key characteristics of the NCA are the sharp contrast between the shingle coastal promontories, the extensive open, low-lying agricultural land behind and the inland backdrop of well-wooded rising ground.
- 4.58 The prominent, coastal location of the nominated site and low-lying hinterland mean that the nominated site can be seen from distant viewpoints including parts of the High Weald Area of Outstanding Natural Beauty (AONB) located 22km to the south west, the Kent Downs AONB located 25km to the north east and the Dover-Folkestone Heritage Coast located approximately 21km to the north east of the nominated site.
- 4.59 The Countryside Agency/CPRE county tranquillity map identifies the nominated site as lying within one of the most tranquil parts of the South East of England⁴³.

Soils, Geology and Land Use

- 4.60 The site is located on non agricultural lands. The soils and geology are Storm Beach Deposits underlain by Hastings Beds. The Dungeness shingles on the coast are the largest shingle structure in the UK and have developed over the past 5,000 years. Shingle is aligned in sub-parallel ridges of differing ages with the oldest ridges furthest from the coast.

42 <http://www.kent.gov.uk/leisure-and-culture/heritage/explore-kents-past/historic-environment-record.htm>

43 <http://www.cpre.org.uk/campaigns/landscape/tranquillity/national-and-regional-tranquillity-maps/county-tranquillity-map-kent>

- 4.61 Apart from the existing power station, no significant industrial activities have been undertaken historically in the area. The land use surrounding the existing power stations is primarily shingle beach, marshland and farmland, and is sparsely populated.
- 4.62 There are no current or historical landfills within 1km of the nominated site. Prior to 1997, the existing Dungeness A power station adjacent to the nominated site operated an incinerator which was a Registered Integrated Pollution Control (IPC) registered waste site.
- 4.63 British Geological Society has assessed geological risks in the local area. The potential for landslide ground stability hazards is assessed as “very low risk”.
- 4.64 No mineral abstractions have been identified locally.

Water Quality and Resources

- 4.65 The nominated site is located in the South East (SE) River Basin District (RBD). Within this RBD, only 8% of rivers (by length) meet the requirements for good ecological status (GES) or good ecological potential (GEP). The SE RBD proposes that 34% of all surface waters should be designated as heavily modified and 9% designated as artificial.
- 4.66 33% of groundwater bodies (by number) in the RBD meet the requirements for good status, while 6% of coastal waters (by number) meet the requirements for GES or GEP. No estuaries or lakes meet the requirements for GES or GEP. Currently only one coastal water within SE RBD is at good potential (Isle of Wight East). 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.
- 4.67 The nominated site is nested within the Rother catchment of the SE RBD, where 10% of rivers (by length) meet the requirements for GES or GEP. In addition, two thirds of the surface waters in this catchment are artificial or heavily modified, and are managed to facilitate drainage and flood risk management. In the Rother catchment, groundwater bodies suffer from high nitrate concentrations caused by urban and agricultural activities.
- 4.68 There are no identified Shellfish Waters in close proximity to the nominated site. The nearest identified Bathing Waters are at Camber to the west and Littlestone to the north.
- 4.69 Groundwater is an important resource in the RBD, as the majority of the drinking water comes from groundwater sources. The main pressures on groundwater are abstraction for drinking water supply, saline intrusion and contamination with nitrates, pesticides and solvents.

- 4.70 The nominated site is located within the Denge Gravel aquifer of the Kent Romney Marsh waterbody. The current quantitative and chemical groundwater quality is poor and is predicted to remain in this state to 2015.
- 4.71 There are two groundwater source protection zones in the Denge Gravel aquifer in the vicinity of the nominated site. Current water supply use of groundwater from the Denge gravels is thought by the Environment Agency to be unsustainable due to potentially conflicting water level requirements of the Dungeness SAC, together with the likely future climate change impacts, such as reduced rainfall and sea level rise. On-going studies of the Denge Gravel aquifer by the Environment Agency are expected to continue to 2015 to assess whether modification of abstraction licenses are needed to ensure no adverse impact on the internationally important biodiversity at Dungeness.
- 4.72 Veolia Water Southeast operates one Water Resource Zone, in which the nominated site lies. The Company operates in one of the driest areas of England and was in March 2006 the first water company in the Country to be granted “Area of Water Scarcity” status by Government. Demand for water is set to rise across its operating area in line with forecasted economic growth in the area and an increasing population, along with major housing development in Ashford and the Thames Gateway, the fast rail link from Folkestone to London and nominations for a new nuclear power station at Dungeness.
- 4.73 The Veolia Water Southeast planned supply/demand balance demonstrates that there is no supply/demand balance deficit forecast under average conditions until 2031⁴⁴. There is a progressive decline of Water Available for Use due to the impact of climate change.
- 4.74 The exact water requirements for the nominated site are not yet finalised. The existing nuclear facilities at Dungeness A and B employ direct cooling, with water abstracted from the English Channel. The nomination expresses a preference for employing similar direct water cooling technology for any new nuclear power station on the nominated site.
- 4.75 The east coast of England, including the nominated site at Dungeness, is influenced by the semi-diurnal tide of the Atlantic Ocean which transfers energy to the North Sea from both the north and the south (via the English Channel). The general direction of transport by both waves and tidal currents is towards the south. The southern part of the east coast has a higher tidal range and greater tidal currents than locations further north.
- 4.76 The nominated site is located on Dungeness Foreland, a huge expanse of shingle deposited by the sea over 10,000 years. The Foreland contains an active shingle ridge face which is subject to the erosion and deposition, and a series of relict shingle ridges on the landward side. The Foreland is an active landscape subject to rapid and ongoing evolution.

⁴⁴ This is dependent on 96% compulsory domestic metering by 2012 and renewal of bulk imports from South East Water and Southern Water until 2035

Flood Risk

- 4.77 The nominated site contains areas of Flood Zone 1 ('Low Probability'), Flood Zone 2 ('Medium Probability') and Flood Zone 3 ('High Probability'). Areas in Flood Zone 2 and Flood Zone 3 are currently at risk from coastal flooding.
- 4.78 The site nomination states that the existing nuclear facilities are protected against coastal erosion and flooding by a shingle embankment. This structure is fronted by a relatively steep shingle beach and was designed to provide protection against a 1 in 10,000 year flood event associated with a tsunami wave. The shingle structure in front of the nominated site erodes, but this is artificially replenished using shingle from Lydd-on-Sea.
- 4.79 This same shingle beach protects the nominated site. The exact standard of protection provided is unknown, but is thought to be high.

