

Appraisal of Sustainability: Site Report for Wylfa

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

Preface:

Appraisal of Sustainability of the revised draft Nuclear National Policy Statement

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

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

AoS Non-Technical Summary

Main AoS Report of revised draft Nuclear NPS

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

Annexes to Main AoS Report: Reports on Sites

- Site AoS Reports
- Technical Appendices

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

This document is the Appraisal of Sustainability : Site Report for Wylfa.

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, NPA Ltd, Studsvik UK Ltd and Metoc plc.

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Summary of Key Findings

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

Summary of Key Findings

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

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

There are potential negative effects on at least four national and internationally protected nature conservation sites. These effects are significant, but mitigation opportunities could be available following further study at the project level.

The site is predominantly located on higher ground with hard bedrock. The risks from coastal flooding, sea level rise and erosion are therefore considered to be low. However, further assessment is required to determine the need for additional defences over the lifetime of a new power station.

Coastal water conditions at the site are considered generally favourable for the dispersion of the heated water that would be released after cooling.

The development of a new nuclear power station will have a negative visual impact on the local and sub-regional landscape, particularly the Anglesey Area Of Natural Beauty (part of which lies within the nominated site boundary) and North Anglesey Heritage Coast. Currently the exact placing of a new nuclear power station is unknown as a large site has been nominated, but some adverse impact which may not be fully mitigated is anticipated.

There is also potential for positive effects associated with long term employment and enhanced prosperity for communities at the local level.

Wylfa 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 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.

1 Introduction

This Appraisal of Sustainability Report

- 1.1 This report considers the site at Wylfa 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 Wylfa. 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 AoS 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 Nuclear National Policy Statement

- 1.4 In the White Paper on Nuclear Power⁴, the Government set out its policy on the role that new nuclear power stations could play alongside other low-carbon sources in the UK's future energy mix. The 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 sites. This SSA process⁵ drew on the emerging findings of the site AoSs and the Habitats Regulations Assessment (HRA)⁶.

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.

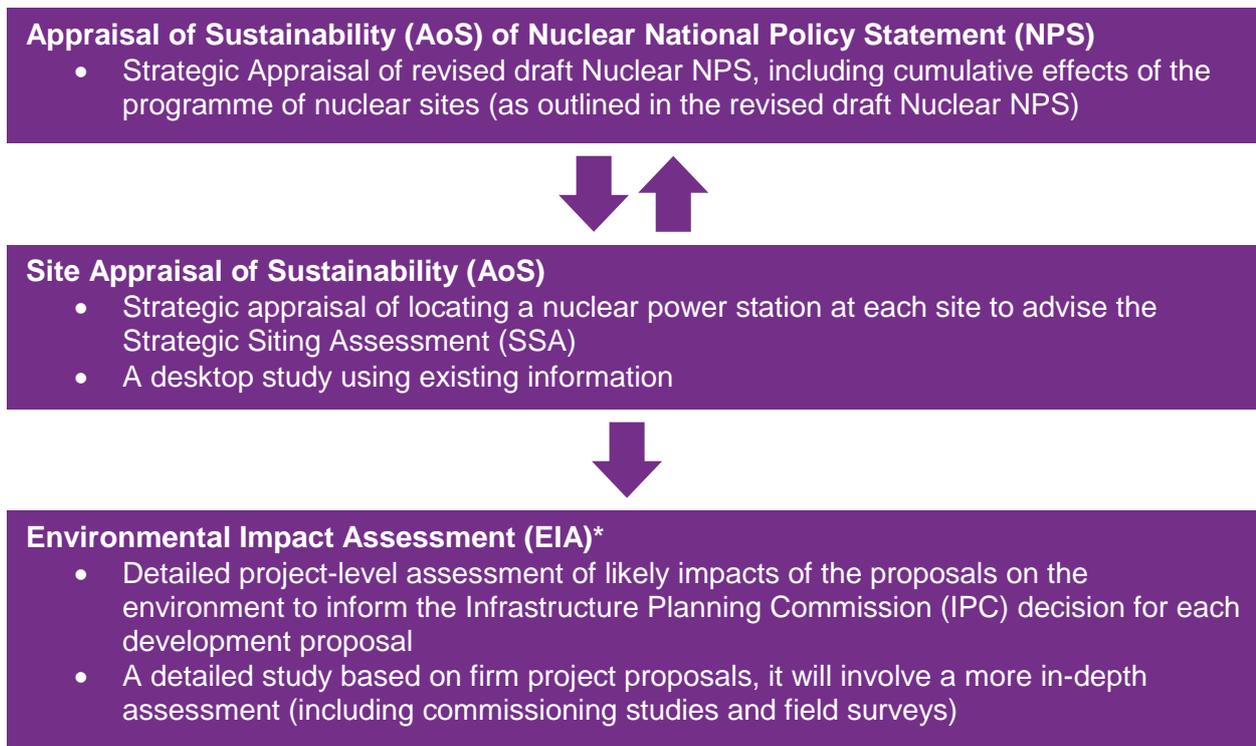
⁴ BERR (Jan 2008) Meeting the energy challenge: a white paper on nuclear power, URN 08/525

⁵ 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>

⁶ Wylfa HRA Report <http://www.energynpsconsultation.decc.gov.uk>

Appraisal of Sustainability incorporating Strategic Environmental Assessment

- 1.5 The Planning Act (2008)⁷ 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 Directive⁸ 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 Wylfa site. This AoS also identifies the significance of those effects, and to suggest possible ways of mitigation. The AoS for the Wylfa 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.



*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 Report⁹, the Environmental Study¹⁰, the Update

⁷ Planning Act 2008

⁸ 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*

⁹ BERR (March 2008) Consultation of Strategic Environmental Assessment for proposed National Policy Statement for new nuclear power, URN08/680

¹⁰ BERR July 2008 Environmental Study

Report¹¹, 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 Report¹² and Environmental Study¹³)
Air Quality	to avoid adverse impacts on air quality (12)
Biodiversity and Ecosystems	to avoid adverse impacts on the integrity of wildlife sites of international and national importance (1) to avoid adverse impacts on valuable ecological networks and ecosystem functionality (2) to avoid adverse impacts on Priority Habitats and Species including European Protected Species (3)
Climate Change	to minimise greenhouse gas emissions (13)
Communities: population, employment and viability	to create employment opportunities (4) to encourage the development of sustainable communities (5) to avoid adverse impacts on property and land values and avoid planning blight (10)
Communities: Supporting Infrastructure	to avoid adverse impacts on the function and efficiency of the strategic transport infrastructure (8) to avoid disruption to basic services and infrastructure (9)
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)

¹¹ BERR January 2009 Update Report

¹² BERR (March 2008) Consultation of Strategic Environmental Assessment for proposed National Policy Statement for new nuclear power, URN08/680

¹³ BERR July 2008 Environmental Study

Sustainable Development Theme	AoS/SEA Objective (Numbers refer to Scoping Report ¹² and Environmental Study ¹³)
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 Safely¹⁴. This set the framework for managing higher activity radioactive waste in the long term through geological disposal, coupled with safe and secure interim storage and ongoing research and development. Geological disposal involves isolating radioactive waste deep inside a suitable rock formation, to ensure that no harmful quantities of radioactivity ever reach the surface environment. The White Paper also invites communities to express an interest in opening up without commitment discussions with Government on the possibility of hosting a geological disposal facility at some point in the future.
- 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 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. 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. The HSE and EA are undertaking a process of Generic Design Assessment (GDA) of new nuclear reactor designs. GDA allows the

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

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.

- 1.19 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.
- 1.20 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 Wylfa Site AoS Report provided in the right hand column.

Table 1.2: Base Case Assumptions and Variations Considered for Wylfa

Base Case	Variations considered in AoS of Wylfa (as proposed in nomination)
1 nuclear reactor	
Technology neutral (i.e. unknown reactor type)	
A requirement for cooling water abstraction	Nomination gives preference to direct cooling using seawater
Discharges of cooling water	
Site boundary as indicated on nomination form	A Marine Off-Loading Facility and inlet and outfall tunnels/pipe-work will be required in coastal/marine areas, outside of the nominated 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 ¹⁵	
<u>No. of employees:</u>	

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

Base Case	Variations considered in AoS of Wylfa (as proposed in nomination)
Construction: approx 4,000 (around 50% from within region) Operation: approx 500 Decommissioning: range of 400 – 800 at key phases ¹⁶ Associated employment creation: 2000	
Coastal flood and protection measures (where relevant)	
Infrastructure for transporting reactor (for example, jetty, landing facility)	
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	

