DEPARTMENT OF ENERGY & CLIMATE CHANGE

Habitats Regulations Assessment: Site Report for Wylfa

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

Planning for New Energy Infrastructure

Habitats Regulations Assessment of the revised draft Nuclear National Policy Statement

Habitats Regulations Assessment (HRA) screening and Appropriate Assessment (AA) of the revised draft Nuclear NPS including potentially suitable sites, has been undertaken in parallel with the Appraisal of Sustainability (AoS). These strategic assessments are part of an ongoing assessment process that will continue with project level assessments. Applications to the IPC for development consent will need to take account of the issues identified and recommendations made in the strategic, plan level HRA/AA; and include more detailed project level HRA as necessary.

The Habitats Regulations Assessment is provided in the following documents:

HRA Non-Technical Summary

Main HRA of the revised draft Nuclear NPS

Introduction
Methods
Findings
Summary of Sites
Technical Appendices

Annexes to the Main HRA Report: Reports on Sites

Site HRA Reports
Technical Appendices

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

This document is the Habitats Regulations Assessment Site Report for Wylfa.

This document has been produced by the Department of Energy and Climate Change based on technical assessment undertaken by MWH UK Ltd with Enfusion Ltd and Nicholas Pearson Associates Ltd.

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1 Introduction

This HRA Report

1.1 This report sets out the Habitats Regulations Assessment (HRA) Screening and Appropriate Assessment components of the Habitats Regulations Assessment of the proposals for Wylfa. This site was nominated into the Strategic Siting Assessment (SSA) process to be considered as a potentially suitable site for the deployment of a new nuclear power station(s) by 2025. This site report is one of the Site HRA Reports comprising Part III of the HRA Report that accompanies the revised draft Nuclear National Policy Statement (NPS). Part II of the HRA report for the revised draft Nuclear NPS sets out details of the HRA process, methods, findings and summary of the individual assessments at the nominated sites. Part I of the HRA report is a Non-Technical Summary.

1.2 This HRA has been undertaken at a strategic level and is part of an ongoing assessment process that started in July 2008 and will continue with project level assessments. Sites that are assessed to be potentially suitable for the deployment of new nuclear power stations by 2025, will be listed in the Nuclear NPS; developers will be able to apply to the Infrastructure Planning Commission[1] for development consent to develop new nuclear power stations at those sites.

1.3 Each development consent will need to be accompanied by a project level HRA report, alongside an Environmental Statement reporting the findings of a detailed Environmental Impact Assessment (EIA). The proposals will also be subject to various other regulatory and licensing requirements.

The revised draft Nuclear National Policy Statement

1.4 The revised draft Nuclear NPS sets out a list of sites that, following the Strategic Siting Assessment, have been found to be potentially suitable for the siting of new nuclear power stations by 2025, and the framework by which development consent decisions on sites should be made, by the Infrastructure Planning Commission.

[1] 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.

HRA Process

1.5 The Habitats Directive[2] protects habitats and species of European nature conservation importance. Together with the Birds Directive[3], the Habitats Directive established a network of internationally important sites designated for their ecological status. Special Protection Areas (SPAs) are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds. Special Areas of Conservation (SACs), and European Offshore Marine Sites (EOMS) are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. Internationally important wetlands are designated under the Ramsar Convention 1971. UK Government policy states that the Ramsar sites are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them[4]. These sites combine to create a Europe-wide 'Natura 2000' network of European Sites, which are hereafter referred to as 'European Sites'[5] in this and other HRA reports[6].

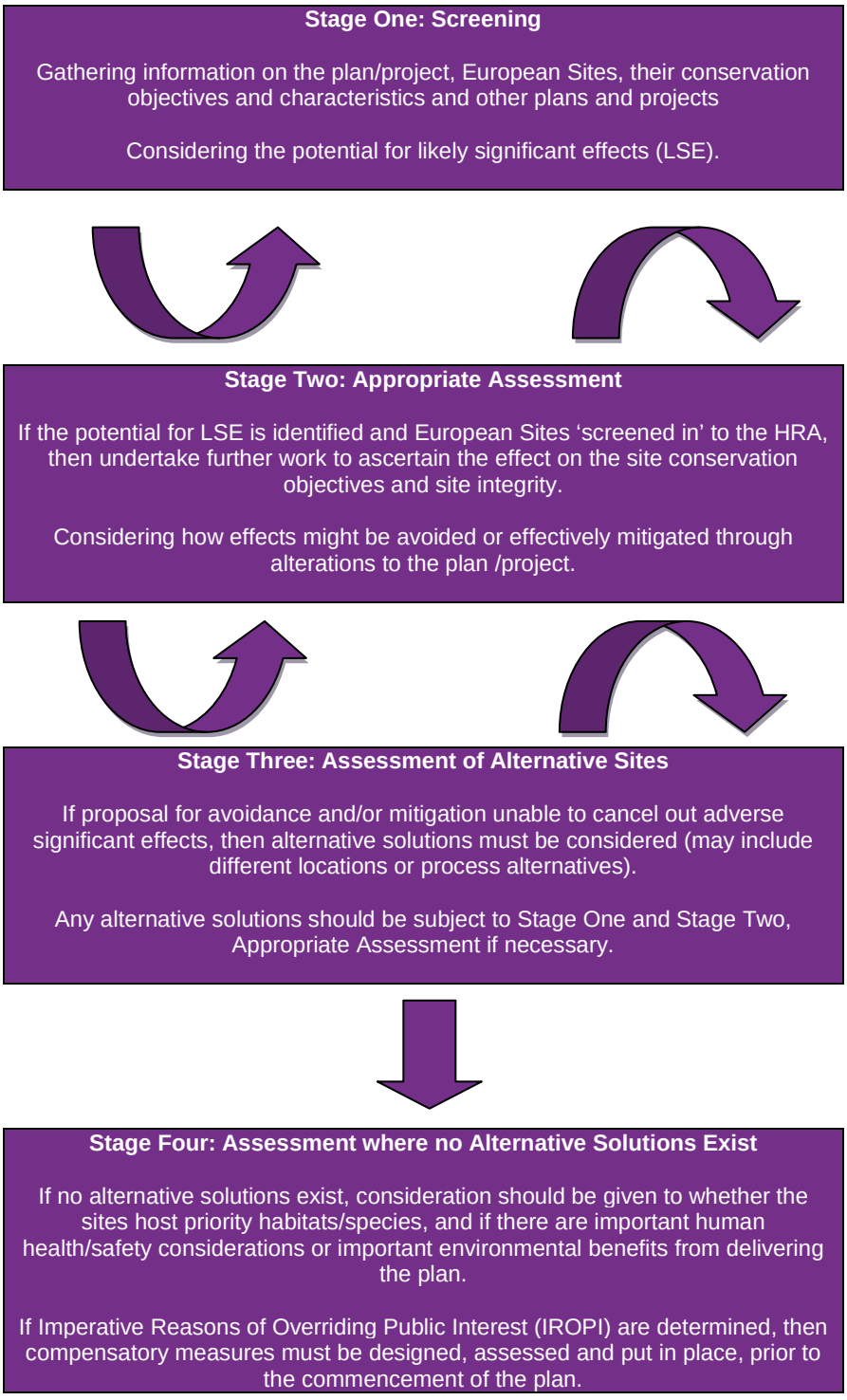
1.6 HRA tests whether the impacts identified as arising from a proposal, plan or project are likely to have a significant effect on European sites of nature conservation importance. Article 6 (3) of the Habitats Directive requires an 'appropriate assessment' to be undertaken on proposed plans or projects which are not necessary for the management of the European Site, but which are likely to have a significant effect on one or more European Sites either individually, or in combination with other plans, programmes or projects. In England and Wales this requirement was transposed into UK law by the Conservation of Habitats and Species Regulations 2010[7]) (the 'Habitats Regulations'). The process of fulfilling the requirements of the Directive and the Regulations is now in practice referred to as HRA, and Appropriate Assessment (AA) if required, forms a stage within the overall HRA process.

1.7 The full details of the HRA method and process, including the key principles and any assumptions made in this plan level HRA of the revised draft Nuclear NPS and nominated sites; are outlined in Part II of the HRA Report. This report covers the Screening Assessment and Appropriate Assessment (AA) stages of the HRA for the nominated site at Wylfa, as outlined in Table 1. It takes into account the information contained within the site nominations submitted to Government by the nominators (both RWE Npower and the Nuclear Decommissioning

2 Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna
3 Council Directive 79/409/EEC on the protection of wild birds: http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1979/L/01979L0409-20070101-en.pdf
4 ODPM, 2005, Planning Policy Statement 9: Biological and Geological Conservation; and ODPM Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System
5 Ramsar sites are included within the definition of European sites for the purposes of this report.
6 The term European Site is used throughout all the Site HRA Reports and in the Main HRA Report, and incorporates SACs, SPAs, EOMS and Ramsar sites.
7 Regulation 106 applies the requirements and controls in relation to plans under the regulations to National Policy Statements designated under the Planning Act 2008.

Authority have nominated the site) on 31 March 2009[8]. The process is typically iterative and assessments have been revised on the basis of commentary from the Statutory Consultees.