Appraisal of Sustainability

Introduction

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

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

Local Effects
<p>The AoS Site Reports identify potentially significant benefits and disbenefits of locating a new nuclear power station at each of the nominated sites. Some of the effects identified are significant at the local level and are more appropriately addressed through the development consent process to the Infrastructure Planning Commission. Applications for development consent will include Environmental Impact Assessment, undertaken by the developer. Such local effects may include, for example, an adverse effect on a County Wildlife Site or disturbances to local communities arising from increased construction traffic during the construction phase. Effects of local significance are discussed in the detailed appraisal matrices set out in Appendix 2 of this AoS Report and are available to inform the IPC and others of issues that are likely to arise at the next stage of the planning and assessment processes.</p> <p>As with any major infrastructure project, there are likely to be effects during construction that have the potential for nuisance⁴⁵ and disturbance to local communities, demands on local services and supporting community infrastructure, and the risk of pollution and/or damage to environmental assets, such as biodiversity and water. The significance of such effects will be investigated at project level through the Environmental Impact Assessment process. These effects can often be minimised and controlled through careful design, working in accordance with good site practices, and managed through the use of Construction Environmental Management Plans, which will be agreed with, and monitored by, the environmental regulators and planning authorities.</p>
Strategic Significant Effects
<p>Other identified adverse or beneficial effects are more significant strategically as they have the potential to affect a matter of wider regional, national or even international importance. These may include, for example, an effect on biodiversity of national and international value (see also the site level HRA Reports). Where an effect is considered to have significant implications for the wider region for example, a benefit for the regional economy, this has been considered as a strategic significant effect. Effects which are better assessed at local or district level when more detailed site specific information is available have not been considered in this category. The significance of the potential strategic effects identified for each stage of the project (construction, operation and decommissioning) is summarised in Table 6.2.</p>

Air Quality

5.4 There is potential for air quality impacts during the construction, operation and decommissioning stages of developing new nuclear power stations. However,

⁴⁵ 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 of EN-1 applies.

relative to some other forms of power generation, nuclear power plants do not emit significant quantities of carbon dioxide, sulphur dioxide nitrogen oxides or particulates. 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 on the nominated site is likely to have some localised adverse effects on air quality in the short term (5-6 years), including dust and emissions from construction vehicles, HGVs, and traffic movements generated by the construction workforce. This has the potential to affect residential properties along local access/haul routes in the immediate surrounding area. In particular, traffic may need to be routed through Lydd, potentially increasing emissions in the town. Similar local impacts may arise during the decommissioning phase of the project, at the end of the plant's operational life.
- 5.6 Lydd (London Ashford) Airport is 6km from the nominated site. Two planning applications, one to extend the existing runway and one to construct a new terminal, were submitted in December 2006⁴⁶. The applications will now be considered by a public inquiry. If the proposals are approved, further studies will need to be undertaken to explore the potential for any cumulative effects with the construction and operation of a new nuclear power station at Dungeness.
- 5.7 During operation, the traffic generated by the operational workforce has the potential to create longer-term adverse effects on air quality. Traffic and air quality assessments will be undertaken as part of the detailed EIA process, and likely mitigations may include highway improvements, traffic and construction management plans and the use of rail and port facilities where possible.
- 5.8 Whilst important at a local level, impacts on air quality arising from construction and increased traffic movements during operation and decommissioning are not considered to be of strategic significance. There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature conservation interest. This is discussed further in the Biodiversity and Ecosystems Section.
- 5.9 Radioactive releases to air, which could have a detrimental effect on local and regional air quality (in the event of a significant release), are strictly controlled in accordance with limits laid down in authorisations issued under the Environmental Permitting (England and Wales) Regulations 2010 and subject to monitoring and reporting. Further consideration of the control of radioactive discharges to air is given in Section 7 of the Main AoS Report.
- 5.10 There is a very low risk of an accidental release of radioactive emissions from the nominated site at Dungeness, which could have a significant strategic

⁴⁶<http://www.ukplanning.com/ukp/findCaseFile.do?jsessionid=1189E4647B67F2B979ABAEDB74FDE1A3.wam2?appNumber=Y06%2F1648%2FSH&action=Search>

effect on air quality. The Health and Safety Executive (HSE)/Nuclear 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 large population to be adversely affected means that, at this stage of assessment, the potential for strategic adverse sustainability effects has been identified.

- 5.11 **Strategic Effects on Air Quality:** The AoS has identified that the potential exists for a large population to be affected by any significant accidental release of radioactive emissions from the Dungeness site which has a potentially strategic effect on sustainability. 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

- 5.12 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.
- 5.13 Of greatest concern are activities which might lead to detrimental effects on Internationally Designated Sites of Ecological Importance, as the construction of a new nuclear power station at Dungeness has the potential to affect two sites which form part of the Natura 2000 network (such as the Dungeness SAC/SPA/SSSIs and proposed Ramsar sites).
- 5.14 Given that part of the Dungeness SAC lies within the nominated site, the development would involve an area of direct land take from the SAC. This land take would be in and around the existing nuclear power station site. Development of the site would also involve land take from the Dungeness SSSI and the Dungeness NNR. These designated sites share some common interest with the Dungeness SAC and the same impacts and mitigations would apply. There will be no land take from the Dungeness to Pett Level SPA. This is likely to remain the case if the boundaries of the SPA are extended to become the Dungeness Romney Marsh and Rye Bay SPA, as

set out in Natural England's public consultation⁴⁷. Land take should be kept to a minimum for essential operational purposes.