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

2 The Site: Wylfa

- 2.1 The site at Wylfa is located at Wylfa Head, which extends into the Irish Sea from the north coast of the Isle of Anglesey, some 15km north east of Holyhead between Cemaes and Cemlyn Bays. It includes the headland south of Mynydd-y-Wylfa local nature reserve and extends eastwards to the western outskirts of the villages of Cemaes and Cemaes Bay, south to the A5025 and the village of Tregale and west to the Porth-y-Pistall inlet. The location of the nominated site is illustrated in Figure 1. Figure 2 shows the location of the nominated site in a sub-regional context to help address any implications for cumulative effects on biodiversity and on socio-economic factors.
- 2.2 The Wylfa site has supported nuclear power facilities since 1971. The existing power station is a twin-unit Magnox Plant supplying up to 1140MWe, approximately 40% of Wales' electricity demand. It is currently understood that this will close at the end of 2010, although there is potential for life extension up to four years beyond. Part of the nomination site area was, in 1989, identified by the Central Electricity Generating Board as being suitable for development of an additional 1,175 MWe Pressurised Water Reactor which was never constructed.
- 2.3 The existing nuclear power station is situated adjacent to the urban area of Cemaes with agricultural farmland surrounding the site to the south. A river runs south from Wylfa down to Llannerch-Y-Medd. Wylfa is situated 3km north of Tregale and 15km north east of Holyhead. The area is situated on the north coastline of Anglesey with the A5025 leading to the power station from Valley adjacent to Holyhead. The main road into Anglesey is the A55 from Llanfairpwllgwyngyll to Holyhead. A train line runs from Amlwch to Llangwyllog and from Holyhead to Llanfairpwllgwyngyll.
- 2.4 The nomination identified a site located to the south east and to the east of the existing power station. It outlines an area of approximately 232ha, of which 113.1ha is owned by the Nuclear Decommissioning Authority, including the 48.6ha occupied by the existing Wylfa A station for generation, transmission and landscaping. The area used for operational facilities could vary depending on the design of the power station and the type of cooling water system selected, but 30-50ha is identified in the nomination for the permanent site of a single nuclear power unit. 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, marine off-loading facilities and possibly also coastal defences 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
 - construction of marine off-loading facilities beyond the site boundary
 - possible construction of coastal defences beyond the site boundary (including possible sea wall at Porth-y-Pistyll and possible raising or protection of access routes)
 - 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 Wylfa was nominated into the Strategic Siting Assessment (SSA) process, in respect of which nominations closed on 31 March 2009. The Government is also assessing the environmental and sustainability impacts of including the nominated site 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 scoping¹⁷ stage, a review of national plans was undertaken to help identify key sustainability objectives that need to be met and contribute to the development of the AoS Framework of objectives for appraisal.
- 3.2 This section considers the policy context at the regional level relevant to the potential new nuclear power station at Wylfa 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 Report 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:
- Planning Policy Wales, Welsh Assembly Government (2010)
 - Technical Advice Note 5: Nature Conservation and Planning, Welsh Assembly Government (2009)
 - One Wales: A Progressive Agenda for the Government of Wales, Welsh Assembly Government (2007)
 - People, Places, Futures: The Wales Spatial Plan 2008 Update, Welsh Assembly Government (2008)
 - Strategic Framework for Economic Development, Welsh Assembly Government (2005)
 - Isle of Anglesey Unitary Development Plan (stopped, but a material consideration in decision making), Isle of Anglesey County Council (2005)
 - Minerals Planning Policy Wales, National Assembly for Wales (2001)
 - Environment Strategy for Wales, Welsh Assembly Government (2006)
 - Wales Biodiversity Framework, Wales Biodiversity Partnership (updated 2010)
 - Sustainable Homes: A National Housing Strategy (Consultation Draft) Welsh Assembly Government (January 2009)
 - Wise about Waste: National Waste Strategy, Welsh Assembly Government (2002)
 - Starting to Live Differently: The Sustainable Development Scheme, Welsh Assembly Government (2004)
 - One Wales: Connecting the Nation; The Wales Transport Strategy, Welsh Assembly Government (2008)
 - River Basin Management Plan for Western Wales, Environment Agency (2009)
 - North West Wales Catchment Flood Risk Management Plan (2010)

¹⁷ BERR (March 2008) Scoping Report

- West of Wales Shoreline Management Plan Cardigan Bay Coastal Group (2010)

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

- Promote and conservation of the landscape and biodiversity
- Preserve and enhance the historic environment
- Enhance the economic success of urban areas and the countryside
- Reduce the need for travel and promote sustainable transport
- Promote the generation of energy from renewable sources
- Stimulate economic growth to support job creation and regeneration
- Mitigating and adapting to the effects of climate change
- Reducing flood risk: fluvial and coastal
- Improving water quality and maintaining water resources
- Reducing the amount of waste produced, increase recycling and make better use of resources

3.5 These may have indirect and/or cumulative interactions and this is discussed further in Section 5: Interactions and Cumulative Effects with Other Plans and Projects.

4 Site Characterisation

Introduction

- 4.1 A general description of the nominated site at Wylfa and its location is provided in Section 2.
- 4.2 This section describes the general characteristics of the nominated site at Wylfa 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 this stage in the AoS for Wylfa is presented in Table 4.1 below.

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

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 • Location and description of World Heritage Sites, Scheduled Monuments, Historic Battlefields, Historic Parks and Gardens, Designated Protected Wrecks, Conservation Areas, Listed Buildings • Register of Landscapes of Outstanding Historic Interest (Wales) • CCW LANDMAP (Wales) • CCW Tranquil Areas Map (Wales)
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 Wales is generally good, and has been steadily improving since the 1990s. However, pockets of moderately poor air quality exist in the region, concentrated around major industrial installations and heavily urbanised areas of

South Wales. The main causes of moderate or higher pollution in urban areas are fine particles (PM₁₀) and ozone.

- 4.5 There are 24 Air Quality Management Areas (AQMAs) in Wales, however none have been declared in the Isle of Anglesey County Council region, in which the nominated site lies.¹⁸
- 4.6 There is no clearly discernable trend in the number of days when air pollution was moderate or higher. There is a clear downward trend in emissions of carbon monoxide and particulate matter in Wales since 1990. Rural ozone concentrations have been relatively stable over the last 20 years, although average urban ozone levels appear to be rising.¹⁹
- 4.7 Pollution levels for all key air quality pollutants¹¹ (such as sulphur dioxide, nitrogen dioxide and particulates) in the area around Wylfa are typically low.²⁰ Other than the existing nuclear facilities at Wylfa, there are no other major industrial sites in the immediate area. The nearest industrial facilities lie in Amlwch (5km to the west) and Holyhead (15km to the south west). Emissions from the existing nuclear power stations at Wylfa are licensed and monitored to ensure they meet acceptable regulatory standards.
- 4.8 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, including for the current generation of nuclear power from the existing facilities at Wylfa, indicates that all fall within authorised limits.²¹
- 4.9 The UK nuclear industry is highly regulated. All nuclear power stations require a licence to operate provided by the Health and Safety Executive (HSE)/Nuclear Installations Inspectorate (NII). The licence deals with all consents and changes from initial application to decommissioning and beyond.

Biodiversity and Ecosystems

- 4.10 The biodiversity interest around the nominated site includes a number of European designated sites and nationally designated Sites of Special Scientific Interest (SSSI). Further information on the European designated sites and their current condition is given in the separate HRA Report for Wylfa.
- 4.11 The nominated site lies within close proximity (approximately 1km) of the Cemlyn Bay Special Area of Conservation (SAC); the Ynys Feurig, the Skerries and Cemlyn Bay Special Protection Area (SPA); and Henborth, Cemlyn Bay, Cae Gwyn and Llanbadrig-Dinas Gynfor SSSIs. Key interest features of this designated site include

¹⁸ UK Air Quality Archive (online) available:

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

¹⁹ Air Pollution in Wales 2007: A report of the Welsh Air Quality Forum - available online at:

<http://www.welshairquality.co.uk/>

²⁰ <http://www.anglesey.gov.uk/doc.asp?cat=1367> [accessed 08 April 2009]

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

<http://maps.environment->

agency.gov.uk/wiyby/wiybyController?latest=true&topic=pollution&ep=query&lang=_e&x=235050.208333333328&y=393727.4166666666&scale=5&layerGroups=1&queryWindowWidth=25&queryWindowHeight=25

a coastal lagoon and shingle bank, which support nationally important breeding populations of Tern species (Arctic, Common, Roseate and Sandwich Terns).

- 4.12 Tre'r Gof SSSI also lies within the boundary of the nominated site. This rich-fen habitat supports nationally scarce plants and is considered a representative example of this habitat type within North West Wales. Within the wider landscape, additional habitats of value include bog, fen, wet heathland and the mudflats/sandflats of the Menai Strait and Conwy Bay SAC. Early indications of legally protected species within 10km of the nominated site include bat species, common species of reptile and choughs *Pyrrhocorax pyrrhocorax*²².
- 4.13 Liverpool Bay SPA is 14.5km from the nominated site, supporting populations of Red-throated diver (*Gavia stellata*), migratory populations of Common scoter (*Melanitta nigra*) and more than 20,000 wildfowl during the non-breeding season.
- 4.14 Lavan Bay SPA and Puffin Island SPA are approximately 30km away, but have potential hydrological connections with the nominated site.

Climate Change

- 4.15 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 Flood Risk section.
- 4.16 The per capita CO₂ emissions total of 11.1 tonnes per resident in Wales is the second highest per capita rate of all regions in the UK. However, in light of its small population, Wales accounts for just 6% of the UK's total emissions.
- 4.17 The UK's 2008 Climate Change Act²³ 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.
- 4.18 The region has short-term and long-term aims for reducing greenhouse gases. The Welsh Assembly has also set a number of multi-sectoral climate change goals. The key goals include:
- Transport: emissions to stabilise and then start to decline over ten years
 - Residential: targets for the residential sector to build on the existing downward trajectory continuing year on year reduction over the next ten years
 - Public sector: One Wales has a stated goal of annual reduction in greenhouse gas emissions of 3% to 2011²⁴
 - Carbon reduction in the power sector: starting now and continuing through the 2020s, based on replacing existing conventional fossil fuel fired plants with renewable, nuclear and carbon capture and storage (CCS) technologies
 - Carbon reduction in industry: through the introduction of new technologies, such as CCS in cement, iron and steel

²² RSPB notes that choughs, an Annex 1 species under the EC Birds Directive, use the headland and fields adjacent to the nominated site

²³ http://www.decc.gov.uk/en/content/cms/legislation/cc_act_08/cc_act_08.aspx

²⁴ <http://www.plaidcymru.org/uploads/publications/281.pdf>

- 4.19 There are currently four power stations within 80km radius of the nominated site with a combined capacity of 2125 MW. These are primarily hydro and wind. The current power station at Wylfa currently has a capacity of 980 MW.

Communities: Population, Employment and Viability

- 4.20 In 2008, Wales had a population of 2.99 million.²⁵ This represents a 2.9% increase since 1997, which compares with an overall increase of 4.6 per cent for the UK as a whole over the same period.²⁶ The population of Wales is predicted to increase to 3.3 million by 2031.²⁷
- 4.21 Population density on the Isle of Anglesey is low, with an average of 0.94 people per ha, below the average for Wales of 1.4 per ha.
- 4.22 During 2009, the employment rate for people of working age in Wales was 66.6%, which is lower than the rate for the UK overall of 70.7%.²⁸
- 4.23 Full time employment levels for the Isle of Anglesey (67.5%) are higher than the average for Wales. A significant proportion of the population of north Anglesey is employed at the existing Wylfa power station.
- 4.24 The Isle of Anglesey has an aging population. The population aged 65 and over is higher than the regional average.