Table 1: Habitats Regulations Assessment: Summary Overview of Key Stages [9]



8 http://www.energynpsconsultation.decc.gov.uk
9 Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article6 (3) and (4) of the Habitats Directive 92/43/EEC. . European Commission DG Environment (2001) http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

2 HRA Screening of Wylfa

2.1 The nominated site is located at Wylfa Head which extends into the Irish Sea from the north coast of Anglesey, some 15km north east of Holyhead, between Cemaes Bay and Cemlyn Bay. The nomination identifies land lying to the southeast, south and southwest of the existing nuclear power station in current operation. 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, southwards to the A5025 and the village of Tregele and westwards to the Porth-y-pistyll inlet. To the west and east of Wylfa, lies Anglesey Area of Outstanding Natural Beauty (AONB), which overlaps a small area of the nominated site in the North West, and the coastline area of this AONB also designated as North Anglesey Heritage Coast (see Appraisal of Sustainability report). The grid reference on the approximate centre of the nominated site at Wylfa is 235260 393350. The location of the site is shown in Figure 1.

Screening

2.2 The Screening process forms the first stage of any HRA and is focused on the 'likely significant effect' (LSE) test. The aim of the LSE test is to determine whether the plan either alone, or in-combination with other plans and projects is likely to result in a significant effect at European site[s]. This is essentially a risk assessment process that seeks to understand whether there are mechanisms for any identified impacts arising from the plan to adversely affect the European sites (i.e. a cause-effect pathway)[10]. The key questions asked are:

- would the effect undermine the conservation objectives for the site?
- can significant effects be excluded on the basis of objective information?

2.3 The tasks undertaken to complete the Screening process for Wylfa are described below.

European site Identification and Characterisation

2.4 European sites within a 20km radius of the nominated site were scoped into the HRA Screening Assessment process as set out in Table 2a and Figure 2. This area of search reflects guidance recommendations[11], but also takes into account that distance is in itself not a definitive guide to the likelihood or severity of impacts known to arise from developments (for example, inaccessibility/ remoteness is typically more relevant) and factors such as the prevailing wind directions, river and groundwater flow direction will all have a bearing on the relative distance at which an impact can occur. As such, an additional eight European Sites which fall

10 Appropriate Assessment of Plans (Therivel, May 2008)
11 Communities and Local Government (2006) Planning for the Protection of European sites: Appropriate Assessment – Guidance for Regional Spatial Strategies and Local Development Documents.

beyond 20km from the site (listed in Table 2b) are included within this report following consultation with relevant Statutory Consultees given their potential hydrological connections to the site.

Table 2a: European sites within 20km of the nominated Site

	Designation	Distance from nominated site[12]
Cemlyn Bay SAC	**SAC**	0.7km
Ynys Feurig, Cemlyn Bay and The Skerries	**SPA**	0.7km
Holy Island Coast	**SAC**	13.8km
Holy Island Coast	**SPA**	13.8km
Anglesey Fens	**SAC**	14.2km
Anglesey and Llyn Fens	**Ramsar**	14.2km
Llyn Dinam	**SAC**	14.8km
Menai Strait and Conwy Bay	**SAC**	15.6km
Liverpool Bay	**SPA**	14.5km

Table 2b: European sites outside 20km of the nominated Site

	Designation	Distance to nominated site[13]
Anglesey Coast Salt Marsh	**SAC**	24.3km
Glantraeth	**SAC**	26.3km
Abermenai to Aberffraw Dunes	**SAC**	26.3km
Puffin Island	**SPA**	30.2km
Lavan Sands, Conway Bay	**SPA**	29.8km
Snowdonia	**SAC**	34.3km
Afon Gwyrfai a Llyn Cwellyn	**SAC**	34.7km
Great Orme's Head	**SAC**	39.2km

2.5 Liverpool Bay SPA (SPA) is also included within this HRA process, using the boundary of the pSPA set out in the November 2009 consultation, which is unchanged in the final SPA designation (Autumn 2010). As such, a precautionary approach has been taken for this site during its assessment at both the HRA Screening Assessment and Appropriate Assessment stages.

2.6 **Appendix 1** details the characteristics of the seventeen European sites scoped into the HRA Screening Assessment. The characterisations include an overview of the sites':

- ecological features;
- their qualifying features/ reasons for designation;

12 Distance measured is from nearest site boundary.
13 Following consultation with DEFRA and CCW potential or proposed European sites are required to be included within this assessment

- conservation objectives and the condition status of their constituent Sites of Special Scientific Interest (SSSIs) where available;
- environmental conditions necessary to support site integrity; and
- site vulnerabilities, including any key pressures or trends known to be affecting the sites.

Nominated site Review and Identification of Likely Impacts

2.7 The nomination documents[14] state that the nominated site is approximately 232 hectares in size, the main operational footprint of one nuclear reactor is likely to be approximately 30-50 hectares. It states that additional land will also be required for cooling water intake and outfall structures, and a (construction phase) marine offloading facility, beyond the nominated site boundary. The developer was not required to provide details of the proposed development at this stage.

2.8 From the nomination documents[15] it is assumed that the nomination is for a nuclear power station development, incorporating :

- at least one nuclear reactor;
- construction phase areas and facilities, including a Marine Off-Loading Facility;
- infrastructure and facilities related to the operation of a nuclear power station, such as highways and transmission infrastructure;
- ancillary and induced developments including a new access road;
- the potential need for sea defences at the coastal frontage of the site and/or adjacent to other ancillary infrastructure;
- cooling water infrastructure (with tunnels/ inlet and outfall pipework potentially extending into the open sea for up to 3km from any seaward point should direct cooling intake methods (the developers' preferred option) be employed);
- interim radioactive waste storage facilities.

2.9 The existing Wylfa 'A' nuclear power station occupies the land to the North West and to the west of the nominated site. This is a twin-unit Magnox Plant supplying up to 1,140MW, approximately 40% of Wales' electricity. This power station commenced electricity generation in 1971. The current plan is to cease generation in 2010[16].

2.10 The full range of potential impacts on environmental conditions and biodiversity arising from the development of new nuclear power stations are outline and discussed in Part II of the HRA Report. Impacts of particular relevance to this nominated site include: effects on the marine and water environment, direct habitat loss and fragmentation, coastal

14 Nomination documents submitted by the developers (RWE npower and the Nuclear Decommissioning Authority), at www.energynpsconsultation.decc.gov.uk
15 Op cit.
16 http://www.nda.gov.uk/news/wylfa.cfm

squeeze, and effects of disturbance. These issues are discussed in detail in the HRA Screening Assessment task below.

Identification and Consideration of Other Plans and Projects

2.11 It is a requirement of Article 6(3) of the Habitats Directive that HRA examines the potential for plans and projects to have a significant effect either individually or 'in combination' with other plans and projects (PPs). The aim is that plans and projects are evaluated within the context of the prevailing environmental conditions and that account is taken of their effects.

2.12 Plan level HRA practice has shown that the in-combination assessment is most relevant where plans might otherwise be screened out because their individual contribution is inconsequential. The requirement is that the HRA assessment process should take account of reasonably foreseeable impacts (as opposed to every conceivable effect)[17].

2.13 For the purposes of this assessment consideration was given to:

- Local Development Plans delivering planned spatial growth
- Major Development Schemes (including transport plans/ airport expansion) where relevant
- Coastal Tourism Strategies

2.14 Where relevant (and available), reference was also made to:

- Coastal Habitat Management Plans
- Water Resource Management Plans
- Catchment Abstraction Management Strategies
- Shoreline Management Plans
- Flood Risk Management Strategy
- River Basin Management Plans
- Minerals and Waste Development Frameworks
- Decommissioning plans for the existing nuclear power station
- Environment Agency's Review of Consents
- CCW Review of SPAs (2002)

2.15 A summary of the key plans referred to in the assessment process is provided in **Appendix 2**.

Screening Assessment

2.16 The following sections outline the issues arising from the Screening Assessment (LSE test) undertaken at **Appendix 3**, for the nominated site at Wylfa. The Screening Assessment indicated that development of

17 Tyldesley, D. (2009) Habitats Regulations Assessment of Local Development Frameworks. Revised Draft guidance for Natural England. Natural England, Sheffield.

the nominated site at Wylfa has the potential to significantly affect European sites as a result of:

- **Water Resources and Quality Impacts**
- **Habitat (and Species) Loss and Fragmentation**
- **Coastal Squeeze**
- **Disturbance (Noise, Light and Visual)**
- **Air Quality**

2.17 Each of these issues is considered in turn below.

Water Resources and Quality Impacts

European sites for which no significant effects are likely (see Appendix 3):

- Holy Island Coast SPA
- Anglesey Coast Salt Marsh SAC
- Glantraeth SAC
- Abermenai to Aberffraw Dunes SAC
- Snowdonia SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Great Orme's Head SAC

European sites for which significant effects are likely (see below):

- Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA
- Holy Island Coast SAC
- Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar
- Llyn Dinam SAC
- Menai Strait and Conwy Bay SAC
- Liverpool Bay SPA
- Puffin Island SPA
  Lavan Sands, Conwy Bay SPA

2.18 The quality of fresh and marine water that feeds and supports the protected European sites at Wylfa is a key determinant in ensuring the integrity of the habitats and dependant species of the protected sites. Poor water quality arising from the build up of heavy metals and salts and from the discharge of toxic compounds [that may also bind to sediments] can lead to mortality in aquatic life and upon those predators that feed upon them (for example bird species). Routine[18] releases of radioactive discharges from effluents associated with systems for collecting and treating reactor cooling water, spent fuel storage ponds

18 As regulated by the Environment Agency in relation to the Government's discharge strategy targets (Environment Agency (2005) Measuring Environmental Performance, Sector Report for the Nuclear Industry).

and activities such as plant decontamination will have to meet annual dose constraints and be subject to a discharge license from the Environment Agency, as such toxic releases create free radicals which damage proteins, membranes and DNA with effects ranging from cancers, reproductive problems, birth defects and increasing the vulnerability of species to disease. Toxins can accumulate in animals and plants through uptake and ingestion through the food chain, increasing the vulnerability of species to disease and genetic mutation. Bioaccumulation can also result in endocrine disruption following synergistic impacts between toxic compounds[19], leading to altered rates of reproduction and dispersal.