- 5.15 Direct loss of vegetated shingle habitat (perennial vegetation of stony banks) and fragmentation of priority habitats could result from the positioning of the nominated site, which could have an adverse impact on protected species and habitats associated with the Dungeness SAC, the Dungeness to Pett Level SPA, and the Dungeness, Romney Marsh and Rye Bay proposed Ramsar site. The features of interest and detailed baseline surveys at the designated sites will guide the identification of potential mitigation and compensation measures. Appropriate management systems should be put in place to protect local designated sites.
- 5.16 The nominated site is at high risk of coastal and fluvial flooding and coastal erosion. Existing flood defences are in place at the nominated site, but continual management is required to replenish shifting shingle deposits. Shingle is currently extracted from a section of the coastline, which is included in proposals to extend the Dungeness to Pett Level SPA. Continued shingle extraction in this area to defend a new power station at the nominated site could have adverse effects on the extended SPA (Dungeness Romney Marsh and Rye Bay SPA).
- 5.17 Biodiversity could also be impacted at the local level if important habitats/species (for example UK Biodiversity Action Plan habitats/species or legally protected species) are present within or in close proximity to the nominated site.
- 5.18 The abstraction of water for cooling purposes and thermal impacts from cooling water discharges could potentially impact on fisheries, plankton, intertidal and sub-tidal benthic habitats. Excavation of the seabed and coastal habitats may be required for both the cooling water intake and outfall culverts. Water abstraction could potentially impact on the marine environment. The nomination documentation identifies direct water cooling as the preferred method of cooling, which has a greater potential to lead to fish entrainment than indirect cooling. Infrastructure construction may cause scouring and changes to the local sediment transport regime and may impact upon marine ecology. Mitigation measures should be incorporated to protect fish populations, and further studies will be necessary to determine impacts on the marine environment.
- 5.19 Additional cited interest that could be affected by the development includes additional terrestrial habitats, plant species protected under Schedule 8 of the Wildlife and Countryside Act 1981, water vole populations, breeding and passage birds and endangered invertebrates with statutory protection. Detailed baseline surveys should inform mitigation measures to protect these species.

47 http://www.naturalengland.org.uk/regions/south_east/ourwork/dungenessconsultation/default.aspx

- 5.20 A separate report, documenting the Habitats Regulation Assessment (HRA) for Dungeness⁴⁸ has been undertaken. This report should be referred to for further information relating to the effects of a new nuclear power station at Dungeness on European-designated habitat sites and the effectiveness of potential mitigations (whilst this report highlights potential mitigations on biodiversity and ecosystems, the HRA for Dungeness contains more detail on this).
- 5.21 As noted above, development of the site would also involve land take from the Dungeness SSSI and the Dungeness NNR. These designated sites share some common interest with the Dungeness SAC and the same impacts and mitigations would apply.
- 5.22 There are significant negative effects on several national and internationally protected nature conservation sites, including the Dungeness SAC, the Dungeness to Pett Level SPA, and the Dungeness SSSI. The adverse effects would include direct loss of vegetated shingle habitat, which is internationally recognised for its ecological importance. It is considered unlikely that these adverse effects could be fully mitigated.
- 5.23 **Strategic Effects on Biodiversity and Ecosystems: The potential for adverse effects on designated sites and species considered to be of UK-wide and European nature conservation importance (the Dungeness SAC, the Dungeness to Pett Level SPA, the Dungeness, Romney Marsh and Rye Bay proposed Ramsar, the Dungeness, Romney Marsh and Rye Bay SSSI and the Dungeness NNR) means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. Detailed baseline studies will form part of the project-level Environmental Impact Assessment. The Habitats Regulations Assessment for Dungeness should be referred to for further details and advice on the internationally designated sites.**

Climate Change

- 5.24 The establishment of a new nuclear power station will contribute positively to local and national 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.
- 5.25 A new nuclear power station on the nominated site may result in emissions from the transport of goods and labour throughout the construction, operation and decommissioning phases if the railhead situated within the site of the existing nuclear facilities at Dungeness A and B is not extended to link with the nominated site. However, any development or extension of the existing railhead would likely impact on the neighbouring SSSI, SAC and SPA. The

48 DECC (2010) *Habitat Regulations Assessment site report for Dungeness*
www.energyngpsconsultation.decc.gov.uk

nomination document refers to the possible construction of a marine off-loading facility, which could reduce long-distance road journeys.

- 5.26 Complementary carbon emission 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.
- 5.27 **Strategic Effects on Climate Change: A new nuclear power station on the nominated site would have positive long-term effects on climate change during the operational stage compared to conventional sources of energy, contributing positively to local and national climate change objectives. 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. However, extension of the railhead could impact on designated nature conservation sites, which would need to be further investigated by the nominator in the site-specific EIA.**

Communities: Population, Employment and Viability

- 5.28 The operation of a new nuclear power station at Dungeness is likely to have long term positive impacts on employment, the economy and communities at the local level – this may also require investment in training and skills development. On a strategic regional level, impacts are considered to be slightly positive. However, some uncertainty has been identified, as the project may lead to a shortage of local construction workers to meet the needs of other industries and major projects within the region.
- 5.29 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. If public transport access is improved, impacts on local roads may be reduced.
- 5.30 Job losses from closure of the existing Dungeness nuclear 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. This may be significant locally because of the importance of the existing Dungeness power station as a source of employment (and indirect economic benefit) in the area. However, the time lag between job losses and job creation and possible differences in skill requirements may require workers to seek temporary employment elsewhere.
- 5.31 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.

- 5.32 Positive cumulative effects are also likely for the South East Region when considered with initiatives such as Ashford's Future and the Thames Gateway⁴⁹. A 2002 study stated that Ashford has the potential to accommodate up to 31,000 new homes and 29,000 jobs by 2031⁵⁰. When combined with a new nuclear power station at Dungeness, this plan could contribute significantly to the regional economy and employment.
- 5.33 There are claims 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 America⁵¹ 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
- 5.34 Strategic Effects on Communities: Population, Employment and Viability: Positive effects of local economic significance are likely to occur. These are less significant at the regional scale, but may still occur when the project is considered cumulatively with other projects in the South East. 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

- 5.35 Negative effects at a local scale are likely due to increased pressure on basic services and infrastructure in South Kent and Shepway, including conventional waste management facilities, waste water 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 conventional waste networks. This is considered to be a local, rather than strategic effect.
- 5.36 Transport: There could be significant effects on national road infrastructure through increased congestion and disruption of traffic on the M20 motorway. In isolation, this is not considered likely to be significant. However, the cumulative effect of development in the region, including any new residential development around the Ashford 'Growth Area', which may include regeneration-led development of coastal towns such as Dover, Folkestone

49 <http://www.homesandcommunities.co.uk/ashford.htm>

50 <http://www.homesandcommunities.co.uk/ashford.htm>

51 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

and Ramsgate, may lead to increased congestion. This can likely be mitigated, provided the design includes transportation management plans, green travel plans and consideration of alternatives to road for the transport of large loads (for example, transport by rail and sea.) Nevertheless, further studies will be required.