Communities: Supporting Infrastructure

- 4.25 Transport: The strategic road transport routes in the area comprise the A55 Trunk Road and the A5, which both run east to west to the south of the nominated site, connecting Holyhead with the Menai Strait Bridges and from there to the rest of the country. The A55 also forms part of the Trans-European Network and is a National Freight Route, as well as being part of the Anglesey to Hull 'land bridge' (Euro Route 22) linking Ireland, North Wales, England and mainland Europe. As such its operation is characterised by convoys of HGVs, which compromises both capacity and journey speed. The nominated site is accessed from the A5/A55 along the A5025 and is approximately 16km from the A55 junction at Valley. The A5025 is a single carriageway road, which runs around the north side of Anglesey and connects all the settlements in this part of the island.
- 4.26 Holyhead is served by rail, being the terminus of the main line from London via Chester. This line carries both passenger and freight traffic, although the latter is restricted due to facilities available at Holyhead.
- 4.27 The port of Holyhead predominantly handles Roll On – Roll Off ferry traffic, although it is occasionally used for bulky goods, such as those connected with marine construction. The site nomination identifies a marine off-loading facility as a requirement of a new nuclear power station at Wylfa.

²⁵ Population forecasts provided by email by Welsh Assembly Government (not yet available online)

²⁶ Neighbourhood Statistics <http://www.statistics.gov.uk/cci/nugget.asp?id=1135>.

²⁷ <http://wales.gov.uk/docs/statistics/2009/090326walespop09en.pdf>

<http://wales.gov.uk/topics/statistics/headlines/econ2009/hdw20090619/?lang=en>.

²⁸ Official Labour Market Statistics. <https://www.nomisweb.co.uk/reports/lmp/la/2038432099/report.aspx>

- 4.28 The nearest commercial airport is Anglesey airport (located at RAF Valley), approximately 18km south west of the nominated site. This airport currently operates a small number of commercial flights to Cardiff.
- 4.29 Conventional waste²⁹: Municipal wastes are collected by Verdant waste contractors on behalf of the Isle of Anglesey County Council. In 2005/06 49,242 tonnes of municipal wastes were generated within the area. Of this total, 20% was composted and recycled. Statistics on the total amount of municipal solid wastes (MSW) disposed of at landfill were not identified. However it was determined that 23,255 tonnes of biodegradable municipal wastes (BMW) were sent to landfill in 2005/06, accounting for 47% of the waste fraction.³⁰
- 4.30 There are currently two inert landfill sites in the region, but no non-hazardous sites in the Isle of Anglesey: municipal wastes are transported to disposal sites in neighbouring Conwy and Gwynedd. There are currently no hazardous waste landfills or treatment facilities in either the Isle of Anglesey County and North of Wales region, although established waste management contractors are known to operate and provide services within the region. Anglesey is the host authority for a sub-regional In-Vessel Composting unit (IVC) at Penhesgyn, a collaborative project with adjoining Gwynedd County Council and Conwy County Borough Council.³¹

Human Health and Well-Being

- 4.31 The nominated site is within the Lower Super Output Area (LSOA) known as Llanbadrig.³² Indices of deprivation show that the Llanbadrig LSOA is a reasonably deprived area, with income, employment, health and living environment deprivation and barriers to housing and services greater than the average for Wales as a whole. The age profile for this LSOA is very similar to that for Wales, although there are slightly fewer working age people in the immediate vicinity of the nominated site.
- 4.32 The most recent census (2001) found that people on the Isle of Anglesey generally reported good or fairly good health. The life expectancy was found to be slightly greater than the Welsh average. Infant mortality is also significantly below the averages for Wales and England.
- 4.33 With regard to mental health, the report 'Anglesey Life' for 2007³³ shows that estimates of the percentage of people claiming incapacity benefit for mental illness on the island (30% of all claimants) is less than the average for Wales as a whole (37% of all claimants).
- 4.34 Pupils on the Isle of Anglesey area perform slightly below the average for Wales in their GCSE equivalent examinations. Their results are above the average for England.

²⁹ Conventional waste means 'controlled waste', i.e. waste controlled under Part II of the Environment Act 1990.

³⁰ Report on the Landfill Allowances Scheme (LAS) Wales 2007/8, Environment Agency Wales, September 2008
[http://www.environment-agency.gov.uk/static/documents/Research/LASReport_2007_08_FINAL\(1\).pdf](http://www.environment-agency.gov.uk/static/documents/Research/LASReport_2007_08_FINAL(1).pdf)

³¹ North Wales Regional Waste Plan 1st Review Core Document: *Recommended Draft, March 2008* [available online:]
http://www.walesregionalwasteplans.gov.uk/north/regional_waste_plan_first_review.html

³² An LSOA 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

³³ www.anglesey.gov.uk/doc.asp?cat=3933

- 4.35 Housing stock within Isle of Anglesey County Council's area is generally good, with a significantly smaller percentage of unfit housing³⁴ than in Wales as a whole.
- 4.36 Figures from the North Wales Police for the 12 months up to June 2009³⁵ show the crime rate in Anglesey to be average compared to the rest of North Wales.
- 4.37 The economic well-being of the area is slightly negative, as is demonstrated by the local employment figures³⁶ (see 'Communities: Population, Employment and Viability' section above - noted here as a measure of well-being). From July 2007 to June 2008, 70.9% of the population of the Isle of Anglesey County Council area was employed. This number compares unfavourably with figures for Wales (71.5%) and Great Britain as a whole (74.5%).
- 4.38 Local access to medical services is reasonable, with one general practitioner (GP) practices within 5km of the nominated site. There is also another GP practice within 10km of the nominated site and a local hospital, though without an accident and emergency department, approximately 10.3km distant. The nearest accident and emergency department is Ysbyty Gwynedd in Bangor (31.5km), whilst the nearest mental health hospital is the Hergest Unit also at Ysbyty Gwynedd in Bangor.
- 4.39 One of the wider determinants of health and well-being is access to local recreational facilities. In this regard, the nominated site is reasonably well served, with two leisure centres within 20km of the nominated site. In addition, as Anglesey is in a rural and coastal location, with a coastal Area of Outstanding Natural Beauty (AONB) and numerous beaches, the area offers good potential for outdoor recreational activities, such as walking, cycling and water sports.
- 4.40 The existing nuclear power station at Wylfa has been in operation since 1971. 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.
- 4.41 The Committee on Medical Aspects of Radiation in the Environment (COMARE), a scientific advisory committee providing independent authoritative expert advice on all aspects of health risk to humans exposed to natural and man-made radiation, has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites starting with the Sellafield site in 1986.
- 4.42 COMARE has published a series of reports on topics related to exposure to radiation. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.
- 4.43 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear sites. The results for the power generating stations supported the conclusion that *'there is no evidence from this very large study that living within 25 km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'*.

³⁴ Dwellings not suitable for occupation as defined by various criteria in Section 604 of the Housing Act 1985 (as amended)

³⁵ <http://maps.north-wales.police.uk/map/isle-of-anglesey/>

³⁶ <https://www.nomisweb.co.uk/reports/lmp/la/2038431858/report.aspx?pc=IP164UR>

- 4.44 In its eleventh report COMARE examined the general pattern of childhood leukaemia in Great Britain and concluded that many types of childhood cancers '*have been shown not to occur in a random fashion*'. It is also stated that '*The results of analyses ... suggest that there is no general clustering around nuclear installations.*'
- 4.45 Following the KiKK study on childhood leukaemia around German nuclear power plants, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as possible. This reanalysis - the Bithell paper - was published in December 2008. It showed that the conclusions of the COMARE tenth report remained valid when applying the KiKK methodology and did not support the findings of the KiKK study.
- 4.46 The KiKK study gave the results on childhood cancer in the vicinity of 16 German nuclear power plants from a dataset established by the German Childhood Cancer Registry, which included over 1500 childhood cancer cases from 1980 to 2003. In comparison, the dataset used for COMARE's tenth report and the subsequent Bithell paper contained over 32,000 cases of childhood cancer from 1969 to 1993. This is a verified national database and is believed to be the largest national database on childhood cancer in the world. The size of the database used by COMARE therefore gives considerable confidence in the results of the tenth report.
- 4.47 COMARE is currently undertaking a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. This will be published as COMARE's 14th report later this year.
- 4.48 Radioactive monitoring carried out in 2008³⁷ found generally low concentrations of artificial radionuclides attributable to the existing Wylfa nuclear power station in water, sediment and beach samples and in meat and seafood samples taken from around the existing site. However, the presence in the area of radionuclides from other nuclear activities (including the Sellafield reprocessing plants and mixed oxide fuel manufacture) makes the apportioning of radiological effects in this location very difficult. Nevertheless, from this sampling, the estimated total dosage levels to the public from all sources within the Wylfa area were assessed as being less than 2% of the dose limit for members of the public of 1mSv per year as specified in The Ionising Radiations Regulations 1999.

Cultural Heritage

- 4.49 There are seven scheduled monuments within a 5km radius of the nominated site, of which two lie within 3km radius of the nominated site. Both of these monuments are Standing Stones dating from the Bronze Age (AN030, AN080) located south of the nominated site close to Tregele. The presence of these features indicates prehistoric and historic activity within and close to the nominated site. As such, the area is likely to be considered of at least local to regional archaeological importance.
- 4.50 There is one conservation area, the North Anglesey Coast, which is designated as Heritage Coast, and which includes land approximately 0.50km north west from the nominated site,

³⁷ Food Standards Agency (2008). Radioactivity In Food and the Environment (RIFE 14) report.

- 4.51 Cestyll Garden (GD45) is a Registered Historic Park and Garden of Special Historic Interest in Wales. The garden lies immediately to the west of the nominated site boundary. Cestyll House (within the nominated site boundary) was demolished in 1991. The gardens are currently owned and maintained by Wylfa's existing power station operator and are opened to the public on three days a year.
- 4.52 There are three Grade II listed buildings in Gafnan, immediately to the west of the nominated site, which are associated with the former operation of Gafnan Mill. These are located adjacent to Cestyll Garden, and include a Corn Mill, Corn Drying House and Mill House. There are a number of other listed buildings in and on the outskirts of Cemaes.
- 4.53 Many of the field boundaries within the nominated site are shown on a 19th century Ordnance Survey map, which suggests there is the potential for an historic landscape to exist.