2.19 Changes in water quality such as through nutrient loading can result in enrichment (eutrophication). Excess nutrients can alter sensitive vegetation communities of aquatic habitats whilst exacerbating colonisation by more generalist and invasive species. Algal blooms resulting from excess nutrient input can also impact upon the availability of oxygen in waters, whilst the discharge of cooling water up to10°C warmer[20] from the nominated site can further reduce the amount of soluble oxygen available (as oxygen is less soluble at higher temperatures). Such alterations in water temperature and the availability of oxygen and can result in artificial thermal and chemical barriers to species and communities, significantly affecting the qualifying features of European sites.

2.20 Ancillary developments including aggregates extraction and road building change existing hydrological regimes and impact on water quality by increasing urban runoff. Earthworks and site drainage may alter groundwater levels resulting in changes in the flow of watercourses.

2.21 The addition of water to ecological systems through discharge can also impact upon water quality through altering salinity and sediment movement and flow regimes within the system, whilst the removal of water from the natural cycle through abstraction can affect groundwater supply to protected habitats. Both discharge and abstraction can thus significantly affect habitat and species which are sensitive to such changes.

2.22 The HRA Screening Assessment reviewed the potential for impacts on water resources and quality arising from the construction, operation and decommissioning phases of a new nuclear power station at the nominated site. Issues include:

- increased/ altered drainage from earthworks and excavations and potential sedimentation changes;
- the potential for accidental contamination from accidental leakage;

19 Marine Biological Association (2003) The Characterisation of European sites: The Severn Estuary. (possible) Special Area of Conservation and Special Protection Area. Occasional Publication No. 13.
20 BEER (July 2007) Towards a Nuclear National Policy Statement – Applying the proposed Strategic Siting Assessment criteria: a study of the potential environmental and sustainability effects.

- routine[21] (monthly discharges of liquid wastes (with radioactive substances likely to include Tritium, Carbon-14 and Iodines) within annual dose constraints and limits authorised by the relevant environmental regulator under the Environmental Permitting (England and Wales) Regulations 2010 and accidental release of radioactive discharges to water;
- alteration of flow through abstraction and the return of additional water volumes to the aquatic system;
- changes to water temperature, dissolved oxygen content and vegetative growth arising from the controlled discharge of abstracted water of greater temperature than the receiving body;
- the potential for toxic contamination (for example from anti-fouling agents associated with cooling water systems) from accidental leakage may interact or combine with routine non-radioactive or radioactive discharges that will be subject to discharge consents regulated by the Environment Agency.

2.23 Of the 17 European sites screened, ten were identified as possessing specific vulnerabilities relating to water resources: Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Holy Island SAC, Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar, Llyn Dinam SAC, and Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA.

Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA

2.24 Cemlyn Bay SAC, and Ynys Feurig, Cemlyn Bay and The Skerries SPA are most likely to be impacted by changes in water quality arising from the development, given that these sites are located as close as 0.7km from the nominated site for Wylfa. Specialised perennial vegetation of the stony banks and the plant and animal communities within the coastal lagoon, both designated features within the SAC, are sensitive to eutrophication and competition from generalist and invasive species which may arise from alterations to salinity, water temperature and dissolved oxygen content arising from discharge. Discharges can also increase levels of nutrient enrichment which further exacerbate eutrophication and competition within vegetative communities, whilst additional sediment loading can alter the structure and stability of these habitats and associated species. The integrity of these habitats is also reliant upon the maintenance of the hydrological regimes currently in place. Any alterations to current nutrient and sediment loads and/or hydrological regimes as a result of the nominated site may result in a reduction in the currently afforded status of ‘favourable maintained’ for the coastal lagoon, whilst further degradation to the vegetative communities of stony banks is likely to be significant given the current unfavourable condition of this habitat type.

21 As regulated by the Environment Agency in relation to the Government’s discharge strategy targets (Environment Agency (2005) Measuring Environmental Performance, Sector Report for the Nuclear Industry).

2.25 Detrimental impacts may also arise upon those designated bird species within Ynys Feurig, Cemlyn Bay and The Skerries SPA (Arctic, Common, Roseate and Sandwich Tern) as a result of potential contamination of their prey (fish) leading to reductions in forage availability and the uptake and transfer of toxins through the food chain. The presence of chemical, thermal and physical barriers arising from the development may also impact upon the prey of these bird species. The creation of thermal inclines and chemical barriers arising from discharge can affect the migration and dispersal of fish species, whilst the construction of a marine off-loading facility and cooling water intake structures may also present physical barriers to fish species, including their impingement on cooling water intake screens and the entrainment of their larvae during the intake cycle. Such impacts upon the reproductive success and dispersal of fish species can result in significant effects upon designated bird populations within Cemlyn Bay and The Skerries SPA through such changes in resource availability.

Menai Strait and Conwy Bay SAC
Holy Island Coast SAC
Liverpool Bay SPA
Lavan Sands SPA
Puffin Island SPA

2.26 Changes in water quality may also impact upon coastal habitats and species supported within Menai Strait and Conwy Bay SAC, Holy Island Coast SAC, Liverpool Bay SPA, Laven Sands SPA and Pufflin Island SPA, though to a lesser extent than Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and The Skerries SPA given their distance away from the nominated site (these sites being situated within15km from the nominated site). Coastal habitats including sandbanks, mudflats, sand flats, reefs, inlets, bays and sea caves designated within Menai Strait and Conwy Bay SAC, and vegetated sea cliffs designated within Holy Island Coast SAC are highly sensitive to changes in nutrient and sediment loading, with alterations to their structure and associated communities of animals and plants impacting upon the quality and extent of these designated habitats. Impacts may also occur upon bird species designated within Liverpool Bay SPA (overwintering populations of Red-throated Diver and Common Scoter), Lavan Sands SPA (overwintering populations of Oystercatcher) and Puffin Island SPA (breeding populations of Cormorant), particularly as their boundaries overlap with Menai Strait and Conwy Bay SAC, with impacts arising from alterations to water quality through the discharge and accumulation of toxic compounds potentially transferred to habitats and prey items (including fish, invertebrates, molluscs and other benthic fauna) located further along the coast at these European sites. Reductions in water quality can alter the abundance, distribution and quality of prey items, with impacts transferred to bird populations, impacting upon their foraging, breeding and overwintering success.

Anglesey Fens SAC and Anglesey, and Llyn Fens Ramsar
Llyn Dinam SAC

2.27 Anglesey Fens SAC and Anglesey and Llyn Fens Ramsar are particularly vulnerable to alterations in groundwater quantity and quality and changes to nutrient levels, given that the maintenance of such conditions are crucial in the conservation of the habitats and species for which they were designated (Chara lakes, calcareous and alkaline fens, wet heaths and Molinia meadows, Geyer's Whorl Snail *Vertigo geyeri*, Southern Damselfly *Coenagrion mercuriale*, Marsh Fritillary butterfly *Euphydryas aurinia* and Otter *Lutra lutra*). Similar sensitivities are also present at Llyn Dinam SAC, designated for its lakes. Potential impacts to these European sites may therefore result from increased levels of abstraction and increases in nutrient levels arising from the development should river and groundwater catchment areas of the European sites overlap or interact with those areas at Wylfa. A further detailed assessment of the groundwater connections between Llyn Dinam SAC and Wylfa should be considered at the detailed project stage.

2.28 **The impacts of the development upon water resources and quality on the site integrity of Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Holy Island Coast SAC and SPA, Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar Llyn Dinam SAC, Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA should be considered further through Appropriate Assessment.**

Habitat (and Species) Loss and Fragmentation

European sites for which no significant effects are likely (see Appendix 3):

- Holy Island Coast SAC, SPA
- Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar
- Llyn Dinam SAC
- Anglesey Coast Salt Marsh SAC
- Glantraeth SAC
- Abermenai to Aberffraw Dunes SAC
- Snowdonia SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Great Orme's Head SAC

European sites for which significant effects are likely (see below):

- Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA
- Menai Strait and Conwy Bay SAC
- Liverpool Bay SPA
- Puffin Island SPA

- Lavan Sands, Conwy Bay SPA

2.29 The development of a new nuclear power station at Wylfa would likely impact upon biodiversity, with direct impacts resulting from land take arising from the development of the site itself (including a marine off-loading facility, cooling water infrastructure and a temporary landing stage), from induced and ancillary developments associated with the power station (such as transport infrastructure, new community facilities etc), and from the construction and maintenance of flood defences. Indirect impacts arising from the nominated site can also lead to habitat and species loss and fragmentation, such as from the result of increased/altered levels of sedimentation and nutrient loading, and the creation of thermal (through the discharge or warmer water), chemical (through the discharge of water of different salinity and/or organic/non-organic content), and physical (flood defence, cooling tower and offshore marine landing platform structures) barriers to species migration and dispersal, as discussed earlier. The depletion of water resources and potential impingement of fish on cooling water intake screens, and the entrainment of fish larvae during the abstraction process, can also result in habitat/species loss and fragmentation.