- 5.37 Lydd Airport is close to the site at Dungeness. Any proposed expansion of the airport would need to be considered by the regulators in relation to the existing Dungeness nuclear power stations and any new nuclear power station at Dungeness.
- 5.38 Conventional waste: Waste material will be generated during the construction, operation and decommissioning of a development. Local impacts may be expected upon local/regional facilities however the scale of operation is not considered to be significant in the long/medium term. Construction traffic will also be a short-term factor. 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.
- 5.39 Radioactive waste⁵²: 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.
- 5.40 Electricity transmission: The development of a nuclear power station at Dungeness 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).
- 5.41 **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 when considered cumulatively**

52 Radioactive waste is waste regulated under Environmental Permitting (England and Wales) Regulations 2010.

with the proposed regional development around the Ashford 'Growth Area' and sub-regional development in coastal towns such as Dover, Folkestone and Ramsgate. There is, nonetheless, a range of mitigation options available.

Human Health and Well-Being

Radiological Health Issues

- 5.42 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 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.⁵³
- 5.43 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.⁵⁴ 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.
- 5.44 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.⁵⁵ 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

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

54 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>

55 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).

public and the environment are protected against exposure to radioactivity. Regulation of all disposals, including discharges to air, water and land, of radioactive waste off or on nuclear sites is regulated under the Environmental Permitting (England and Wales) Regulations 2010⁵⁶. This regulatory system will apply to a potential new nuclear power station at Dungeness and should ensure that permitted radioactive discharges do not cause unacceptable risk to health.

Regulatory Justification

- 5.45 European Council Directive 96/29/Euratom of 13 May 1996 (the Basic Safety Standards Directive)⁵⁷ requires Member States to ensure that, in 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 has decided, after public consultation, that two nuclear reactor designs, Westinghouse's AP-1000 and Areva's EPR, should be Justified⁵⁸.
- 5.46 The Government believes that the regulatory regime will effectively limit and minimise the radiation dose and release of radioactivity from new nuclear power stations, until they have been fully decommissioned, to very low levels, and that the health detriments associated with the operation of new nuclear power stations will be very low
- 5.47 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 UK. 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.

Construction and Operational Effects

- 5.48 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

56 Environmental Permitting (England and Wales) Regulations 2010

http://www.opsi.gov.uk/acts/acts1993/ukpga_19930012_en_1

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

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

⁵⁸ www.decc.gov.uk

radioactive materials no 'significant dose events' were associated with the nuclear power industry⁵⁹.

- 5.49 The scale of construction work associated with a potential new nuclear power station at Dungeness 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.
- 5.50 During the operation of a potential nuclear power plant at Dungeness, activities will be regulated in accordance with the Health and Safety at Work Act 1974, Nuclear Installations Act 1965 and the Ionising Radiations Regulations 1999. The potential operator must have a Nuclear Site Licence from the 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.
- 5.51 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 advice⁶⁰, a precautionary approach is adopted to the routing of any required power lines.
- 5.52 The presence of, and more particularly the construction of, a new nuclear power station at the nominated site at Dungeness will increase community disturbance to some degree. Such disturbance may include noise and vibration, dust in the construction phase and increased traffic in all phases. To mitigate construction phase disturbances, an environmental management plan should be developed, implemented and monitored for effectiveness throughout the construction period. Potential traffic issues in all the project's phases can be mitigated through the adoption of a transport plan aimed at minimising community disturbance whilst also promoting 'green' travel.
- 5.53 Noise emissions will arise from both the construction and operational phases. Construction noise will arise from plant/activity and transportation sources. Similarly, operational noise levels will arise from both fixed installation and mobile 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 managed through the construction management plan procedures.

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

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

- 5.54 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) 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 or pose a constraint to development at Dungeness.

Local Health and Recreation

- 5.55 With regard to recreation, there is a potential impact associated with the footpath, which passes between the beach and the nominated site at Dungeness⁶¹. 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.
- 5.56 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.
- 5.57 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 being near a nuclear power station so this is unlikely to be a problem at this location.
- 5.58 It is probable that building, operating and decommissioning a new nuclear power station at Dungeness will lead to an increase in employment, community wealth, housing stock and other associated neighbourhood infrastructure. These positive effects on the community are likely to be much more significant than any potential negative consequences.

⁶¹ This path might in future form part of an English coastal route, in accordance with the objectives of the Marine and Coastal Access Act 2009.

5.59 Strategic Effects on Human Health and Well-Being: The rigorous system of regulation of routine discharges from the proposed nuclear power station at Dungeness 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 nominated 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

- 5.60 The nominated site at Dungeness is within an area of known archaeological value. The main effects of the development of a new nuclear power station would be local and within the footprint of the facility itself. Most notably, the Dungeness Redoubt monument falls within the footprint of the nominated site.
- 5.61 The development may have potential impacts on the setting of scheduled monuments, conservation areas and listed buildings in the area, depending on distance and sight lines. The Dungeness Conservation Area and Grade II and Grade II* listed buildings (lighthouses and lighthouseman's dwelling) lie to the east of the existing nuclear power stations. As the site nomination identifies an area to the west of the existing facilities, development is unlikely to have a significant direct impact on the Conservation Area and listed buildings. Some impacts on the view from the Lade Fort scheduled monument, which is 4km to the north east of the nominated site, could be incurred, particularly throughout the construction phase. This could be minimised by appropriate planning and design of construction activities and operational facilities, including adherence to the principles of good design⁶².
- 5.62 In addition, there may be potential off-site effects on cultural heritage assets caused by an increase in traffic and the development of new infrastructure. Detailed assessment will be required at the project level EIA stage.
- 5.63 As yet unidentified archaeological sites of post medieval date and layers of palaeo-environmental potential could potentially be present within the nominated site. Maritime archaeology may also be present which could be impacted upon by new sea defences and wharf facilities. Detailed investigations (including consultation with 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 a watching brief during the construction phase (during ground preparations and excavations).