Landscape

- 4.54 Wylfa is situated within the Anglesey Coastline Landscape Character Area (LCA) Number 01. The landscape of this area is characterised by an open, remote, rugged rural coastline with low cliffs and coves and intermittent old and new industrial sites.
- 4.55 There are panoramic vistas across the area from mountains to the east and west and across an undeveloped seascape. Land cover is dominated by enclosed farmland and areas of moor and heath. The Anglesey Coast Path, a popular regional tourist route, runs through this area.
- 4.56 The existing Wylfa power station, its power lines and inland wind power generators, can be found in an area of the countryside locally designated as a Special Landscape Area. It is sandwiched between, but outside, areas of nationally designated landscape.
- 4.57 A small area of the Anglesey Area of Outstanding Natural Beauty (AONB) overlaps the nominated site in the northwest. The North Anglesey Heritage Coast extends around the majority of the coastline, but does not include the length immediately adjoining the nominated site (the Heritage Coast designation stops at Porth y Gwanhog west of the nominated site, and starts again east of the site at Trwyn n Penrhyn). There is also potential for intervisibility with the Amlwch and Parys Mountain Landscape of Outstanding Historic Interest, 8km to the east. Although the Snowdonia National Park is located 36km to the south of the nominated site, there are potential impacts on the Park from supporting infrastructure, particularly transmission lines.
- 4.58 The CCW Tranquil Areas Map identifies the nominated site as lying within Zones B (countryside subject to significant traffic intrusion and other equivalent disturbance) and Zones C (countryside somewhat disturbed by light traffic noise, small settlements etc³⁸). The CCW Map and the LANDMAP landscape assessments for the area could be a valuable resource for the project level EIA.

³⁸ This land would fit within the broad English definition of Tranquillity, but is not deemed fully tranquil by Wales's standards.

Soils, Geology and Land Use

- 4.59 The nominated site is located on low grade agricultural land. The soils are noted to be deep, well-drained, fine, loamy soils and similar soils, with slowly permeable subsoils and slight seasonal waterlogging. The local geology is Coastal Zone Deposits (Undifferentiated) and Till, Devensian.
- 4.60 Other than the existing power station at Wylfa, currently no land appears to be used for industrial purposes in the area. The land use surrounding the existing power stations is primarily farmland, and is sparsely populated.
- 4.61 There are no current or historical landfills within 1km of the nominated site. Prior to 1980, the existing nuclear station adjacent to the nominated site operated an incinerator which was a Registered Waste Treatment site and an Integrated Pollution Control (IPC) registered waste site. Further information regarding the identified waste sites, including extent, nature and quantities of waste will be obtained and assessed as part of a site specific EIA.
- 4.62 Three historical mineral abstraction sites are present locally. All three sites were opencast mines located between approximately 380m to 990m to the southeast of the nominated site for the abstraction of the New Harbour Group (igneous and metamorphic rocks).
- 4.63 British Geological Society (BGS) has assessed geological risks in the local area, which include:
- Potential for shrinking or swelling clay ground stability hazard - very low risk
 - Potential for compressible ground stability hazards - very low risk
 - Potential for landslide ground stability hazards - very low risk
 - Potential for running sand ground stability hazards - very low risk

Water Quality and Resources

- 4.64 The site at Wylfa is located in the Western Wales River Basin District (RBD). Within this RBD, only 28% of rivers (by length) will meet the requirements for good ecological status (GES) by 2015. Only two of the 779 surface water bodies in the RBD (0.25%) are designated as artificial and 13% of all surface waters are designated as heavily modified.
- 4.65 64% of groundwater bodies (by number) are at good chemical status and 96% of these at good quantitative status. Of the eleven estuaries assessed, eight do not meet good ecological status or potential. Of the 19 coastal waters assessed, 15 are at good ecological status or potential. 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.
- 4.66 Within the North West Wales catchment, in which the nominated site is located, 40% of surface water bodies are currently achieving good ecological status, with this predicted to increase to 43% by 2015. 95% of groundwater bodies are currently achieving good quantitative quality, with this percentage predicted to be maintained to 2015. 65% of groundwater bodies are currently achieving good chemical quality, with this percentage predicted to be maintained to 2015.

- 4.67 There are no estuarine waters or lakes near the nominated site. Coastal waters adjacent to the nominated site have been assessed as having good ecological quality, with this status to be maintained to 2015. The chemical quality of the coastal waters to the west of the nominated site has not been assessed. The coastal waters to the east of the nominated site have been assessed as having high chemical quality, with this predicted to decline to good by 2015.
- 4.68 Bathing waters in the vicinity of the nominated site are of good quality. The nearest Designated Shellfish Waters are in the Menai Strait, 25km away.
- 4.69 The nominated site is situated on the Ynys Môn Minor aquifer. Local data show the groundwater body under the nominated site to be of good quantitative quality and poor chemical quality, with this status to be maintained to 2015.
- 4.70 There are no Groundwater Source Protection Zones near the nominated site.
- 4.71 The nominated site is located within the Ynys Môn Catchment Abstraction Management Strategy (CAMS) area, but it is not located in either of the two Water Resource Management Units (WRMUs) within the CAMS area. WRMU1 of the Ynys Môn CAMS area is currently designated as having “water available” status; whereas WRMU2 is designated as having “no water available” status. The predicted status for both WRMUs is “no water available” by 2013.
- 4.72 There are 3 Sites of Special Scientific Interest (SSSIs) in WRMU1. In WRMU2 there are 4 SSSIs and one Special Area of Conservation (SAC) which is also designated as a Ramsar site (the Anglesey Fens).
- 4.73 The nominated site is located within Dŵr Cymru Welsh Water’s North Eryri/Ynys Môn (NEYM) water resource zone (WRZ). The NEYM WRZ is currently the subject of a substantial engineering scheme to enable improved utilisation of resources on Anglesey and improved operational flexibility between the island and the mainland. This ensures that the WRZ will have sufficient resources until 2019/20. However, Dŵr Cymru Welsh Water aims to complete a programme of leakage reduction and water efficiency schemes by 2017/18, and the upgrade of water treatment works and increased abstraction at Marchlyn Bach Reservoir by 2022/23. This will move the WRZ into a small surplus situation through to the end of the planning period (2034/2035).
- 4.74 The exact water requirements for the nominated site are not yet finalised. The existing Wylfa power station uses direct water cooling and uses an outfall in Porth Wnal for the thermal discharge. 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 rocky coastline of Anglesey is very resistant to coastal erosion. The prevailing wave direction off the Anglesey coast is from the west, and south west. Shelf sea circulation off the coast of Anglesey is mainly driven by winds and tides, although narrow coastal currents and jets along the seasonal fronts can be driven by density gradients. The overall effect of the tides is quite small as tidal currents mainly move water back and forth.
- 4.76 The overall pattern of circulation is mainly towards the north and wave induced sediment transport (suspended and bedload) generally follows the bathymetric

contours and is towards the north and east around the Anglesey coastline. However, where the coastal alignment changes or shelter is provided by a major headland, the direction of transport may be reversed.

Flood Risk

- 4.77 The majority of the nominated site is located in Flood Zone 1 'Low Probability', but is bounded along the coastline by Flood Zone 3 'High Probability', as indicated on the Environment Agency Flood map.
- 4.78 The nominated site is shown to be defended, but at this time no information was available on the composition, condition grade and standard of protection afforded by these defences.
- 4.79 Long term sea-level change is the result of a combination of global change in sea level (1.5mm to 2mm / year) and local change in land levels. The British Isles is slowly tilting with northern Britain rising and southern Britain subsiding. This tilting occurs because of uplift of the earth's crust following its depression under the weight of the ice sheet at the end of the last Ice Age. The North Wales coastline, including Anglesey, is within the zone of zero uplift.
- 4.80 Climate change also means a possible increase in storminess, which will subject the coastline to increased wave activity and storm surge effects. Coupled with an accelerated rise in sea level that is greater than current predictions, climate change will impact on the open coastline by causing an increase in coastal erosion and increased risk to coastal flooding. The coastline around the nominated site is resistant to coastal erosion under present conditions, but with sea levels around Wales predicted to rise by 86cm by 2080, waves will be able to reach those areas of the cliffs that are not normally subjected to wave attack and could cause erosion if the cliffs are not composed of hard geology.
- 4.81 The West of Wales Shoreline Management Plan (SMP) states an objective to prevent property loss from erosion at the Wyfla power station, which "is located on the edge of a cliff and may be lost with coastal recession."³⁹ A review of the SMP is currently underway (SMP2). The final SMP2 is likely to identify changes to reflect nominations for a new power station at Wyfla.

³⁹ <http://www.westofwalesmp.org>

5 Appraisal of Sustainability

Introduction

- 5.1 This section considers the potential sustainability effects of including the nominated site at Wylfa 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 Wylfa, 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 Wylfa 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 Potential Significance in the Site-Level AoS

Local Effects
<p>The AoS Site Reports identify potentially significant benefits and disbenefits of locating a new nuclear power station at each of the nominated sites. Some of the effects identified are significant at the local level and are more appropriately addressed through the development consent process to the IPC. Applications for development consent will include EIA, undertaken by the developer. Such 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 nuisance⁴⁰ 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 (CEMPs), 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 nuclear power stations. However, relative to some other forms of power generation, nuclear power plants do not emit significant quantities of carbon dioxide, sulphur dioxide nitrogen oxides or particulates. Based on published national background air quality data for North Wales and the Isle of Anglesey CC Air

⁴⁰ During the construction, operation and decommissioning of energy infrastructure there is potential for the release of a range of emissions such as odour, dust, steam, smoke, artificial light and for infestation of insects. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990. For statutory nuisance effects section 4.21 of EN-1 applies.