2.30 The Screening Assessment noted the potential for direct impacts through habitat loss and fragmentation from the construction phases of development at Wylfa, including:

- construction of the power station itself;
- construction of infrastructure and facilities relating to the operation of the power station;
- construction of coastal defences; and
- the construction of a marine off-loading facility and cooling water inlet and outfall pipe infrastructure.

2.31 Of the 17 European sites screened, six were identified as possessing specific vulnerabilities relating to habitats and species: Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA.

Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA

2.32 Such impacts described above are specifically relevant to Cemlyn Bay SAC, and Ynys Feurig, Cemlyn Bay and The Skerries SPA, these sites being located as close as 0.7km from the nominated site at Wylfa. Land take and the associated loss of supporting and/or buffer habitats and corridors arising from the development can indirectly impact upon habitats and species designated within the SAC and SPA, whilst increased levels of runoff and sediment loading, and alterations to drainage arising from excavation and earthworks during construction (and deconstruction during decommissioning) also has the potential to significantly affect the integrity of the coastal lagoons and vegetated

stony banks. Any loss and fragmentation of habitats will ultimately impact negatively upon those species they support. In addition, further impacts will arise from the construction of the marine off-loading facility (at the foreshore to import large components) and cooling water inlet and outfall pipes (should direct cooling methods be employed, pipe work and tunnels extending up to 3km into the open sea may be required). Coastal defence measures may therefore become necessary at the outset of the development of a nuclear power station at Wylfa, and/or be required during the later stages of the operation and/or decommissioning.

2.33 The operation of the power station could also have indirect impacts upon designated Tern species which feed within Cemlyn Bay and The Skerries SPA (Arctic Tern *Sterna paradisaea*, Common Tern *S. hirundo*, Roseate Tern *S. dougallii* and Sandwich Tern *S. Sandvicensis*) through alterations to the distribution and abundance of their prey (predominantly fish). The controlled discharge of previously abstracted water at increased temperatures could impact upon the physiological behaviour of fish species by altering the natural timings of breeding and spawning cycles, or by affecting their distribution and dispersal through the creation of thermal barriers within the water column. Such impacts upon this foraging source can therefore result in the displacement and/or alteration of foraging ranges of those bird species designated within this SPA. Detrimental impacts upon the survival and reproductive success of these bird species may therefore arise as a result of increased foraging efforts and associated increases in energy expenditure required to compensate for any decline in food availability.

Menai Strait and Conwy Bay SAC
Liverpool Bay SPA
Lavan Sands SPA
Puffin Island SPA

2.34 Given the distance of Menai Strait and Conwy Bay SAC and Liverpool Bay SPA from the development area proposed for Wylfa, no direct impacts upon habitat (and species) are anticipated. However indirect impacts may arise should impacts of the development at the nominated site be transferred further afield. For example, increased sediment run-off and loads arising during construction and decommissioning phases may be transferred to sensitive sandbank, mudflat and reef habitats designated within Menai Strait and Conwy Bay SAC, altering the extent and quality of these areas with impacts upon associated plant and animal communities. Impacts may also occur upon bird species designated within Liverpool Bay SPA (overwintering populations of Red-throated Diver and Common Scoter), Lavan Sands SPA (overwintering populations of Oystercatcher) and Puffin Island SPA (breeding populations of Cormorant) through the loss of buffering and connecting habitats within Menai Strait and Conwy Bay SAC (as the boundary of Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA overlaps

with Menai Strait and Conwy Bay SAC). Alterations to habitat quality and extent within these European sites through the deposition of additional sediment loads transferred down the coast from the nominated site may impact upon the prey items of these designated bird species (including fish, invertebrates, molluscs and other benthic fauna) that depend on these habitats as breeding grounds, nursery areas and/or areas of shelter. Any reduction in habitat quality and/or extent as a result of these impacts may thus significantly affect foraging, breeding and overwintering populations of designated bird species within these European sites.

2.35 **The impacts of habitat loss and fragmentation on site integrity of Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands and Puffin Island SPA should be considered further through Appropriate Assessment.**

Coastal Squeeze

European sites for which no significant effects are likely (see Appendix 3):

- Holy Island Coast SAC, SPA
- Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar
- Llyn Dinam SAC
- Anglesey Coast Salt Marsh SAC
- Glantraeth SAC
- Abermenai to Aberffraw Dunes SAC
- Snowdonia SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Great Orme's Head SAC

European sites for which significant effects are likely (see below):

- Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA
- Menai Strait and Conwy Bay SAC
- Liverpool Bay SPA
- Puffin Island SPA
- Lavan Sands, Conwy Bay SPA

2.36 Coastal squeeze impacts are closely related to habitat loss and fragmentation, and relate specifically to situations where the coastal margin is squeezed by the fixed landward boundary. Coastal squeeze typically arises through the development of flood and sea defences and the reinforcement of coastal margins through hard engineering (construction works, drainage, infrastructure provision), thereby preventing and altering the natural transport and movement of coastal material, impacting upon species communities and habitats.

2.37 Of the 17 European sites screened, six were identified as possessing specific vulnerabilities relating to habitats and species: Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA.

Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA

2.38 Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and The Skerries SPA are most likely to be impacted by coastal squeeze, these European sites being located as close as 0.7km from the nominated siteat Wylfa. Alterations to sediment transport and hydrology regimes arising from a new nuclear power station development at Wylfa can significantly impact upon the ecological integrity of the SAC and SPA, given that those designated habitats and species which they support are highly vulnerable to such alterations. Changes to sediment transport regimes as a result of construction works at the coastal fringes could result in increases in coastal erosion and/or deposition at coastal lagoon and stony shingle bank habitats. Such changes have the potential to dramatically alter and destroy these habitats which are dependent upon a delicate balance of hydrographic conditions. Moreover, given the location of Wylfa on the coast, should the construction of sea or flood defences become a requirement during its lifetime, then the degree of alteration to sediment transport and hydrology regimes may be potentially much greater.

Menai Strait and Conwy Bay SAC

Liverpool Bay SPA

Lavan Sands SPA

Puffin Island SPA

2.39 The impacts of coastal squeeze upon Menai Strait and Conwy Bay SAC, arising from the development of the coastal fringe at the nominated site at Wylfa are considered to be much reduced given their distance away from the nominated site (15.6km), relative to impacts arising at Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and The Skerries SPA, located 0.7km west of thenominated site. However any changes to the sediment transport and hydrology regime arising from the construction of coastal and flood defence structures at the nominated site have the potential to impact upon designated habitats further down the coastline within Menai Strait and Conwy Bay SAC. In particular, mudflat, sand flat and shallow inlet and bay habitats within Menai Strait and Conwy Bay SAC are currently considered to be in unfavourable condition and may act as a sink for sediment deposition; additional pressures arising from development of the nominated site at Wylfa could thus result in alterations to the geomorphology of the coastline and associated habitats within Menai Strait and Conwy Bay SAC. Should any degradation in habitat quality and extent occur within this European site, then given its overlapping boundaries with Liverpool Bay SPA, Lavan Sands SPA, and Puffin Island SPA, such impacts may also lead to

significant effects upon designated bird populations within these additional SPA sites which depend upon these areas for foraging, roosting and overwintering.

2.40 **The impacts of coastal squeeze upon the integrity of Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool SPA, Lavan Sands SPA and Puffin Island SPA should be considered further through Appropriate Assessment.**

Disturbance (Noise, Light and Visual)

European sites for which no significant effects are likely (see Appendix 3):

- Cemlyn Bay SAC
- Holy Island Coast SAC, SPA
- Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar
- Llyn Dinam SAC
- Menai Strait and Conwy Bay SAC
- Anglesey Coast Salt Marsh SAC
- Glantraeth SAC
- Abermenai to Aberffraw Dunes SAC
- Snowdonia SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Great Orme's Head SAC

European sites for which significant effects are likely (see below):

- Ynys Feurig, Cemlyn Bay and The Skerries SPA
- Liverpool Bay SPA
- Puffin Island SPA
- Lavan Sands, Conwy Bay SPA

2.41 Disturbance to habitats and species arising from a new nuclear station can arise during the construction phase (and decommissioning phase) from a number of sources, including construction traffic, movement of construction materials, generation of intermittent sounds from machinery, vehicles and plant (for example, alarms/ sirens), the influx of a large workforce, and deployment (and removal) of plant. Disturbance will also be present throughout the operation stage, predominantly arising from the large workforce employed (typically approximately 4000 workers are assumed to be required) and their movement to and from site, but also from the construction and maintenance of permanent and temporary induced and ancillary developments offsite (for example the construction of road/rail access and infrastructure, as well as the construction of additional housing, community and recreation facilities). In particular,

noise and vibration disturbance impacts can be significant and tend to occur on a continuum where the most disturbing activities are those that are irregular, unpredictable loud noise events and movement or vibration of a long duration. Less disturbing are regular, frequent, quiet and predictable patterns of sound or vibration with limited vibration[22].

2.42 Of the 17 European sites screened, four were identified as possessing specific vulnerabilities relating to habitats and species: Ynys Feurig, Cemlyn Bay and The Skerries SPA, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA.