62 Planning Policy Statement 1: Delivering Sustainable Development

- 5.64 Strategic Effects on Cultural Heritage: The AoS has identified potential, adverse effects on the view from the Lade Fort Scheduled Monument. However, there is a possibility that this can be mitigated. Further detailed assessment at project level will be required.**

Landscape

- 5.65 Due to the open, prominent character of the Dungeness foreland and far reaching views, there would likely be significant adverse direct and indirect landscape and visual impacts during the construction and operation of a power station. Potential adverse impacts on visual amenity are likely to be perceptible from the High Weald and Kent Downs AONBs and the Dover – Folkestone Heritage Coast. However, the new power station would be seen in the context of existing power station facilities, prior to decommissioning.
- 5.66 Direct impacts would be at a local level and may include land raising both within the nominated site and with regard to associated infrastructure and transmission lines, the loss of distinctive coastal landform and geomorphology including shingle beaches, specialised shingle vegetation and/or saltmarsh. The power station footprint would increase temporarily during the construction phase. Indirect landscape and visual impacts are likely to result from increased onshore and offshore traffic, which may have a negative impact on the tranquility of the landscape. Any increase in the height or extent of sea defences and the incorporation of a new marine landing platform could also give rise to adverse impacts on the appearance of the existing shoreline.
- 5.67 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, which would not be able to be mitigated, given the scale of possible new buildings. The nomination states a preference for the use of direct water cooling, which would have less visual impact than indirect water cooling via water towers.
- 5.68 Given the scale of the likely development, fully effective mitigation of the local landscape and visual impacts during the constructional and operational phases is unlikely. The decommissioning of the existing power station may allow some landscape restoration of previously developed areas in the long term, which could be delivered and monitored through the use of an Integrated Land Management Plan. However, long term land uses for the restored areas remain difficult to predict.
- 5.69 As part of the EIA process a visual impact, seascape character and sensitivity assessment (which should also cover the historic environment) is recommended to inform the development of detailed proposals.
- 5.70 Strategic Effects on Landscape: The AoS has identified potential, adverse visual effects and some localised impacts on landscape and the seascape character, including potentially some perceptible adverse**

indirect impacts on parts of the High Weald and Kent Downs AONBs and the Dover – Folkestone Heritage Coast. At a local level, there is also the potential for long term adverse effects on the distinctive Dungeness coast. Overall, the new power station would be seen in the context of existing power station facilities and industrial setting, prior to any decommissioning. However, given the scale of the nominated site it is unlikely that effects could be mitigated entirely. Further detailed design at project level will be required to ensure that attempts are made to avoid and reduce any adverse effects.

Soils, Geology and Land Use

- 5.71 The construction of a new power station at the nominated site at Dungeness and associated infrastructure, including transmission lines and towers, could lead to the direct loss of soil structure. This may include impacts on soils that maintain terrestrial habitats, including designated nature conservation sites; the Dungeness, Romney Marsh and Rye Bay SSSI, Dungeness to Pett Level SPA, Dungeness SAC and Dungeness 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.
- 5.72 The development of the 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.
- 5.73 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 areas of touristic value, are considered to be of local impact.
- 5.74 **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

- 5.75 The nominated site is surrounded by areas which are shown on Environment Agency (EA) maps as being at risk of flooding from rivers and sea without defences. During the lifespan of the proposed nuclear power station, and as a result of potential sea-level rises, the nominated site is likely to require the construction of new flood defences. These defences would be designed to counteract the effects of existing fluvial and coastal processes, but are likely to have the secondary effect of impacting the movement of sediment in the river system and along the coast. The effects of the construction and long-term presence of upgraded coastal defences on coastal process, hydrodynamics and sediment transport along the coast could be reduced or

possibly eliminated by the adoption of suitable, environmentally-friendly designs.

- 5.76 If cooling water is returned to the sea at elevated temperatures, this could have significant adverse effects on both sediment transport and water quality. There could be further adverse effects on coastal habitats, particularly on aquatic biodiversity. A more detailed appraisal is required at the project EIA level to assess the implications of this thermal discharge. Any future thermal discharge will require an Environmental Permit⁶³ from the Environment Agency and will need to meet existing regulatory standards and the requirements of the Water Framework Directive, including the objective of no deterioration in ecological status (whichever is the most stringent). In addition to the thermal effects from direct cooling, there are other potential water quality issues, for example from discharge of radioactive or non-radioactive materials, such as anti-fouling agents, associated with the cooling water process. These discharges will also be subject to permitting by the EA.
- 5.77 The Marine and Coastal Access Act 2009 makes provision for the production of Marine Policy Statements. It is intended to produce a Marine Policy Statement (MPS) that, for the first time, brings together the policies for all UK administrations. The second stage in the new planning system will consist of a series of Marine Plans. The Marine Management Organisation (MMO) set up under the Marine and Coastal Access Act, is responsible for preparing marine plans for the English inshore and offshore regions according to the policies and objectives set out by the Government. Similar plans will be produced for Welsh marine waters. The MPS will interact with National Policy Statements and, in reaching its decisions, the IPC must have regard to the MPS but, subject to certain exceptions, must decide in accordance with the relevant National Policy Statements.
- 5.78 To maintain water quality standards, any future discharges from the power station will need to be considered as part of the project level EIA 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.
- 5.79 The development of a new nuclear power station on the nominated site may have the short-term effect of increasing water demand during the construction phase, due to an increased population. The potential magnitude and duration is dependent on the timing of new development in relation to the activities (operation or decommissioning) of the existing nuclear facilities. It is anticipated that, as the operation of a new nuclear power station on the nominated site is likely to have a similar or lower demand for water to the existing power station, no adverse long-term impacts are expected on water resources, although this will need to be confirmed as part of the planning for this nominated site. Similar comments apply to wastewater production from the nominated site, although there is likely to be a short-term effect of

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

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

- 5.80 Increased water supply would likely need to be transferred from the adjacent water resource zone, which could impact on other groundwater bodies. In addition, a potentially significant effect could occur as a result of the impact of any possible new development on the quality and quantity of groundwater at the nominated site. The nominated site is located on the Denge Gravel aquifer, which is currently used for water supply. The Environment Agency considers that existing groundwater abstractions from the Denge Gravel aquifer are likely to be unsustainable due to the potentially conflicting water level requirements of the Dungeness SAC, together with sea level rise. 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. There is the potential for adverse long-term impacts on water resources at the nominated site and a more detailed appraisal is required to assess these implications.
- 5.81 **Strategic Effects on Water Quality and Resources: The AoS has identified potential, adverse, long-term, direct impacts from water consumption, particularly on the quality and quantity of groundwater at the nominated site. Groundwater bodies in the adjacent water resource zone could also be affected by water consumption. In addition, if cooling water is returned to sea at elevated temperatures, this could have direct effects on sediment transport and water quality locally, and potential indirect effects on nationally and internationally designated habitats. Upgraded coastal defences could cause impacts on coastal processes and sediment transport.**

Flood Risk

- 5.82 The nominated site is situated in an area that the Environment Agency considers to be at risk from flooding by rivers and sea without defences. 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.
- 5.83 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 coastal retreat, existing coastal defences may need to be improved or new defences constructed. These defences have the potential to modify existing hydrodynamics and associated sediment movement, which may have secondary effects on marine ecosystem structure and functioning. However, the use of an appropriate design and a full understanding of hydrodynamics and sediment transport could minimise the potential effects. If continued, the current system of shingle recycling (extraction from one area of the coast to defend the existing power station) could have impacts on nationally and internationally important conservation sites (see Biodiversity and Ecosystems section).