Quality Progress Report 2006/07, there are no exceedances of government air quality objectives. 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. Similar local impacts may arise during the decommissioning phase of the project, at the end of the plant's operational life.
- 5.6 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 should 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.
- 5.7 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.
- 5.8 Radioactive releases to air, which could have a detrimental effect on local and regional air quality (in the event of a significant release), are strictly controlled in accordance with limits laid down in permits issued under the Environmental Permitting (England and Wales) Regulations 2010 and subject to monitoring and reporting. Further consideration of the control of radioactive discharges to air is given in Chapter 7 of the Main AoS Report.
- 5.9 There is a very low risk of an accidental release of radioactive emissions from the nominated site at Wylfa, which could have a significant strategic 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 significant urban and rural population to be adversely affected means that, at this stage of assessment, the potential for strategic adverse sustainability effects has been identified.
- 5.10 Any air quality impact arising from the development on the amenity of Cestyll Gardens will also need to be assessed. However, any potential air quality impacts likely to be readily mitigated by design and layout of the development and location of temporary and permanent access routes etc.
- 5.11 **Strategic Effects on Air Quality: The AoS has identified that there is a low risk for significant urban and rural population to be affected by any significant accidental release of radioactive emissions from the Wylfa site which, combined with potential transboundary effects, 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 de-commissioning 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 and quantity, which, in turn, could affect sensitive ecosystems. During operation, cooling and discharge of heated water and routine discharge of radioactive material could affect aquatic habitats and species if not managed appropriately.
- 5.13 There is the potential that activities may lead to detrimental effects on coastal habitats and species, including migratory fish, particularly associated with the Cemlyn Bay Special Area of Conservation (SAC) and the Ynys Feurig, the Skerries and Cemlyn Bay Special Protection Area (SPA); and Tre'r Gof, Henborth, Cemlyn Bay, Cae Gwyn and Llanbadrig-Dinas Gynfor SSSIs. Cemlyn Bay lies 1km to the west of the nominated site and nationally important Tern populations breeding at the Bay (Arctic, Common, Roseate and Sandwich Terns), as well as Chough populations not associated with the SPA, but which use the headland and fields adjacent to the existing power station, may be disturbed if a new nuclear power station was constructed on the nominated site. Activities with greatest potential for detrimental effects are those associated with the Marine Off-Loading Facility (MOLF), inlet and outfall pipe-work, and potentially (if direct water cooling is selected) tunnels and pipe-work extending for up to 3km into the open sea.
- 5.14 There are also potential significant effects on the more distant Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA, which could be brought about by indirect water quality impacts, which could affect designated bird species using the sites.
- 5.15 Biodiversity could also be impacted at a more local level if important habitats/species (for example, UK Biodiversity Action Plan habitats/species or legally protected species) are present within or in close proximity to the nominated site. There are five SSSIs located within 2km of the site at Wylfa, with the Tre'r Gof SSSI lying entirely within the nominated site boundary. This rich-fen habitat could suffer direct or indirect effects associated with changes to water quality or quantity.
- 5.16 Further investigations regarding impacts on biodiversity would be undertaken during the EIA process for the nominated site. Design and mitigation measures should seek, in the first instance, to avoid and minimise loss of habitat (particularly SAC/SPA habitats and species) and avoid disturbance of legally protected species. During the design phase, careful consideration should be given to layout and location of potential sources of impact. During construction, good site environmental management practices should be employed and implemented through a construction

environment management plan or similar document. Opportunities should also be sought for positive improvements to biodiversity within and around the development, for example through habitat creation and enhancement.

- 5.17 A separate report, documenting the Habitats Regulation Assessment (HRA) for Wylfa⁴¹ has been undertaken. This report should be referred to for further information relating to the effects of a new nuclear power station at Wylfa on European-designated habitat sites.
- 5.18 **Strategic Effects on Biodiversity and Ecosystems: The potential for adverse effects on sites and species considered to be of UK-wide and European nature conservation importance (the Cemlyn Bay Special Area of Conservation (SAC) and the Ynys Feurig, the Skerries and Cemlyn Bay Special Protection Area (SPA); and, Tre'r Gof, Henborth, Cemlyn Bay, Cae Gwyn and Llanbadrig-Dinas Gynfor SSSIs and indirectly on Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA) means that significant strategic effects on the biodiversity cannot be ruled out at this stage of the appraisal. There is, however, potential for the mitigation or compensation of biodiversity effects, including the creation of replacement habitat for UK designated sites⁴². Detailed baseline studies will form part of the project level Environmental Impact Assessment. The Habitats Regulation Assessment for Wylfa should be referred to for further details and advice on the internationally designated sites.**

Climate Change

- 5.19 The establishment of a new nuclear power station will contribute positively to Wales' 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.
- 5.20 Due to the remote location of the nominated site, and despite good alternative transport links to Anglesey itself, a new nuclear power station at Wylfa may result in emissions from the transport of goods and labour throughout the construction, operation and decommissioning phases. The nomination document refers to the construction of a marine off-loading facility, which could reduce long-distance road journeys. There is some potential for the nominator to promote increased use of public transport through provision of appropriate transport links to the power station.
- 5.21 Complementary carbon emissions mitigation measures should include sustainable design and construction, sustainable and low carbon technologies and transport, and potential increased investment in public transport and renewable energy services infrastructure.
- 5.22 **Strategic Effects on Climate Change: A new nuclear power station on the Wylfa site would have positive long-term effects on climate change during the operational stage compared to conventional sources of energy, contributing**

⁴¹ Habitat Regulations Assessment Pilot Wylfa: HRA Screening and Appropriate Assessment Report

⁴² For European Sites, compensation measures, such as creation of replacement habitat, may only be considered if it has been established that there are no alternative solutions and the plan or project is necessary for imperative reasons of overriding public interest. For UK designated sites, the Welsh Assembly Government's Technical Advice Note 5 states that "where there may be significant harmful effects local planning authorities will need to be satisfied that any reasonable alternative sites that would result in less or no harm have been fully considered."

positively to Wales' climate change objectives. A lack of sustainable transport options to the site may result in increased emissions from the transport of goods and labour, but these emissions could be partially mitigated with green travel plans and investment in public transport.

Communities: Population, Employment and Viability

- 5.23 35% of the population of North Anglesey is currently employed at the existing nuclear power at Wylfa. Combined with the high unemployment rate on the island, this means that the development and operation of a new nuclear power station at Wylfa is likely to have positive impacts on employment, the economy and communities at the local level. The significance of these effects is reduced at a regional and national scale, and when considered in combination with other projects within Wales, although the potentially positive implications for employment of a new power station at Wylfa are noted in the Spatial Plan for Wales⁴³.
- 5.24 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 site. If public transport access is improved, impacts on local roads may be reduced.
- 5.25 A potential, though uncertain, effect of strategic (regional) impact may be the increased demand in construction labour, which could lead to a shortage of local construction workers to meet the needs of other industries.
- 5.26 Job losses from closure of the existing power station adjacent to the site are likely to be offset by labour demands from construction and operation of a new nuclear power station. However, the time lag between job losses and job creation and possible differences in skill requirements may require workers to seek temporary employment elsewhere.
- 5.27 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.
- 5.28 It is commonly perceived that proximity to a nuclear facility such as a power station would have an adverse effect on property values. However, the evidence for this is inconclusive and contradictory. A study of effects in America⁴⁴ 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.

⁴³ <http://wales.gov.uk/dpsp/wspatialplan/documents/wsp2008update/wsp2008updateee.pdf?lang=en>

⁴⁴ 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

- 5.29 **Strategic Effects on Communities: Population, Employment and Viability:** Significant positive effects on employment, the economy and communities are likely to arise at a local level, and positive effects of regional economic significance may also occur when considered cumulatively with other projects in Wales. 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

- 5.30 Negative effects at a local scale are likely due to increased pressure on basic services and infrastructure in Anglesey, including conventional waste management facilities, 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. Cumulative effects could be incurred when considered with other proposed major developments in Wales, such as the 'One Wales' plan to meet housing need by building a further 6,500 homes across Wales by 2011.⁴⁵
- 5.31 Transport: There is potential for negative effects on national road infrastructure through increased congestion and disruption of traffic on the A55 Trunk Road, particularly at the Britannia Bridge. The single carriageway available across this strategic crossing would cause congestion at peak periods if traffic loadings increased. Improvement of this crossing is not possible, due to the listed nature of the basic structure. In isolation, this could be a significant factor, but further investigations would be necessary. Notwithstanding this, the overall effect of a nuclear power station on the nominated site could likely be mitigated through transportation plans, green travel plans and consideration of alternatives to road for the transport of aggregates and other construction materials, such as rail transport and the existing port facilities at Holyhead.
- 5.32 Conventional Waste: Waste material will be generated during the construction, operation and decommissioning of a development. Local impacts may be expected upon local and regional facilities, however the scale of operation is not considered to be significant in the long/medium term. Waste management facilities will be available to deal with construction projects for the foreseeable future and waste/recycling sites should not be detrimentally impacted. Good site practices and the site-specific EIA at the time of application for development consent 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.
- 5.33 Radioactive Waste⁴⁶: 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

⁴⁵ <http://wales.gov.uk/strategy/strategies/onewalesdelivery/deliverye.doc?lang=en>

⁴⁶ Radioactive waste is waste regulated under Environmental Permitting (England and Wales) Regulations 2010. The Radioactive Substances Act 1993 still applies in Scotland and Northern Ireland.

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.

- 5.34 Electricity transmission: The development of a nuclear power station at Wylfa 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).
- 5.35 **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 (A55 Trunk Road, particularly at the Britannia Bridge), although there is a range of mitigation options available.**

Human Health and Well-Being

Radiological Health Issues

- 5.35 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.⁴⁷
- 5.36 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.⁴⁸ 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.
- 5.37 The environment agencies run monitoring programmes to provide an independent check on the impacts of radioactive discharges. In 2008, they published a report

⁴⁷ Ionising Radiation Exposure of the UK Population: 2005 Review HPA-RPD-001

⁴⁸ 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>

covering 2007, showing that radiation doses to people living around nuclear sites remained below the statutory dose limit of 1 mSv per year.⁴⁹ In England and Wales, the main regulatory bodies are the Nuclear Installations Inspectorate (NII), a division of the Health and Safety Executive and the EA. These agencies regulate radioactive discharges from nuclear power stations and have responsibilities for ensuring that workers, the general public and the environment are protected against exposure to radioactivity. Regulation of all disposals, including discharges to air, water and land, of radioactive waste off or on nuclear sites is regulated under the Environmental Permitting (England and Wales) Regulations 2010⁵⁰. This regulatory system will apply to a potential new nuclear power station at Wylfa and should ensure that permitted radioactive discharges do not cause unacceptable risk to health.

Regulatory Justification

- 5.38 European Council Directive 96/29/Euratom of 13 May 1996 (the Basic Safety Standards Directive)⁵¹ 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 Justified⁵².
- 5.39 The Government believes that the regulatory regime will effectively limit and minimise the radiation dose and release of radioactivity from new nuclear power stations, until they have been fully decommissioned, to very low levels, and that the health detriments associated with the operation of new nuclear power stations will be very low.

Construction and Operational Effects

- 5.40 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.
- 5.41 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

⁴⁹ 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).

⁵⁰ The Radioactive Substances Act 1993 still applies in Scotland and Northern Ireland. http://www.opsi.gov.uk/acts/acts1993/ukpga_19930012_en_1

⁵¹ 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

⁵² Completion of the Regulatory Justification process is not dependent on consent being granted by the IPC and similarly there is no need for the IPC to wait for completion of the Regulatory Justification process before granting consent.