Ynys Feurig, Cemlyn Bay and The Skerries SPA

2.43 The Screening Assessment identified that disturbance arising during the construction and decommissioning phases of the proposed development will likely significantly impact breeding bird species designated within Ynys Feurig, Cemlyn Bay and The Skerries SPA (Arctic, Common, Roseate and Sandwich Terns). Increased disturbance will likely arise from a range of sources (lighting, noise and vibration) both on the development areas proposed for Wylfa (for example, from a power station itself and from associated ancillary and induced infrastructure) and off site (for example, additional transport infrastructure). Disturbance could result in the displacement of birds from their usual commuting routes, foraging and nesting grounds during both acute and chronic disturbance incidents. Displacement from feeding and nesting sites may adversely impact upon species survival and breeding success given the increases in energy expenditure required to forage/nest further afield, whilst also placing additional pressures upon adjacent supporting habitats[23].

Liverpool Bay SPA

Lavan Sands SPA

Puffin Island SPA

2.44 Given the distance of Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA from the nominated site at Wylfa, no direct impacts arising from disturbance upon designated bird species within these European sites are considered likely. However indirect impacts may arise should impacts of disturbance arising from the nominated site and ancillary developments result in the displacement of local bird populations to neighbouring habitats including those occurring within Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA. The influx of additional bird populations to these European sites may result in additional pressures upon breeding and overwintering sites whilst also increasing competition over food resources. Such reductions in habitat and food availability to resident bird species may affect their breeding success and distribution.

22 Scott Wilson (Nov 2008) EcoTowns: Sustainability Appraisal and Habitats Regulations Assessment.
23 Gill, Sutherland & Norris (1998) The consequences of human disturbance for estuarine birds. RSPB Conservation Review 12. 67-72.

2.45 **Given the extended construction phase of the development and identified sensitivities of the designated species to disturbance events, the potential for adverse effects upon the integrity of Ynys Feurig, Cemlyn Bay and The Skerries SPA, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA should be considered further through Appropriate Assessment.**

Air Quality Impacts

European sites for which no significant effects are likely (see Appendix 3):

- Holy Island Coast SAC, SPA
- Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar
- Llyn Dinam SAC
- Menai Strait and Conwy Bay SAC
- Liverpool Bay SPA
- Anglesey Coast Salt Marsh SAC
- Glantraeth SAC
- Abermenai to Aberffraw Dunes SAC
- Puffin Island SPA
- Lavan Sands, Conwy Bay SPA
- Snowdonia SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Great Orme's Head SAC

European sites for which significant effects are likely (see below):

- Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA

2.46 The effects of changing and poor air quality at European sites vary according to the pollutant type, (acid deposition, ammonia, nitrogen oxides, ozone and sulphur dioxide, radioactivity) and the nature of the receiving environment. Key pollutants that are of concern for terrestrial habitats are sulphur dioxide (SO_2), ammonia (NH_3) and nitrogen oxide (NO_x). Deposition of nitrogen can lead to soil enrichment and sulphur dioxide to acidification which may alter species composition with impacts on associated species.

2.47 Background air quality in the UK has improved progressively and is expected to continue to improve significantly over the next 15 years with tightening emissions standards and moves towards 'cleaner' energy generation.

2.48 The Screening Assessment noted the potential for impacts on air quality at a local level arising from the construction, operation and decommissioning phases of a new nuclear power station at Wylfa. The mobilisation of dust particles and increased emissions from associated

traffic (typically nitrogen dioxide, oxides of nitrogen, PM_{10}, carbon monoxide, benzene, and 1.3-butadiene)[24], and use of diesel generators and boilers (combustion gases) during construction, operation and decommissioning of the site can adversely affect sensitive habitats designated within Cemlyn Bay SAC and habitats within Ynys Feurig, Cemlyn Bay and The Skerries SPA which support designated bird species given their proximity to the nominated site. In particular, the generation of dust particles of differing acidities and increased nitrogen and carbon loads from vehicle emissions may be deposited within the coastal lagoon, leading to increases in acidity and nutrient levels which could potentially have major detrimental effects upon the communities and species this habitat supports. Indeed potential increases in nitrogen and carbon emissions are known to arise from vehicles using major roads located within 200m of a receptor site[25].

2.49 The operation of a new nuclear reactor would also result in gaseous radioactive emissions (noble gases, carbon-14, tritium and iodines)[26] emitted to the atmosphere via a stack, though estimates for monthly discharges of gaseous wastes and proposed annual limits with derivation for radioactive gases are undergoing further detailed assessment to support an assessment of the impact of gaseous discharges, an analysis of Best Available Techniques (BAT) and the setting of indicative limits for authorisation[27]. Statutory obligations require that radiation exposures not only comply with dose limits but are As Low As Reasonably Achievable (ALARA). Regulatory sources however indicate aerial emissions to be low and cause little (human) and biodiversity radiation exposure[28]. The assessment also noted the potential for unplanned radioactive releases to the atmosphere, for instance as a result of accidents such as the result of failures of equipment or from hazards such as fire or flooding which could lead to radioactive releases into the air.

2.50 The screening of sites that may be impacted by potential changes to local air quality (Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA) did not identify air quality as a specific vulnerability for the qualifying and interest features of the site. It is assessed that local level impacts (that can be managed and monitored through site level processes) are unlikely to result in significant impacts.

2.51 However, given the role of air quality in maintaining the overall site integrity of European sites, and the development proposed through other plans (for example Local Development Frameworks), it is considered relevant to gather further air quality data to confirm a ‘no

24 BERR (July 2007) Towards a Nuclear National Policy Statement – Applying the proposed Strategic Siting Assessment criteria: a study of the potential environmental and sustainability effects.
25 Department for Transport (2003) Transport Analysis Guidance, the Local Air Quality Sub-Objective TAG Unit 3.3.3.
26 Op. cit. 27
27 Op. cit. 27
28 Environment Agency (2005) Measuring Environmental Performance, Sector Report for the Nuclear Industry.

significant effect' finding and ensure that supporting environmental conditions will not be significantly affected by development at Wylfa.

2.52 **Given the extended construction phase of the development and identified sensitivities of the designated habitats to changes in air quality, the potential for adverse effects upon the integrity of Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA should be considered further through Appropriate Assessment.**

Conclusions and Recommendations

2.53 In line with the screening requirement of the Habitats Directive and Regulations, an assessment was undertaken to determine the likely significant effects of the development at Wylfa on the ten European Sites that lie within 20km of the nominated site or beyond[29] of the nominated site for Wylfa. The screening analysis and conclusions were informed by:

- The information gathered on the European sites – **Appendix 1**;
- The summary analysis of potential environmental impacts generated by the development activities arising from Wylfa;
- Consideration, where necessary, of other plans and projects that have spatial/ contextual relevance – **Appendix 2**;
- The summary analysis of potential environmental impacts generated by the development activities arising from Wylfa - **Appendix 3**; and
- Government guidance[30] which indicates that HRA for plans is typically broader and more strategic than project level HRA and that it be undertaken at a level that is proportionate to the available detail of the plan.

2.54 The Screening Assessment identified a number of key impacts arising from the proposed development and the potential for significant effects at all seventeen of the European sites scoped into the screening process. These findings are summarised in Table 3 below. The potential for 'in-combination' effects with other plans and projects was also identified.

29 An additional eight European sites which fall beyond 20km from the site are considered within this report following consultation with relevant Statutory Consultees given their potential hydrological connections to the nominated site.

30 Planning for the Protection of European Sites: Appropriate Assessment - Guidance For Regional Spatial Strategies and Local Development Documents", http://www.communities.gov.uk/archived/publications/planningandbuilding/planning2

Table 3: Summary of Likely Significant Effect Screening

European sites within and outside of 20km of nominated site at Wylfa	Water Resources and Quality	Habitat Loss and Fragmentation	Coastal Squeeze	Disturbance (Noise, Light, Visual)	Air Quality
Cemlyn Bay SAC	✓	✓	✓	✗	✓
Ynys Feurig, Cemlyn Bay and The Skerries SPA	✓	✓	✓	✓	✓
Holy Island Coast SAC	?	✗	✗	✗	✗
Holy Island Coast SPA	✗	✗	✗	✗	✗
Anglesey Fens SAC	?	✗	✗	✗	✗
Anglesey and Llyn Fens Ramsar	?	✗	✗	✗	✗
Llyn Dinam SAC	?	✗	✗	✗	✗
Menai Strait and Conwy Bay SAC	?	?	?	✗	✗
Liverpool Bay SPA	?	?	?	?	✗
Puffin Island SPA	?	?	?	?	✗
Lavan Sands, Conway Bay SPA	?	?	?	?	✗
Anglesey Coast and Saltmarsh SAC	✗	✗	✗	✗	✗
Glantraeth SAC	✗	✗	✗	✗	✗
Abermenai to Aberffraw Dunes SAC	✗	✗	✗	✗	✗
Snowdonia SAC	✗	✗	✗	✗	✗
Afon Gwyrfai a Llyn Cwellyn SAC	✗	✗	✗	✗	✗
Great Orme's Head SAC	✗	✗	✗	✗	✗

Key		
Likely Significant Effect	✓	**further Appropriate Assessment required**
No Likely Significant Effect	✗	**no further Appropriate Assessment required**
Significant Effect Uncertain	?	**precautionary approach taken and further Appropriate Assessment required**

2.55 It is recommended that the HRA proceeds to the next stage of 'Appropriate Assessment' in relation to the ten European Sites where the potential for likely significant effects (✓) or significant effect

uncertain (**?**) has been identified. This next stage of the HRA process is outlined in the following section 3 of this report.