- 5.84 Any residual flood risks to the nominated site at Dungeness could be mitigated though the siting of the most vulnerable site infrastructure at the lowest levels of flood risk.
- 5.85 **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 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, taking account of coastal processes, hydrodynamics and sediment transport.

Key interactions between Sustainable Development Themes

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

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

- 5.88 Interactions and cumulative effects can occur between the plan or proposal being appraised and other key plans and policies. This AoS identified the other relevant plans and programmes with sustainability objectives that need to be considered. This is reported in Section 3 Policy Context and Appendix 3: Plans and Programmes Review. The key plans that might have significant interactions with cumulative effects for the revised draft Nuclear NPS and Dungeness were identified as follows:
- South East Biodiversity Strategy, South East England Biodiversity Forum (February 2009)
 - River Basin Management Plan for the South East, Environment Agency (2009)
 - Water Resources Management Plan 2009, Veolia Water South East (September 2009)
 - Folkestone to Rye Coastal Defence Strategy Study, Environment Agency (2001)

5.89 Other key projects that might have significant interactions with the proposals for new nuclear power station at Dungeness were identified as follows:

- Decommissioning of existing reactors at Dungeness
- Lydd (London Ashford) Airport, located 6km from the nominated site – proposed extension to the existing runway and construction of a new terminal in December 2006⁶⁴.
- Development in South East including the Thames Gateway.

5.90 The appraisal of cumulative sustainability effects arising through interactions between the Dungeness nomination 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
Biodiversity and Ecosystems	<ul style="list-style-type: none"> • Increased development proposed in the region places demands on sensitive ecosystems, particularly the Dungeness SPA peninsula, but may offer possibilities for enhancing green infrastructure • Expansion of Lydd airport could negatively impact biodiversity at Dungeness (including disturbance to internationally important birdlife and direct land take from Dungeness SAC)
Climate Change	<ul style="list-style-type: none"> • Low carbon economy promoted by nuclear power proposals seeks to minimise the effects of climate change
Communities: Population, Employment and Viability	<ul style="list-style-type: none"> • The Government's Sustainable Communities Plan identifies 'Growth Areas' for new housing and jobs in nearby communities
Communities: Supporting Infrastructure	<ul style="list-style-type: none"> • Potential cumulative effects of congestion with new developments along the high speed rail links planned for Ashford and increased traffic on local arterial routes during construction • Decommissioning of existing nuclear facilities at Dungeness may coincide with construction of a new nuclear power station to create adverse effects on supporting infrastructure, in particular transport networks
Human Health and Well-Being	<ul style="list-style-type: none"> • Enhanced prosperity and secure long-term employment likely to have synergistic positive effects on health and well-being

⁶⁴<http://www.ukplanning.com/ukp/findCaseFile.do?jsessionid=1189E4647B67F2B979ABAEDB74FDE1A3.wam2?appNumber=Y06%2F1648%2FSH&action=Search>

AoS Sustainable Development Theme	Interactions and Cumulative Effects
Landscape	<ul style="list-style-type: none"> • Potential in-combination effects associated with further electricity pylon infrastructure improvements by the National Grid • Potential in-combination effects associated with new housing and industrial development in the vicinity • Potential positive effects if the power station scheme is sensitively integrated with emerging Local Area Action Plan proposals
Water Quality and Resources	<ul style="list-style-type: none"> • Potential for interaction with the South East River Basin Management Plan's targets to achieve good water quality by 2015. Specific targets for the Rother Catchment have been identified (see Appendix 3) • All proposals will need to meet with the requirements of the EU Water Framework Directive, as implemented through the South East River Basin Management Plan • Potential for interaction with the Veolia South East Water Resource Management Plan in relation to water supply and demand
Flood Risk	<ul style="list-style-type: none"> • Sea defences may need to be upgraded or constructed as part of any development on the nominated site

6. Summary 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 following 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 Dungeness. Beneficial and adverse effects were identified as potentially significant at the local level and it is recommended that these need to be further considered by the developer, regulators and the decision-maker (the IPC), during project level assessments.
- 6.3 The AoS process has included recommendations to inform the development of the revised draft Nuclear NPS. This site report for Dungeness has helped to inform the decision-making for the SSA. It has included advice as to the strategic significant effects arising from the construction of a new nuclear power station at Dungeness, and suggestions for how adverse effects may be mitigated, including proposed mitigation measures which could be considered as part of project level EIA.
- 6.4 A number of the strategic effects identified for Dungeness will be similar across all the nominated sites, including positive effects for employment and well being. However a number of potential strategic effects have been identified that are of particular note for the nominated site at Dungeness. These are discussed below:
- 6.5 There are likely significant negative effects on several national and internationally protected nature conservation sites, including the Dungeness SAC, the Dungeness to Pett Level SPA, the Dungeness, Romney Marsh and Rye Bay proposed Ramsar (pRamsar) and the Dungeness SSSI. The adverse effects would include direct loss of vegetated shingle habitat, which is internationally recognised for its ecological importance. It is considered unlikely that these adverse effects could be fully mitigated.
- 6.6 The AoS has also identified adverse effects on water quality and fish populations in nearby coastal waters due to the abstraction and release of sea water for cooling. These effects are significant, but mitigation opportunities could be available following further study at the project level.
- 6.7 Parts of the nominated site are at high risk from coastal and fluvial flooding, and coastal erosion. There are existing flood defences in place at the nominated site, but continual management is required to replenish shifting shingle deposits. Flood defences and erosion management plans may require significant upgrading to protect against sea level rise and coastal erosion for the full life time of a new power station.

- 6.8 A new nuclear power station would be set in the context of the existing power station at Dungeness, but the surrounding area is a predominantly flat and undeveloped landscape. A new nuclear power station would have additional adverse visual impacts on parts of the High Weald and Kent Downs AONBs and the Dover to Folkestone Heritage Coast.
- 6.9 Dungeness is not close to any other nominated site and therefore does not form part of a cluster. This means that regional or sub-regional cumulative impacts are not considered relevant for this nominated site.
- 6.10 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.
- 6.11 Table 6.1 provides an overall summary of the significance of the environmental and sustainability effects for the Dungeness site. Each sustainable development theme and each development stage has been considered. The symbols and colours used are explained in the key.