Database (RAMTED) for the period 1958 to 2008 showed that of the recorded 913 events associated with the transport of radioactive materials no 'significant dose events' were associated with the nuclear power industry⁵³.

- 5.42 The scale of construction work associated with a potential new nuclear power station at Wylfa 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.
- 5.43 During the operation of a potential nuclear power plant at Wylfa, 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.
- 5.44 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 advice⁵⁴, a precautionary approach is adopted to the routing of any required power lines.
- 5.45 The presence of, and more particularly the construction of, a new nuclear power station at the Wylfa site will increase community disturbance to some degree. Such disturbance may include noise and vibration, dust in the construction phase and increased traffic in all phases. To mitigate construction phase disturbances an environmental management plan should be developed, implemented and monitored for effectiveness throughout the construction period. Potential traffic issues in all the project's phases can be mitigated through the adoption of a transport plan aimed at minimising community disturbance whilst also promoting 'green' travel.
- 5.46 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.
- 5.47 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

⁵³ <http://www.hpa.org.uk/HPA/Publications/Radiation/HPARPDSeriesReports/>

⁵⁴ http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733817602

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 and pose a constraint to development at Wylfa.

- 5.48 Any noise impacts arising from the development on the amenity/tranquillity of Cestyll Gardens will also need to be assessed. However, any potential noise impacts are likely to be readily mitigated by design and layout of the development and location of temporary and permanent access routes etc.

Local Health and Recreation Issues

- 5.49 With regard to recreation, there is a potential impact associated with the Anglesey Coastal Footpath, which passes through the Wylfa site. It is likely that this path may need to be closed during some phases of power station construction, but this effect will be temporary and can readily be mitigated by providing a bypass path around the Wylfa site.
- 5.50 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.
- 5.51 It is possible that the presence of a nuclear power plant may lead to increased stress levels in certain individuals, due to potential perception of risk associated with living or working near a power station. However, there is little literature available on this potential impact which suggests that it has not been a significant problem in the past. In any event, in the case of the nominated site, people living and working nearby have had a long time to get used to there being an adjacent nuclear plant so this is unlikely to be a problem at this location.
- 5.52 It is probable that building, operating and decommissioning a new nuclear power station at Wylfa will lead to an increase in employment, community wealth, housing stock and other associated neighbourhood infrastructure. These positive effects on the community are likely to be much more significant than any potential negative consequences of the project assuming there are no adverse effects on the health of the local population.
- 5.53 **Strategic Effects on Human Health and Well-Being: The rigorous system of regulating routine radioactive discharges from the potential nuclear power station at Wylfa should ensure that there are no unacceptable risks to health when the plant is operating normally. There is a very small risk of adverse**

health impacts arising from an accidental radioactive discharge but the multiple safety features and operating systems within modern nuclear plants makes such an event exceedingly unlikely. It is possible that the presence of a nuclear power plant may lead to increased stress levels in certain individuals although this is less likely at this site where there is a history of nuclear power generation. Overall, development of the site is likely to enhance employment opportunities, community wealth, housing stock and other associated neighbourhood infrastructure which is anticipated to improve community well-being and health, both at a local and regional scale.

Cultural Heritage

- 5.54 The main effects of the development would be at a local scale, within the footprint of the proposed facility, although any physical effect on the historic landscape could be of regional or national importance.
- 5.55 Potential setting effects upon historic assets in the wider vicinity could also be of regional or national importance, depending on distance and sight lines. This includes potential impacts on the registered Cestyll Garden, which lies immediately to the west of the nominated site boundary, the Bronze Age standing stones Scheduled Monument 1km to the south, three Grade II listed buildings in Cafnan to the west of the nominated site, and listed buildings around Cemaes. Impacts on the setting and views to/from listed buildings, gardens and scheduled monuments could be minimised through the appropriate planning and design of construction activities and operational facilities, including adherence to the principles of good design.
- 5.56 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.
- 5.57 The presence of standing stones indicates historic activity in the area means that an archaeological (buried) resource is potentially present within the nominated site boundary. 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).
- 5.58 **Strategic Effects on Cultural Heritage: The AoS has identified potential, adverse effects on Scheduled Monuments, a registered garden and listed buildings, which may be of regional or national heritage significance. However, there is a possibility that this can be mitigated. Further detailed assessment at project level will be required.**

Landscape

- 5.59 The existing power station and local pylon lines are noticeable features locally and from some distant mountain viewpoints to the east and west.
- 5.60 However, given the scale of a new power station on the nominated site and the open nature of the area, there are likely to be some long-lasting additional direct and indirect adverse visual effects on the landscape character of the surrounding area. The existing power station is distantly visible from locations such as Parys Mountain

and Mynydd y Garn, but most intrusively viewed from nearby headlands, beyond Cemlyn Bay and the east side of Cemaes Bay.

- 5.61 Indirect adverse landscape and visual effects during construction and operation are likely to extend over localised parts of the Anglesey Area of Outstanding Natural Beauty (parts of which are within the nominated site boundary) and North Anglesey Heritage Coast (which extends to within 125m of the nominated site). The nominated site also falls directly within the Anglesey Coastline Regional Landscape Character Area. There are likely to be some effects on the setting of registered historic parks and gardens at Cestyll and Carreglywd and views from them, although these can only be fully assessed at the EIA stage.
- 5.62 Changes arising from installation of new cooling culverts, land raising and sea defences on the low cliffs on the shoreline could potentially give rise to prominent and long-lasting adverse impacts on this feature. The nomination document states a preference for the use of direct water cooling, which would have less visual impact than indirect water cooling via cooling towers.
- 5.63 Full mitigation of adverse visual impacts is unlikely during the construction and operational phases. However, some potential localised visual impacts could be avoided if the nominated site avoids the potentially prominent headland area to the north and permanent buildings are closely clustered alongside the existing power station. There appears to be some potential to mitigate local landscape impacts arising from the more widely extending, temporary construction lay down areas, given the opportunity to protect some enclosing dry stone walls and effectively restore the pasture and moorland land cover. There is also some potential for safeguarding the shoreline cliffs and beach areas through sensitive location and design of cooling culverts (potentially using tunnelling techniques) , sea defences and through use of the existing marine landing platform.
- 5.64 The decommissioning of the facilities may allow some landscape restoration/ enhancement of previously developed areas in the long term, however, long-term land uses for the restored areas are difficult to predict over the long timescale involved.
- 5.65 **Strategic Effects on Landscape:** The AoS has identified potential, adverse effects on landscape. The new power station will be seen in the context of the existing power station, a neighbouring settlement and a nearby small inland wind farm. However, it is still likely that there will be adverse direct and indirect landscape and visual impacts on the surrounding area arising from the proposed development, including on parts of Anglesey Area of Outstanding Natural Beauty and North Anglesey Heritage Coast. This is of potential wider significance due to the national designation of the AONB; however, intervisibility from inland areas is likely to be limited to some extent by the existing undulating topography. Mountain areas provide exceptions to this but they are generally at a significant distance away from the nominated site. The opportunities to mitigate strategic level effects on certain parts of the Area of Outstanding Natural Beauty and the Heritage Coast are likely to be limited given the scale of new development and the scale of any pylons associated with potential off site extended national grid connections.

Soils, Geology and Land Use

- 5.66 The construction of a new nuclear power station at the Wylfa site and associated infrastructure (including transmission lines/towers) could lead to the direct loss of soil structure. Impacts upon the peat geology are likely to have significant knock-on effects on other areas, such as groundwater and future potential land use. This could include impacts on soils that maintain terrestrial habitats, including designated nature conservation sites; the Tre'r Gof SSSI and Cemlyn Bay SSSI/SPA/SAC. This is considered further in the biodiversity appraisal in this Site AoS Report. Effects could be mitigated through limitation of the footprint of the development, which would reduce the area of soils affected.
- 5.67 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.
- 5.68 Blight of land is a likely effect of the development of a new nuclear power station on the nominated site, but is considered to be of local or district significance. Likewise, effects on existing land uses, including surrounding areas of touristic value, are considered to be of local impact.
- 5.69 **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

- 5.70 The nominated site at Wylfa identifies a requirement for both a Marine Off-Loading Facility (MOLF) and inlet and outfall pipe-work, which will be required in the coastal area potentially extending into the sea for up to 3km. Any marine loading facilities that might be required would need to consider the impact on coastal processes carefully. In addition, if coastal defences are to be upgraded due to climate change driven sea level rise, the impact on coastal processes including sediment transport should be considered.
- 5.71 Any structures situated across the beach face from the nominated site would greatly impact on the longshore sediment transport processes and reduce the amount of sediment input to other sections of the coastline. Sand will most likely pile up on the updrift side of the structure causing a deficit of sediment on the down drift side of the structure which if unaided would severely reduce the amount of sediment reaching the down-drift areas. A sediment transport model for the area incorporating baseline hydrodynamic conditions should be used to predict future conditions under increased wave activity and sea level rise. Increasing intensity and elevations of storm surge should also be taken in to account with respect to sea level rise.
- 5.72 In addition to the disruption to coastal sediment transport, construction of the MOLF will disrupt the seabed habitat. There are unique intertidal and sub tidal reef communities of the north east Anglesey coast. A detailed bathymetric survey and benthic study should be undertaken to assess the optimum location for the proposed offshore jetty. The strong currents and energetic wave and wind regime off the coast

of Anglesey may not be a suitable location to site the MOLF offshore. The west coast of Anglesey is less energetic but will face the same environmental problems associated with the interference of sediment transport pathways.

- 5.73 Although there are existing discharges from the current Wylfa nuclear power station, the return of cooling water to the sea at elevated temperatures could have adverse effects on coastal processes, including sediment transport, and water quality. Discharges could cause failures to existing water quality standards and indirectly affecting nationally and internationally designated habitats. Any future thermal discharge will be require an Environmental Permit⁵⁵ 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.
- 5.74 In siting the cooling water facilities, the high velocity current regime offshore of the nominated site is ideal for diluting and dissipating the environmental impacts of discharged heated water. A dispersion and dilution model should be used to determine the fate of the effluent plume.
- 5.75 The Marine and Coastal Access Act 2009 makes provision for the production of Marine Policy Statements. It is intended to produce a Marine Policy Statement (MPS) that, for the first time, brings together the policies for all UK administrations. The second stage in the new planning system will consist of a series of Marine Plans. The Marine Management Organisation (MMO) set up under the Marine and Coastal Access Act, is responsible for preparing marine plans for the English inshore and offshore regions according to the policies and objectives set out by the Government. Similar plans will be produced for Welsh marine waters. The MPS will interact with National Policy Statements and, in reaching its decisions, the IPC must have regard to the MPS but, subject to certain exceptions, must decide in accordance with the relevant National Policy Statements.
- 5.76 The development of a new nuclear power station on the nominated site could 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. Nevertheless, an assessment of the potential impact of development at this site on the local water supply demand balance should be undertaken, bearing in mind that the local water resource zone requires a number of proposed measures to bring it into surplus through to 2034/2035. Similar comments apply to wastewater production from the nominated site, although there is likely to be a short-term effect of increasing wastewater production due to an increased population during the construction phase.