3 HRA Appropriate Assessment of Wylfa

Scoping and Additional Information Gathering

3.1 To support the Appropriate Assessment (AA) phase, additional information was gathered on European sites and their environmental condition, in line with the specific issues identified by the Screening Assessment (**Appendix 4**). This additional information included air quality data from the UK Air Pollution Information System[31] (APIS) and water quality and abstraction data produced by the Environment Agency (EA).

Assessing the Impacts (in-combination) Appropriate Assessment

3.2 The HRA Screening Assessment considered whether the impacts arising from a new nuclear power station at Wylfa have the potential to significantly affect the integrity of the European sites scoped in to the assessment process. The following sections summarise the analysis undertaken against the conservation objectives of each of the European sites considered to determine whether the effects are likely to have an adverse effect on European site integrity, either alone or in-combination with other plans and projects.

Water Resources and Quality Impacts

Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA

Holy Island Coast SAC

Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar

Llyn Dinam SAC

Menai Strait and Conwy Bay SAC

Liverpool Bay SPA

Lavan Sands SPA

Puffin Island SPA

3.3 Radioactive discharges are subject to targets monitored by the Environment Agency, with nitrate contributions considered to be the most significant of the non-radioactive discharges (research cited by the Environment Agency in the nuclear sector report)[32]. In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges.

3.4 Coastal lagoons and perennial vegetation of stony banks, both habitats designated within Cemlyn Bay SAC, are currently in ‘favourable maintained’ and ‘unfavourable’ condition respectively. Alterations in deposition and erosion processes alongside trampling are thought to be

31 www.apis.ac.uk

32 Environment Agency (2005) Measuring Environmental Performance, Sector Report for the Nuclear Industry

key factors in preventing stony bank habitat from recovering towards a favourable condition. “Key Environmental Conditions (factors maintaining site integrity)” listed for this SAC (Appendix 1, site characterisations) further indicate that alterations to sediment load, nutrient loading and freshwater inflow will likely have adverse impacts upon the ecological integrity of the coastal lagoon, whilst additional barriers which impact upon the natural cyclic processes of deposition and erosion will also likely degrade the vegetation communities of the stony banks. Breeding populations of Arctic, Common, and Sandwich Terns designated within Ynys Feurig, Cemlyn Bay and The Skerries SPA are currently considered to be in a ‘favourable maintained’ condition, whilst breeding populations of Roseate Terns (also designated within this SPA) are in ‘unfavourable, unchanged’ condition. The lack of appropriate nesting sites (Roseate Terns requiring protected and enclosed nesting sites compared with the open nesting site requirements of the other species) are a key factor in preventing breeding populations of this species from moving towards a ‘favourable condition’. Other specific vulnerabilities (Appendix 1, site characterisations) identified for these designated bird species include the availability of appropriate and sufficient food sources and habitat which affect their breeding and winter survival rates.

3.5 Current Environment Agency data[33] states that the ecological status of the coastal waters surrounding Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, and around Wylfa are in ‘good’ status. Cemlyn lagoon itself, although not assessed, is considered to achieve a good or better ecological potential by 2015, due particularly to its hydromorphology. The groundwater quantity status around these European sites and Wylfa (groundwater body Ynys Mon Minor) is considered by the Environment Agency to be of ‘good’ status, with elements contributing to this rating including water balance, saline intrusion and impacts upon wetlands and surface waters. The chemical status of the groundwater body Ynys Mon Minor is currently considered to be ‘poor’, although the Environment Agency anticipates this status to increase to ‘good’ by 2027. Groundwater quantity status is expected to remain ‘good’ by 2015. Rivers feeding into the catchment area covering both the SAC and Wylfa include the River Wygyr, which is considered to be in ‘good’ overall and ecological status, this rating anticipated to remain the same in 2015.

3.6 Given that water abstraction requirements, mechanisms used during abstraction and quality of discharge arising from the development of a new nuclear power station at Wylfa are currently unknown, it is not possible to conclude that no adverse effects upon water quality will

33 Environment Agency Draft River Basin Management Plan: Western Wales River Basin District, 2008: The data used in this assessment is taken from the Draft River Basin Management Plan, which was the most up to date plan available at the time. Draft plans were presented to the Government for approval in September 2009, with final plans published in December 2009.

occur at Cemlyn Bay SAC or at Ynys Feurig, Cemlyn Bay and The Skerries SPA.

3.7 With regards to Menai Strait and Conwy Bay SAC, mud flats, sand flats, reefs and large shallow inlets and bays are all currently in 'unfavourable condition'. The ecological integrity of this SAC is dependent upon the maintenance of hydrology, nutrient levels and sediment transport regimes. With the majority of the habitats designated within this SAC being depositional habitats (sandbanks, mud flats, sand flats and shallow inlets and bays), the communities and rare species they support will likely be particularly sensitive to any increases in nutrient loading arising from the discharge and transfer of synthetic and non-synthetic toxic compounds from Wylfa towards this SAC.

3.8 Current Environment Agency data show the ecological and chemical status of the coastal waters around Menai Strait and Conwy Bay SAC to be 'good'. Conwy Bay itself is considered to be at moderate ecological potential and is expected to remain so by 2015. The ecological status of the Menai Strait is assessed as moderate, and is expected to remain so by 2015. Its chemical status has not been assessed. . Groundwater quantity status around this SAC are assessed by the Environment Agency as being 'good', while the chemical status is assessed as being 'poor' to the north and 'good' to the south. These are expected to remain unchanged by 2015.

3.9 The Environment Agency consider the coastal water body type of the Menai Strait and Conwy Bay SAC located within 20km South East of Wylfa to be moderately exposed and macro tidal, becoming more sheltered further southwards. In the developing Shoreline Management Plan (SMP2), prevailing wind directions are South-Westerly along the West coast of Wales, whilst wave-induced sediment and littoral transport is eastwards along the north Wales Coast[34]. Consequently any increase in sediment and nutrient loading during construction and operation will likely be directed eastwards along the coast towards the Menai Strait and Conwy Bay SAC, leading to potential deposition upon those sensitive habitats designated within this SAC. Given that designated habitats of the SAC are mostly in unfavourable condition, significant impacts may therefore potentially arise as a result of reductions in water quality at Wylfa.

3.10 Water abstraction requirements at Wylfa are not expected to have any significant effects upon sensitive habitats within the Menai Strait and Conwy Bay SAC, as its distance away from the nominated site (more than 15km away) ensures that groundwater and river catchment areas remain distinct between this SAC and Wylfa. However given the potential for 'in-combination' effects to arise as a result of other plans

34 North West England and North Wales Shoreline Management Plan: Appendix C: Baseline Process Understanding http://mycoastline.org/documents/overview1.pdf

and programmes identified the risk of likely adverse effects on Menai Straits and Conwy Bay SAC cannot be ruled out at this stage.

3.11 For Holy Island Coast SAC, located south-west of Wylfa, Environment Agency data show the ecological and chemical status of the coastal waters adjacent to this SAC to be 'good' and anticipate this to be maintained by 2015. The Environment Agency considers the ecological and chemical potential of the heavily modified water body of shallow sea separating Holy Island from the Isle of Anglesey to be of 'moderate' status, though expect this to increase to 'good' ecological potential and 'good' chemical status by 2027 and 2015 respectively. Groundwater quantity and chemical quality around Holy Island Coast SAC are assessed by the EA as being 'good' and 'poor' respectively.

3.12 Given that prevailing wind directions are south-westerly along the west coast of Wales, and that wave-induced sediment and littoral transport is eastwards along the north Wales coast[35], any increases in nutrient loading through discharge of synthetic and non-synthetic toxic compounds will be directed away from Holy Island Coast SAC, and thereby are unlikely to impact upon those sensitive habitats designated within this SAC. Moreover water abstraction requirements at Wylfa will have no adverse effect upon sensitive habitats within this SAC given that groundwater and river catchment areas remain distinct between Holy Island and the Isle of Anglesey, being separated by a narrow estuary.

3.13 Anglesey Fens SAC and Anglesey and Llyn Fens Ramsar lie within 15km south-west of Wylfa. Seven of the eight qualifying features of the SAC and listed under Ramsar Criterion 1 of the Ramsar site are currently considered to be in unfavourable declining condition. The 8th feature, North Atlantic wet heath habitats, whilst also in unfavourable condition, remains unclassified as to whether it is showing any sign of improvement or further decline. Furthermore, "Key Environmental Conditions (factors maintaining site integrity)" (Appendix 1, site characterisations) for these European sites indicate that any alterations to drainage and abstraction regimes will lead to the loss of area through drainage and lowered water tables, whilst also affecting the natural balance between ground and surface water feeding these designated habitats. Any changes to water quality will also detrimentally impact designated habitats and species supported within these European sites by altering the delicate balance of constituent ions and nutrients required for its maintenance.

3.14 Current Environment Agency data state that current water quality status (where assessed) of the rivers within the catchment area of Anglesey Fens SAC and Anglesey and Llyn Fens Ramsar range between 'moderate' to 'good' status with regards to both their chemical and ecological status. The Environment Agency anticipate these water

35 North West England and North Wales Shoreline Management Plan: Appendix C: Baseline Process Understanding http://mycoastline.org/documents/overview1.pdf

bodies to achieve an overall 'good' status by 2015 (River Ceint and Afon Nodwydd) or 2027 (River Lligwy, Afon Goch) respectively. The Environment Agency also state that groundwater quantity and chemical quality around the SAC and Ramsar site are assessed by the EA as being 'good', with elements contributing to this status being water balance and its impact upon wetlands and surface waters. Moreover given that the groundwater body covering the Anglesey Fens (Ynys Mon central Carboniferous Limestone) is distinct from that covering Wylfa (Ynys Mon Minor), increased levels of abstraction at Wylfa are not considered likely to adversely affect the groundwater levels at Anglesey Fens SAC or at Anglesey and Llyn Fens Ramsar.