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

Sustainable Development Themes:	Significance of potential Strategic effect at each Development stage:		
	Construction	Operation	Decommissioning
Air Quality	-	- ?	- ?
Biodiversity and Ecosystems	-- ?	-- ?	-- ?
Climate Change	-	++	- ?
Communities: Population, Employment and Viability	+ ?	+ ?	0
Communities: Supporting Infrastructure	- ?	- ?	- ?
Human Health and Well-Being	+	+	+
Cultural Heritage	-	-	-
Landscape	-	-	0 ?
Soils, Geology and Land Use	- ?	- ?	- ?
Water Quality and Resources	-	-	- ?
Flood Risk	-	-	-
Key: Significance and Categories of Potential Strategic Effects			
++	Development actively encouraged as it would resolve an existing sustainability problem; effect considered to be of regional/national/international significance		
+	No sustainability constraints and development acceptable; effect considered to be of regional/ national/international significance		
0	Neutral effect		
-	Potential sustainability issues, mitigation and/or negotiation possible; effect considered to be of regional/national/international significance		
--	Problematical because of known sustainability issues; mitigation or negotiation difficult and/or expensive; effect considered to be of regional/national/ international significance		
Uncertainty			
?	Where the significance of an effect is particularly uncertain, for example because insufficient information is available at the plan stage to fully appraise the effects of the development or the potential for successful mitigation, the significance category is qualified by the addition of '?'		

6.12 Potential environmental and sustainability effects considered to be of a wider strategic significance were also identified. These are summarised in Table 6.2. This table includes a summary of how the potential adverse effects may be mitigated and includes possible feasible suggestions for mitigation to be considered at the project level. Some of these mitigation options could be addressed by the HSE, EA, HPA and others when they consider the development consent application stage. Other mitigation options could be proposed by the developer as part of the project design process and through

EIA. However, mitigation measures can in themselves produce impacts and these would need to be assessed at the project level.

- 6.13 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.
- 6.14 Mitigation measures should be considered in all stages of the project with the aim to develop a strategy that avoids impacts, and if they cannot be avoided, to reduce them. The suggested mitigation measures shown in Table 6.2 include examples from all levels of the mitigation hierarchy that comprises:
- Enhance
 - Avoid
 - Reduce
 - Repair
 - Compensate
- 6.15 Options for mitigating through project design or management should firstly consider avoidance, addressing impacts at source before considering impacts at the receptor, and ensuring that a commitment is made to implementing and monitoring the effectiveness of the proposed mitigation. For European Sites, compensatory measures to offset damage to biodiversity and ecosystems and ensure coherence of the Natura 2000 network may only be considered if it has been established that there are no alternative solutions and the plan or project is necessary for imperative reasons of overriding public interest.

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

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the revised 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

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the revised draft Nuclear NPS and IPC
Biodiversity and Ecosystems	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> • Disturbance to fauna (in particular birds, great crested newts and water voles in important ecological areas) from construction activities • During construction, risk of accidental pollution (for example, spillage of oil or other fuels) • Detrimental effects on air quality, particularly during construction from increased vehicular movements and mobilisation of dust, which could impact on local environmentally important areas 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Nominator to ensure further ecological surveys and impact assessments to define detailed mitigation measures • Avoidance of disturbance to sensitive areas • Construction Environmental Management Plan to avoid/minimise disturbance to wildlife, avoid/minimise risk of pollution and release of emissions to air etc.
<ul style="list-style-type: none"> • Loss, damage or fragmentation of internationally designated sites (terrestrial and marine), such as the Dungeness SAC/SPA/SSSIs and proposed Ramsar sites • Loss of priority and protected species (including plant and invertebrate species) using these habitats⁶⁵ 	<ul style="list-style-type: none"> • Nominator should ensure further ecological surveys and impact assessments to define detailed mitigation measures • Habitat retention and species protection measures on the nominated site at Dungeness • Ecological Mitigation and Management Plan/ Integrated Land Management Plan • Monitoring programme to identify and manage effects on priority species and habitats, as well as wider area
<ul style="list-style-type: none"> • Groundwater abstraction may affect water supply to valuable areas 	<ul style="list-style-type: none"> • Nominator should ensure further hydrological surveys to assess the effects of water abstraction on valuable or vulnerable habitats
<ul style="list-style-type: none"> • Cooling water abstraction may affect fish species, including important migratory fish 	<ul style="list-style-type: none"> • Ensure fish protection in cooling water intake/system design • A suitable water intake system design should be adopted

⁶⁵ 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 revised draft Nuclear NPS and IPC
<ul style="list-style-type: none"> • Routine releases of radioactive discharges, abstraction of water and discharges of heated water could impact on aquatic ecosystems • Unplanned release of radiation/accidental pollution from water treatment plants • Risk of accidental discharges to SPA/SAC/SSSI 	<ul style="list-style-type: none"> • Minimise routine radioactive discharges, avoid accidental discharges
<ul style="list-style-type: none"> • Cumulative effects of a number of proposed projects in the area involving both nuclear and renewable energy options 	<ul style="list-style-type: none"> • Assess and mitigate cumulative effects
Climate Change	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> • Potential short term increase 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"> • 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 	
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

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the revised draft Nuclear NPS and IPC
<p>Beneficial Effects:</p> <ul style="list-style-type: none"> • Positive effects for long-term employment and sustaining communities in Shepway, Kent and wider region • 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 and training for employees and contractors in the region • Positive multiplier effects as income from new population of workers will help support local economy • Potential for property values to increase within vicinity of nominated site, based on previous studies 	
<p>Communities: Supporting Infrastructure</p>	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Potential for congestion and disruption on M20 and local transport network - potential cumulative effects with regional development around the Ashford 'Growth Area' 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Transport Management Plans to minimise effects • Physical improvements to road network • Consideration of port and rail transport options
<ul style="list-style-type: none"> • Potential for significant impacts regarding radioactive and conventional waste 	<ul style="list-style-type: none"> • Conventional waste: good site practices, implementation of waste hierarchy (reduce, reuse recycle) and waste management • Radioactive waste: appropriate storage and management
<p>Human Health and Well-Being</p>	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Possibility of local and regional health risks from authorised discharges 	<p>Mitigation Possibilities</p> <ul style="list-style-type: none"> • Adherence to the UK's strict regulatory framework, to restrict both routine discharges from nuclear power stations and direct radiation exposures to workers and the general public, should reduce potential health impacts to acceptable levels and ensure that radiation doses are well within internationally agreed limits.