⁵⁵ 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.

- 5.77 The nominated site is situated on the Ynys Môn Minor aquifer. Localised groundwater pathways may exist between the site and larger aquifers on Anglesey. Accidental discharges or construction disturbance at the nominated site could lead to impacts on groundwater-dependent surface water features and aquatic ecosystems. Studies should be undertaken at EIA level to ensure that local groundwater bodies are investigated and a suitable design is adopted to mitigate potential impacts.
- 5.78 **Strategic Effects on Water Quality and Resources: The AoS has identified potential, adverse, direct and indirect effects on water. Direct effects on water resources, including groundwater resources could be brought about through increased demand, particularly during construction. Indirect effects on nationally and internationally designated habitats, including from the thermal impact of cooling water discharges, have also been identified. This is of potential wider significance because of indirect effects on national and European designated habitat sites. In addition, any marine loading facilities that might be required will interfere with the stability of the coastline and, therefore, there is the need for the careful consideration of the impacts on coastal processes. This should also include consideration of potential cumulative effects from the proposed Marine Current Turbines tidal energy farm within the Skerries area.**

Flood Risk

- 5.79 Although the nominated site is not situated in an area that the Environment Agency considers to be at risk from fluvial flooding, climate change driven rises in sea-level rise may increase flood risk over the coming decades. Continued management of, and possible upgrades to, the existing defences may be required to mitigate this increase in flood risk. These defences have the potential to modify existing coastal hydrodynamics and associated movement of sediment, which may have secondary effects on coastal ecosystem structure and functioning. However, the use of an appropriate design and a full understanding of the hydrodynamics and sediment transport within the coastal waters could minimise the potential effects. The decision on the need for and scope of modelling can be informed by the results and recommendations of the SFRA and ongoing work to finalise the SMP.
- 5.80 Further mitigation of flood risk could be provided by local land raising of the nominated site.
- 5.81 To fully assess the risk of flooding on the nominated site, it is recommended that the nominator ensures that a detailed site-specific flood risk assessment is undertaken at the planning stage.
- 5.82 The revised Wales Shoreline Management Plan will provide assessments of existing defences and the residual life of assessment along the shoreline in the event of no active intervention and with continued present management and also an assessment of shoreline stability taking into account projections derived from the UK Climate Impacts Programme (UKCIP). It will be advisable when the report becomes available to reassess the stability of the present coastline at Wylfa in order to reassess whether there is a need for coastal protection measures against coastal erosion. At this point, there is no need for coastal protection measures fronting the nominated site as it is considered that the hard cliff geology will afford adequate protection even under elevated sea level conditions.

- 5.83 **Strategic Effects on Flood Risk:** The AoS has identified small 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. However, it is considered that the hard cliff geology and elevated nature of the nominated site will afford adequate protection and that there is no need for coastal protection measures.

Key interactions between Sustainable Development Themes

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

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

- 5.86 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 Wylfa were identified as follows:
- The Wales Spatial Plan Update (2008)
 - One Wales: A Progressive Agenda for the Government of Wales, Wales Assembly Government (2007)
 - Planning Policy Wales, The Welsh Assembly (2002)
 - Strategic Framework for Economic Development, Wales Assembly Government (2005)
 - Isle of Anglesey Unitary Development Plan (stopped, but a material consideration in decision making), Isle of Anglesey County Council (2005)
 - Minerals Planning Policy Wales, National Assembly for Wales (2001)
 - Environment Strategy for Wales, Welsh Assembly Government
 - Wales Biodiversity Framework, Wales Biodiversity Partnership
 - Sustainable Homes: A National Housing Strategy (Consultation Draft) Welsh Assembly Government (January 2009)
 - Wise about Waste: National Waste Strategy, Welsh Assembly Government (2002)
 - Starting to Live Differently: The Sustainable Development Scheme, Welsh Assembly Government (2004)
 - People, Places, Futures: The Wales Spatial Plan 2008 Update, Welsh Assembly Government (2008)

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

- Operation and decommissioning of the existing nuclear power station at Wylfa
- The section of the Spatial Plan for Wales dealing with the North West highlights the development potential of Holyhead as a key international gateway, linking Ireland with England and other parts of Europe via the A55 transport corridor. This strategy may give rise to future project proposals that interact with a new nuclear power station at Wylfa.

5.88 The appraisal of cumulative sustainability effects arising through interactions between the Wylfa 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
Air Quality	<ul style="list-style-type: none"> • The Wales Spatial Plan has the potential to lead to in-combination effects. Planned housing and associated community infrastructure, employment growth and increased transport movements may result in increased levels of air pollution
Biodiversity and Ecosystems	<ul style="list-style-type: none"> • Potential for interaction with the Wales Biodiversity Framework target to maintain natural habitats and sensitively enhance existing and surrounding designated sites • Impacts of development (planned housing and associated community infrastructure, employment growth and increased transport movements) outlined in the Wales Spatial Plan has the potential to lead to in-combination effects, which could impact European sites. Similar in-combination effects may also arise from the successor of the Unitary Development Plan • Decommissioning of the existing nuclear power station at Wylfa may have in-combination effects upon adjacent designated sites, particularly if deconstruction of the existing power station coincides with the construction phase of a new nuclear power station • Increased recreational pressure along the coast, as outlined in Wales Spatial Policy, may have in-combination effects with the proposed nuclear development at Wylfa (for example, through water quality and disturbance impacts on designated sites)
Climate Change	<ul style="list-style-type: none"> • Planning Policy Wales action plan identifies objectives for reducing greenhouse gas emissions and promoting energy from renewable sources • Low carbon economy promoted by reducing unsustainable travel patterns all seek to minimise the effects of climate change • Wales' Strategic Framework for Economic Development supports clean energy development and the Isle of Anglesey Unitary Development Plan encourages renewable energy developments • Potential cumulative effect from proposals for onshore and offshore wind farms in region
Communities: Supporting Infrastructure	<ul style="list-style-type: none"> • Increased traffic during construction and conflict with planned highway improvements • Potential interaction with Planning Policy Wales, which aims to reduce private car use and increase use of public transport • Decommissioning of existing nuclear facilities at Wylfa may coincide with construction of a new nuclear power station to create adverse effects on supporting infrastructure, in particular transport networks

AoS Sustainable Development Theme	Interactions and Cumulative Effects
Human Health and Well-Being	<ul style="list-style-type: none"> • Enhanced prosperity and secure, long-term employment are likely to have synergistic positive effects on health and well-being. This is in line with the objectives outlined in all the Economic Plans for Wales, which aim to improve economic prosperity
Landscape	<ul style="list-style-type: none"> • Potential in-combination effects associated with further off site electricity pylon infrastructure improvements by the National Grid • Potential in-combination effects associated with proposed new transport links, new housing and industrial development in the vicinity • Potential positive effects if the power station scheme is sensitively integrated with other emerging proposals for the area • Potential for cumulative effects when seen together with the existing inland wind farm nearby, when viewed from elevated ground in the surrounding area.
Water Quality and Resources	<ul style="list-style-type: none"> • All proposals will need to meet with the requirements of the EU Water Framework Directive as implemented through the River Basin Management Plan for Western Wales River Basin District. • They should also take into account potential cumulative effects from the proposed Marine Current Turbines tidal energy farm within the Skerries area.
Flood Risk	<ul style="list-style-type: none"> • Sea defences may need to be upgraded or constructed as part of the development of 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 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 Appraisal of Sustainability has explored the potential effects, adverse and beneficial, of building a new nuclear power station at Wylfa. Certain 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, at the project level.
- 6.3 The Appraisal of Sustainability process has included recommendations to inform the development of the revised draft Nuclear NPS. This site report for Wylfa has helped to inform the decision-making for the Strategic Siting Assessment. It has included advice as to the strategic significant effects arising from the construction of a new nuclear power station at Wylfa, and suggestions for how adverse effects may be mitigated, including proposed mitigation measures which could be considered as part of project level Environmental Impact Assessment.
- 6.4 A number of the strategic effects identified for Wylfa will be similar across all the sites, including positive effects for employment and well being. However a number of potential strategic effects have been identified that are of particular note for the nominated site at Wylfa. These are discussed below:
- 6.5 There are potential negative effects on at least four national and internationally protected nature conservation sites. These effects are significant, but mitigation opportunities could be available following further study at the project level.
- 6.6 The site is predominantly located on higher ground with hard bedrock. The risks from coastal flooding, sea level rise and erosion are therefore considered to be low. However, further assessment is required to determine the need for additional defences over the lifetime of a new power station.
- 6.7 Coastal water conditions at the site are considered generally favourable for the dispersion of the heated water that would be released after cooling.
- 6.8 The development of a new nuclear power station will have a negative visual impact on the local and sub-regional landscape, particularly the Anglesey AONB (part of which lies within the nominated site boundary) and North Anglesey Heritage Coast. Currently the exact placing of a new nuclear power station is unknown as a large site has been nominated, but some adverse impact which may not be fully mitigated is anticipated.
- 6.9 There is also potential for positive effects associated with long term employment and enhanced prosperity for communities at the local level.

- 6.10 Wylfa 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 site.
- 6.11 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.
- 6.12 Table 6.1 provides an overall summary of the significance of the environmental and sustainability effects for the Wylfa 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	-	-	-
Soils, Geology and Land Use	- ?	- ?	- ?
Water Quality and Resources	-	-	-
Flood Risk	-	-	-
Key: Significance and Categories of Potential Strategic Effects			
++	Development would resolve an existing sustainability problem; effect considered to be of regional/national/international significance		
+	No sustainability constraints and development acceptable; effect considered to be of regional/ national/international significance		
0	Neutral effect		
-	Potential sustainability issues, mitigation and/or negotiation possible; effect considered to be of regional/national/international significance		
--	Problematical because of known sustainability issues; mitigation or negotiation difficult and/or expensive; effect considered to be of regional/national/ international significance		
Uncertainty			
?	Where the significance of an effect is particularly uncertain, for example because insufficient information is available at the plan stage to fully appraise the effects of the development or the potential for successful mitigation, the significance category is qualified by the addition of '?'		