3.15 Within Llyn Dinam SAC, natural eutrophic lakes (the primary qualifying feature of this SAC) are currently considered to be in unfavourable unclassified condition due to the limited presence of pondweed species indicative of such lake types and the high levels of phosphorous exceeding acceptable levels. This habitat is considered to be in recovery should catchment input levels be maintained. Furthermore, "Key Environmental Conditions (factors maintaining site integrity)" (Appendix 1, site characterisations) for this SAC indicate that any alterations to drainage and abstraction regimes will lead to the loss of area through drainage and lowered water tables affecting inflow and outflow streams. Any increases in nutrient discharge, particularly of phosphorous will also detrimentally impact upon water quality of the designated habitat and species supported.

3.16 Current Environment Agency data state that the current overall and ecological status of Llyn Dinam lake within Llyn Dinam SAC is 'poor'. Elements responsible for this rating include the phytobenthos and the invertebrate communities, these elements expecting to remain 'poor' and increase to 'moderate' status respectively by 2015. The Environment Agency anticipate the overall status and ecological status of Llyn Dinam lake to reach a 'good' status by 2027. Adjacent coastal waters are considered by the Environment Agency to be in good ecological, chemical and overall status, and to remain so by 2015. The Environment Agency also state that groundwater quantity around this SAC are assessed by the Environment Agency as being 'good', with the elements contributing to this status being water balance, impacts upon wetlands and surface waters, and saline intrusion. The chemical status of the groundwater around this SAC however is considered to be 'poor'. Both groundwater quantity status and chemical status are anticipated to increase to a rating of 'good' by 2027.

3.17 Although the groundwater body covering Llyn Dinam SAC is shared with that covering Wylfa (Ynys Mon Minor), its distance away from Wylfa (15km away) and the clear distinction between the river water body catchment areas covering Wylfa and Llyn Dinam SAC (with at least 5 other river water body catchment areas lying between Wylfa and this SAC) suggest that any adverse impacts arising from the development at Wylfa upon water quality will not likely result in adverse impacts upon

the ecological integrity of Llyn Dinam SAC, although to confirm this, a detailed assessment of the groundwater connections between Llyn Dinam SAC and Wylfa should be considered at the detailed project stage.

3.18 Direct impacts upon water resources and quality at Liverpool Bay SPA and Lavan Sands SPA arising from the development at Wylfa are not considered likely given its distance from Wylfa (17km and 31km away respectively). However indirect impacts may arise which may adversely affect the integrity of this European site. The discharge of synthetic and non-synthetic toxic compounds and transfer of additional sediment loading arising from the nominated site to habitats and species within these SPAs may occur given that wave-induced sediment and littoral transport is eastwards along the north Wales Coast[36] and that Liverpool Bay (within which these SPAs occur) is a known net sink for sediment[37].

3.19 Overwintering populations of Red-throated Diver and Common Scoter (designated within Liverpool Bay SPA) and Oystercatcher (designated within Lavan Sands SPA) show preferences for relatively shallow waters and sandy bays where they feed actively over winter, with most individuals thought to roost close to their daytime feeding areas[38]. Food resources such as sand eels, molluscs (including mussels and cockles), crustaceans, invertebrates, sprat and herring are concentrated in these shallower coastal waters and habitats and are the preferred prey items of these bird species. Any alterations to water quality such as through increases in nutrient and sediment loading at these habitats may alter the quality, abundance and distribution of these prey, whilst the deposition and accumulation of toxic, non-synthetic compounds within these mudflat, sand flat, and salt marsh habitats may be transferred to prey and predators through the food chain. In particular, Common Scoter and Oystercatcher favour bivalves such as blue mussels and cockles as part of their diet, with studies showing the abundance and biomass of bivalve prey species to be strong predictors of Common Scoter numbers within Liverpool Bay[39]. However bivalves are known to be particularly efficient bioaccumulators due to their filtering physiology, such that the uptake of toxins and potential transfer to bird species which feed upon them may result in adverse effects upon the integrity of these European sites.

3.20 Breeding populations of Cormorant designated within Puffin Island SPA rarely forage in deeper waters, preferring to forage within shallower

36 North West England and North Wales Shoreline Management Plan: Appendix C: Baseline Process Understanding http://mycoastline.org/documents/overview1.pdf
37 North West and North Wales Coastal Group (2008) Cell 11 Shoreline Management Plan SMP2: North West England and North Wales. Draft Baseline Process Understanding: Report C1 Introduction and Approach. http://mycoastline.org/documents/Intro1.pdf
38 Cork Ecology *2004) Review of divers, grebes and seaduck distribution and abundance in the SEA 5 area. http://www.offshore-sea.org.uk/consultations/SEA_5/SEA5_TR_Seabirds_CorkEcology.pdf
39 Kaiser M.J. (2002) Predicting the displacement of common scoter from benthic feeding areas due to offshore windfarms. http://www.offshorewindfarms.co.uk/Assets/ScoterExecutiveSummary.pdf

waters off the coast[40] where prey items including bottom-dwelling fish, crustaceans and molluscs are abundant. Wave-induced sediment and littoral transport is eastwards along the north Wales coast[41], whilst Liverpool Bay is a known net sink for sediment[42]. Impacts upon designated bird species may therefore arise as a result of alterations to water quality arising from the deposition of sediment-bound toxins at Puffin Island SPA, and the accumulation of such toxins within prey items upon which birds feed. Any uptake of toxins through the food chain to designated bird species may therefore result in adverse effects upon the integrity of this European site.

3.21 As part of the detailed project level assessment, further consideration of mitigation measures should be considered in the context of the developing West of Wales Shoreline Management Plan (SMP2).

Effects in Combination with Other Plans and Projects

3.22 Aspects of the following plans and projects that could lead to 'in combination' effects on European sites with regards to Water Resources and Quality are:

- The Environment Agency's Review of Consents (RoC) is ongoing and due for completion in 2010. This process reviews all permits and consents regarding discharge and abstraction which were granted prior to the enforcement of the Habitats Regulations, and ensures that no adverse effects on the nature conservation interests of designated sites are likely to occur under these permissions. Should levels of abstraction and discharge under existing consents and permits within the vicinity of Wylfa be reduced, impacts upon water quality and resources within European sites around Wylfa may be reduced such that adverse effects upon site integrity become unlikely.
- The implementation of the Dwr Cymru Welsh Water draft Water Resources Management Plan may result in in-combination effects upon Menai Strait and Conwy Bay SAC and Anglesey and Llyn Fens Ramsar in particular, given that the strategies in place under this plan which aim to reduce current deficits (whereby demand is exceeding or forecast to exceed supply) within the North Eryri-Ynys Mon zone (within which Wylfa sits) may impact upon those European sites dependant upon water resources.
- There is the potential for in-combination effects upon water resources and quality to arise from the implementation of the Wales Spatial Plan given that planned housing and employment growth and associated community infrastructure within the

40 Snow D. W. & Perrins C. M. (eds) (1998) The Birds of the Western Palearctic. Concise edition. *Oxford Univ. Press, Oxford.*
41 North West England and North Wales Shoreline Management Plan: Appendix C: Baseline Process Understanding http://mycoastline.org/documents/overview1.pdf
42 North West and North Wales Coastal Group (2008) Cell 11 Shoreline Management Plan SMP2: North West England and North Wales. Draft Baseline Process Understanding: Report C1 Introduction and Approach. http://mycoastline.org/documents/Intro1.pdf

proximity of European sites may result in increased levels of abstraction, discharge, run-off and waste management. Similar in-combination effects may also arise as a result of the implementation of other development plans including The Ynys Môn (Anglesey) Local Plan (1996) and the Gwynedd Structure Plan (1993), or should a revision of the Unitary Development Plan (originally unadopted, 2005) be prepared for future implementation.

- The Welsh Coastal Tourism Strategy Draft Final Strategy Document (2007) may also have in-combination effects with the proposed nuclear development at Wylfa given that increased recreational pressure through water sports and an increased level of waterborne transport and development along the coast has the potential to increase diffuse levels of water pollution. Impacts upon adjacent European sites in addition to those arising from the proposed development itself may therefore be exacerbated.
- Decommissioning of the existing nuclear power station at Wylfa scheduled for 2010[43] may also have in-combination effects with the proposed nuclear development at Wylfa upon water quality and resources within adjacent European sites; particularly should deconstruction of the existing site coincide with the construction phase of a new nuclear power station. However, information on proposals for decommissioning was not available at the time of this assessment. Deconstruction will however likely result in the potential release of large quantities of sediment and discharge to receptor sites, with disturbances to surrounding sediment deposits resulting in the additional release of sediment-bound contaminants previously accumulated. The impacts of discharges into the surrounding water body at Wylfa may therefore be exacerbated, such that adverse effects upon the integrity of adjacent European sites, particularly for Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and the Skerries SPA, Menai Strait and Conwy Bay SAC and Liverpool Bay SPA, may occur.