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the revised draft Nuclear NPS and IPC
<ul style="list-style-type: none"> Possibility of local and regional health risks from accidental discharges 	<ul style="list-style-type: none"> Adherence to the Nuclear Installations Inspectorate (NII)'s regulatory regime for the safe operation of nuclear power stations, including the Nuclear Site licensing Safety Assessment Principles and the continual monitoring by NII of safety risks throughout the lifetime of the station.
<ul style="list-style-type: none"> The potential requirement for appropriate additional health service capacity for the influx of both construction and operational workers 	<ul style="list-style-type: none"> The nominator should carry out a review of local health provision to ensure it is adequate for the expected influx of power station workers
<ul style="list-style-type: none"> The construction and operation of the proposed nuclear power station may lead to unacceptable community disturbance 	<ul style="list-style-type: none"> The nominator should ensure a Construction Environmental Management Plan and an all-phase Travel Plan are produced, observed and monitored
<p>Beneficial Effects:</p> <ul style="list-style-type: none"> Likely positive effects on health via increase in employment, community wealth, additional housing and other associated neighbourhood infrastructure 	
<p style="text-align: center;">Cultural Heritage</p>	
<p>Adverse effects:</p> <ul style="list-style-type: none"> Potential for adverse effects on the view from the Lade Fort Scheduled Monument 	<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 effects on local monuments Application of principles of good design in accordance with PPS1 Further detailed investigations may be required prior to construction, with a watching brief
<p style="text-align: center;">Landscape</p>	

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the revised draft Nuclear NPS and IPC
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Potential for longer-term minor adverse landscape character and visual impacts on the surrounding area, including distant viewpoints within the High Weald and Kent AONB and Dover-Folkestone Heritage Coast 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Some landscape and visual mitigation and enhancement may be possible including opportunities to further the aims and objectives of the Kent and Medway Structure Plan, Shepway District Council Local Plan, Dungeness Special Landscape Area (SLA) • Some potential for visual impact mitigation through sensitive siting, colouring and detailed building design, including application of principles of good design in accordance with PPS1. Potential is, however, limited given the necessary building scale • Rationalisation and reduction of unsightly clutter and infrastructure within the nominated site • Decommissioning may allow some landscape restoration of previously developed areas including removal of overburden derived from construction, reinstatement of prevailing topography, coastal landform and geomorphology, management of wet grassland and/or saltmarsh together with improvements to habitat connectivity with local wildlife sites
Soils, Geology and Land Use	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Localised loss of soil structure, which might adversely affect nationally/internationally designated sites (please refer to the Biodiversity and Ecosystems sections of this report) 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Limitation of the footprint of the development, reducing the area of soils affected • Avoidance of any soils within designated sites of ecological importance
Water Quality and Resources	

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the revised draft Nuclear NPS and IPC
<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 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Further investigations required • Suitable design and location of coastal and fluvial flood defence works and marine landing station. May include the use of Sustainable Drainage Systems (SUDS) • Selection of appropriate construction methods • Sediment transport modelling
<ul style="list-style-type: none"> • Works to abstract cooling water and subsequent discharge of cooling water could have potential effects on coastal processes, hydrodynamics and sediment transport, and potential indirect effects on nationally and internationally designated habitats • Thermal impact of cooling water discharges, potential indirect effects on nationally and internationally designated habitats 	<ul style="list-style-type: none"> • Further investigations required • Abstraction of water and thermal discharges will be subject to Environment Agency permitting
<ul style="list-style-type: none"> • Increased demand for water during construction stage. Magnitude and duration dependent on timing of activities at the existing nuclear power stations. Similar comments apply to wastewater production 	<ul style="list-style-type: none"> • Further investigations required • Detailed planning study to determine that capacity of water and wastewater is adequate to meet estimated demand
<ul style="list-style-type: none"> • Potential impacts on local groundwater (Denge Gravel aquifer) and neighbouring groundwater bodies. Impacts may result from construction disturbances, accidental discharges and abstraction of water to meet increased demand 	<ul style="list-style-type: none"> • Further investigations required • Studies of local groundwater bodies to determine potential pathways and ensure suitable design is adopted to mitigate potential impacts • Potential for ongoing monitoring of impacts on groundwater bodies
Flood Risk	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> • 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 to be upgraded or constructed • Further studies required

Abbreviations

AA	Appropriate Assessment
AGR	Advance Gas Cooled Reactors
ALARP	As Low As Reasonably Practicable
AOD	Above Ordnance Datum
AONB	Area 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
BGS	British Geological Society
CAMS	Catchment Abstraction Management Plan
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
COMARE	Committee on Medical Aspects of Radiation in the Environment
CPRE	Campaign to Protect Rural England
DECC	Department of Energy and Climate Change
Defra	Department for the Environment, Food and Rural Affairs
EA	Environment Agency
EfW	Energy from Waste
EIA	Environmental Impact Assessment
EMF	Electromagnetic fields
EU	European Union
FDWS	Folkstone and Dover Water Services
GEP	Good Ecological Potential
GES	Good Ecological Status
GP	General Practitioner
GW	Giga Watt
GWMU	Groundwater Management Unit
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
IPC	Infrastructure Planning Commission.
LAQM	Local Air Quality Management
MBT	Mechanical Biological Treatment
MOLF	Marine Off Loading Facility
MRF	Materials Recycling Facility
mSv	Millisievert
MWe	Mega Watt (electrical)
MWt	Mega Watt (thermal)
NCA	National Character Area
NDA	Nuclear Decommissioning Authority
NII	Nuclear Installations Inspectorate
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
Nuclear	The proposed National Policy Statement for new nuclear power stations

NPS	
NPS	National Policy Statement
OSPAR	Oslo and Paris Conventions
PM ₁₀	Particles Measuring 10µm or less
PWR	Pressurised Water Reactor
RAMTED	Radioactive Materials Transport Events Database
RBD	River Basin District
RSS	Regional Spatial Strategy
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SEA	Strategic Environmental Assessment
SECCP	South East Climate Change Partnership
SEEDA	South East England Development Agency
SEERA	South East England Regional Assembly
SERBD	South East River Basin District
SMP	Shoreline Management Plan
SOA	Super Output Area
SPA	Special Protection Area
SRF	Solid Recovered Fuel
SSA	Strategic Siting Assessment
SSSI	Site of Special Scientific Interest
SE	South East
UKCIP	UK Climate Impacts Programme
VOC	Volatile Organic Compound
WDA	Waste Disposal Authority
WFD	Water Framework Directive
WRMP	Water Resources Management Plan
WRMU	Water Resources Management Unit

Appendices Available Separately

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

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