6.13 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.

6.14 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.

- 6.15 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
- 6.16 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 during construction 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Please refer to mitigation measures contained in the Biodiversity and Ecosystems sections of this AoS Report
<ul style="list-style-type: none"> • Potential accidental release of radioactive emissions could have a significant strategic effect on air quality 	<ul style="list-style-type: none"> • The nuclear regulators will need to be satisfied that the radiological and other risks to the public associated with accidental releases of radioactive substances are as low as reasonably practicable and within the relevant radiological risk limit.
Biodiversity and Ecosystems	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> • Disturbance to fauna, in particular bird species in important ecological areas, from construction activities • During construction, risk of 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Avoidance of sensitive areas • Construction Environmental Management Plan to avoid/minimise disturbance to

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the Revised draft Nuclear NPS and IPC
accidental pollution of local environment (for example, spillage of oil or other fuels)	wildlife, to minimise habitat loss and to prevent water pollution
<ul style="list-style-type: none"> Loss, damage or fragmentation of nationally or internationally designated sites (terrestrial and marine) such as SSSIs, SACs and SPAs. Loss of priority species using these habitats 	<ul style="list-style-type: none"> Habitat retention and species protection measures on the Wylfa site Habitat creation on the nominated site and wider estate to maintain ecological networks: Ecological Mitigation and Management Plan / Integrated Land Management Plan Monitoring programme to identify and manage effects on priority species and habitats, as well as wider area
<ul style="list-style-type: none"> Harm to migratory fish (SAC) from cooling water abstraction 	<ul style="list-style-type: none"> Ensure fish protection in cooling water intake/system design A suitable water intake system design should be adopted
<ul style="list-style-type: none"> Discharge of heated water, routine discharge of liquids leading to bioaccumulation of these toxins Risk of accidental discharges to SPA/SAC/SSSI 	<ul style="list-style-type: none"> Regulation of routine discharges, avoid accidental discharges
<ul style="list-style-type: none"> Groundwater abstraction may affect water supply to valuable terrestrial wetland habitats New drainage systems resulting in physical loss of habitats, as well as possibility of increased sediment loading in waterways 	<ul style="list-style-type: none"> Nominator should ensure further hydrological surveys to assess the effects of water abstraction and new drainage system on valuable or vulnerable habitats
Climate Change	
<p>Adverse Effects:</p> <ul style="list-style-type: none"> Potential short term increases in greenhouse gas emissions during construction and decommissioning 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Monitor greenhouse gas emissions
<ul style="list-style-type: none"> A lack of sustainable transport options may result in emissions from the transport of goods and labour throughout construction, operation and decommissioning phases 	<ul style="list-style-type: none"> Green travel plans Further investment in public transport
<p>Beneficial Effects</p> <ul style="list-style-type: none"> A nuclear power station on the nominated site would result in lower greenhouse gas emissions during the operational stage compared to fossil fuel sources, with positive long-term effects on climate change 	
Communities: Population, Employment and Viability	

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"> • Pressure on basic services from likely large scale in-migration of construction workers 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Measures to manage potential negative effects on local communities; enhance employment capacity through training; provision of services for staff and local community
<ul style="list-style-type: none"> • Project may lead to a shortage of local construction workers to meet the needs of other industries and major projects in the region. 	<ul style="list-style-type: none"> • Measures to address likely difficulties in sourcing labour and the effects of this on the local/regional construction industry
<p>Beneficial Effects:</p> <ul style="list-style-type: none"> • Strong positive effects for long-term employment and sustaining communities in Anglesey. • New power station may offset job losses from decommissioning of the existing power station at the nominated site. However, time differences between decommissioning may require workers to seek employment elsewhere • Provision of education, training, upskilling for employees and contractors in the region. • Positive multiplier effects as income from new population of workers will help support local community. • 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"> • The transport of materials, including nuclear and conventional wastes, construction workers and plant operatives during the stages of the nuclear power station's life could add to traffic locally, possibly leading to congestion. This could be particularly problematic on the A55 Trunk Road, particularly at the Britannia Bridge 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Transport Management Plan and Green Travel Plan • 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

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the Revised draft Nuclear NPS and IPC
	<p>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.</p>
<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>Cultural Heritage</p>	
<p>Adverse effects:</p> <ul style="list-style-type: none"> • Main effects would be local, within the footprint of the nominated site. Effects would be permanent and irreversible 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> • Further detailed investigations may be required prior to construction, with a watching brief
<ul style="list-style-type: none"> • Immediately surrounding the site, there may be potential effects on the settings of historic assets. The significance will depend on distance, topography and the ability to mitigate 	<ul style="list-style-type: none"> • May be possible to mitigate through appropriate landscaping/planting schemes and the application of principles of good design
<p>Landscape</p>	
<p>Adverse effects:</p>	<p>Mitigation Possibilities:</p>

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"> Potential for long-term adverse landscape character and visual impacts during operation on the surrounding area, including parts of Anglesey Area of Outstanding Natural Beauty and North Anglesey Heritage Coast 	<ul style="list-style-type: none"> Some visual impact mitigation may be possible, including the application of principles of good design Decommissioning may allow some landscape restoration of previously developed areas in the long term An Assessment of the Significance of Impacts of Development on Historic Landscape (ASIDOHL) should be conducted as part of the EIA process
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 (see 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	
<p>Adverse effects:</p> <ul style="list-style-type: none"> New coastal defences (if required), Marine Off-Loading Facility (MOLF), inlet and outfall pipe-work and cooling water provision could potentially have significant effects on coastal processes, including sediment transport Potential disturbance of unique reef communities and habitats 	<p>Mitigation Possibilities:</p> <ul style="list-style-type: none"> Further investigations required Suitable design of coastal defences, which may include SUDS Selection of appropriate construction methods for coastal defence work Sediment transport modelling Detailed bathymetric survey and benthic study to determine optimum location for the works
<ul style="list-style-type: none"> Thermal impact of cooling water discharges, potential indirect effects on nationally and internationally designated habitats 	<ul style="list-style-type: none"> Further investigations required Dispersion and dilution modelling to determine fate of effluent plume. Abstraction of water and thermal discharges will be subject to Environment Agency permitting
<ul style="list-style-type: none"> Increase on water demand during construction phase. Increase in wastewater production 	<ul style="list-style-type: none"> Further investigations required Studies to ensure that capacity of water and wastewater infrastructure is sufficient
<ul style="list-style-type: none"> Potential impacts on local groundwater, particularly within the Ynys Môn Abstraction Management 	<ul style="list-style-type: none"> Further investigations required Studies of local groundwater bodies and potential links to the

Potential Strategic Significant Effects (adverse and beneficial effects)	Suggested Mitigation for Adverse Effects and Recommendations for the Revised draft Nuclear NPS and IPC
Strategy (CAMS) area. May include construction disturbance and accidental discharges	site. Ongoing monitoring of impacts <ul style="list-style-type: none"> • Suitable design to mitigate potential adverse effects
Flood Risk	
Adverse Effects: <ul style="list-style-type: none"> • Sea level rise could be a threat during the latter stages of the operational phase/ decommissioning phase 	Mitigation Possibilities: <ul style="list-style-type: none"> • Flood defence barriers to be upgraded or constructed • Nominator to ensure further studies are carried out

Abbreviations

AA	Appropriate Assessment
ALARP	As Low As Reasonably Practicable
AONB	Areas of Outstanding Natural Beauty
AoS	Appraisal of Sustainability
AoS Report	Report setting out environmental and sustainability effects of the Nuclear NPS. It will incorporate the requirements of the SEA Directive
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
BAT	Best Available Techniques
BGS	British Geological Survey
BS	British Standards
CAMS	Catchment Abstraction Management Plan
CCS	Carbon Capture and Storage
CEMP	Construction Environmental Management Plan
CO ₂	Carbon Dioxide
COMARE	Committee on Medical Aspects of Radiation in the Environment
CoRWM	Committee on Radioactive Waste Management
CPRE	Campaign to Protect Rural England
cSAC	Candidate Special Area of Conservation
CWS	County Wildlife Site
DECC	Department of Energy and Climate Change
Defra	Department for the Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
EU	European Union
GDA	Generic Design Assessment
GEP	Good Ecological Potential
GES	Good Ecological Status
GIS	Geographical Information System
GP	General Practitioner
GW	Giga Watt
GWMU	Groundwater Management Unit
ISO	International Organisation of Standardisation
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
ILW	Intermediate Level Radioactive Waste
IMD	Index of Multiple Deprivation
IPC	Infrastructure Planning Commission.
IVC	In Vessel Composting
LLW	Low Level Radioactive Waste
LNR	Local Nature Reserves
LPA	Local Planning Authority
LSOA	Lower Super Output Area
MCA	Marine Consultation Area
MNR	Marine Nature Reserve
MRF	Materials Recycling Facility

mSv	Millisievert
MWe	Mega Watt (electrical)
MWt	Mega Watt (thermal)
NEYM	North Eryri/Ynys Môn
NCA	National Character Area
NII	Nuclear Installations Inspectorate
NNR	National Nature Reserve
Nuclear NPS	The proposed National Policy Statement for new nuclear power stations
NPS	National Policy Statement
NSA	National Scenic Area
OCNS	Office for Civil Nuclear Security
OSPAR	Oslo and Paris Conventions
PPS	Planning Policy Statement
RAMTED	Radioactive Materials Transport Events Database
RBD	River Basin District
RBMP	River Basin Management Plan
RDPE	Rural Development Programme for England
RIGS	Regionally Important Geological and Geomorphological Site
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SEA	Strategic Environmental Assessment
SMP	Shoreline Management Plan
SO ₂	Sulphur Dioxide
SOA	Super Output Area
SPA	Special Protection Area
SSA	Strategic Siting Assessment
SSCT	Strategically Significant Cities and Towns
SSSI	Site of Special Scientific Interest
UN	United Nations
WFD	Water Framework Directive
WHO	World Health Organisation
WRMU	Water Resources Management Unit
WRZ	Water Resources Zone

Appendices Available Separately

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

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