3.23 Given that no information regarding the quality and levels of discharge from a new nuclear power station development at Wylfa is currently available, and that in-combination effects with other plans and projects are likely, **adverse effects on site integrity are assumed for Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands SPA, Puffin Island SPA and Llyn Dinam SAC in relation to water quality and resources.**

3.24 **Adverse effects upon site integrity are not considered likely for Holy Island Coast SAC, Anglesey Fens SAC, Anglesey and Llyn Fens Ramsar.**

43 http://www.nda.gov.uk/news/wylfa.cfm

3.25 **The potential for mitigation measures to effectively address the adverse effects identified is considered further in the avoidance and mitigation section of this report.**

Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze

Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA

Menai Strait and Conwy Bay SAC

Liverpool Bay SPA

Lavan Sands SPA

Puffin Island SPA

3.26 Direct loss of the coastal lagoon and stony banks of Cemlyn Bay SAC and of sandbanks, mudflats, inlets and bays of Menai Strait and Conwy Bay SAC arising from the development (including ancillary and induced developments) as a result of direct land take, coastal squeeze through the construction of sea defences, and the loss and fragmentation of buffering habitats will have cascading effects down the food chain upon associated species and communities. Sandbanks and mudflat habitats located to the coastal frontage of the nominated site are also important feeding grounds for tern species designated within Ynys Feurig, Cemlyn Bay and The Skerries SPA.

3.27 Indirect loss and degradation of habitats and species will also have adverse effects on site integrity. Increased levels of turbidity arising from discharge and run-off throughout all phases of the development can reduce amount of available photosynthetic light, and together with increased sediment loads can impact upon the development and maintenance of plant communities associated with the intertidal habitats of these European sites. Altered levels of oxygen and changes in water temperature can affect spawning cycles of fish species upon which designated tern species within Ynys Feurig, Cemlyn Bay and The Skerries SPA feed. Moreover evidence shows that a greater number of warmer water species resulting in increased species richness are being captured on intake screens of Hinkley Point 'B' Power station[44], suggesting the potential for the discharge of warmer waters at Wylfa to detrimentally alter species composition of fish with possible impacts upon bird species which feed upon them.

3.28 The construction of a marine off-loading facility, temporary landing stage and associated dredging will also lead to loss of benthic and intertidal habitats and fauna under the footprint of the landing facility, with an associated increase in nutrient loading and remobilisation of sediment affecting the overall nutrient and sediment budgets upon which designated habitats rely. Additional physical barriers created through the presence of a marine off-loading facility, temporary landing stage and cooling water infrastructure at Wylfa can also affect the migratory

44 Hederson, P.A., & Seaby, R.M.H. (2001). Fish and crustacean captures at Hinkey Point B Nuclear Power Station; report for the year April 2000 to March 2001). Pisces Conservation Ltd.

movements, reproductive success and recruitment of bird and fish species.

3.29 In the CCW Core Management Plan for Ynys Feurig, Cemlyn Bay and The Skerries SPA the main pressures and threats identified for these designated bird species relate to reductions in food and nesting habitat resources. Adverse impacts to areas of scrub, coastal lagoons and salt marshes, marshy and coastal grassland, maritime cliff and associated ledges and crevices in particular are likely to impact directly upon the tern species designated within this SPA. Such impacts may likely arise as a result of increased nutrient loading causing eutrophication and alterations in sediment transport and hydrology regimes leading to coastal erosion and disturbance to the freshwater-saline balance. These latter impacts are likely to specifically arise from increasing coastal development including coastal defence works which are likely to be exacerbated by sea level rise. Impacts of nutrient loading and changes to water quality as discussed earlier may also likely detrimentally affect fish populations. There is also evidence to suggest that cetaceans can be significant in driving fish to the surface where they become an available food source to tern species[45]. Any impacts arising from the development at Wylfa may therefore also potentially impact upon cetacean populations (for example through alterations in coastal morphology or the creation of barriers off-shore such as marine landing platforms and temporary landing stages) which may have knock-on effects upon designated bird species within this SPA.

3.30 According to projections by the UK Climate Change Impacts Programme In Wales[46], it is predicted that by 2050 net sea level change after taking into account general subsidence rates around the Welsh coastline, could be between 26.5 to 35.5cm and 71cm. A report by the National Trust[47] in 2007 further states that Cemlyn Lagoon located within Cemlyn Bay SAC, Ynys Feurig and Cemlyn Bay and The Skerries SPA is at risk of disappearing altogether as a result of coastal erosion and flooding exacerbated by rising sea levels leading to coastal squeeze impacts. Although much of the coast proposed for development at Wylfa comprises hard rock cliffs less susceptible to erosion[48], the potential construction of off-site infrastructure (for example if existing road and rail links are not sufficient) in addition to direct land take may result in the loss of buffer habitats adjacent to these European sites as well as coastal squeeze impacts, particularly should the development encroach upon the lower lying areas at Cemlyn Bay. Long term changes in sea-surface temperature arising from climate change

45 Core Management Plan for Cemlyn Bay and The Skerries SPA (CCW 2008) http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/aber-to--brecon-sac-list/bae-cemlyn--cemlyn-bay-sac.aspx
46 Wales: Changing Climate, Challenging choices – a scoping study of climate change impacts in Wales (May 2000) http://www.ukcip.org.uk/images/stories/Pub_pdfs/wales_tech.pdf
47 Shifting Shores. (National Trust 2007) http://www.nationaltrust.org.uk/main/w-global/w-localtoyou/w-wales/w-wales-news/w-wales-news-shifting_shores.htm
48 Wales: Changing Climate, Challenging choices – a scoping study of climate change impacts in Wales (May 2000) http://www.ukcip.org.uk/images/stories/Pub_pdfs/wales_tech.pdf

may also be partly responsible for the consistent and continued decline of fish stocks upon which bird species within the SPA depend, for example species of *Sardinella*, in coastal west Africa and the Gulf of Guinea[49]. As the winter progresses, *Sardinella* become less available to terns in this region and the whereabouts of Roseate Terns and the composition of their diet in the December to May period remain unknown.

3.31 In the Conservation Status Assessments by the JNCC for each of the designated habitats within Cemlyn Bay SAC (H1150 coastal lagoons and H1220 perennial vegetation of stony banks)[50], main pressures and threats identified relate to increased nutrient loading causing eutrophication and alterations in sediment transport and hydrology regimes leading to coastal erosion and disturbance to the freshwater-saline balance. The latter impacts are likely to specifically arise from increasing coastal development including coastal defence works which are likely to be exacerbated by sea level rise.

3.32 In the Conservation Status Assessments compiled by JNCC for each of the designated habitats within Menai Strait and Conwy Bay SAC (H1110 sandbanks, H1140 sand flats and mudflats, H1170 reefs, H1160 shallow inlets and bays, and H8330 sea caves)[51], the main pressures and threats relate to alterations in sediment transport and hydrology regimes arising from development of the coastline and construction of sea defences. Habitats designated within this SAC are habitat complexes comprising an interdependent mosaic of sub tidal and intertidal habitats rich in animal and plant communities. Such habitats and the biotic communities they support depend upon the maintenance of nutrient deposition levels and sediment transport regimes. Greater concentrations of nutrients deposited within these habitats can lead to the creation of abiotic areas or the production of algal mats which can have detrimental impacts upon both the physical structure and the biotic communities they support. Increases in sediment load can also impact upon reef communities by affecting the turbidity of the water resulting in reduced light penetration with direct adverse impacts upon seaweed communities.

3.33 Direct impacts upon habitats and species at Liverpool Bay SPA arising from direct land take are not considered likely given its distance away (the westernmost extent of Liverpool Bay SPA is located greater than 15km from the nominated site). However, indirect impacts may arise which may adversely affect the integrity of this European site. The loss and/or fragmentation of buffering habitats such as those within Menai Strait and Conwy Bay SAC may impact upon the abundance and distribution of overwintering populations of designated bird species. Also,

49 Core Management Plan for Cemlyn Bay and The Skerries SPA (CCW 2008) http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/aber-to--brecon-sac-list/bae-cemlyn--cemlyn-bay-sac.aspx
50 http://www.jncc.gov.uk/pdf/Article17
51 http://www.jncc.gov.uk/pdf/Article17

as discussed previously, the accumulation of synthetic and non-synthetic toxic compounds within habitats upon which designated bird species within Liverpool Bay SPA (Common Scoter and Red-throated Diver) depend for their food supply may also adversely impact these resources. Toxic compounds may be transferred from these habitats to fish, crustaceans, bivalves and invertebrates where they can result in endocrine disruption following synergistic impacts between toxic compounds, leading to altered rates of reproduction and dispersal[52]. Such alterations of food availability will affect the abundance and distribution of designated bird species within this SPA, with studies showing the abundance and biomass of bivalve prey species in particular being strong predictors of Common Scoter numbers within Liverpool Bay[53]. However the extensive area over which Red-throated Diver and Common Scoter occur within Liverpool Bay SPA itself (boundaries of this SPA include all of the coastline between Dulas Bay, east coast of Anglesey, to Fleetwood, north of Blackpool) [54] suggest that adverse impacts upon the integrity of this site are unlikely.

3.34 Direct impacts upon habitats and species at Lavan Sands SPA and Puffin Island SPA arising from direct land take as a result of the development at the nominated site are not likely given its distance away (greater than 30km away). Indirect impacts which may result in adverse effects upon site integrity however may arise. The bioaccumulation of synthetic and non-synthetic toxic compounds within habitats and prey items may be transferred up through the food chain to designated bird species within Lavan Sands SPA (Oystercatcher) and Puffin Island SPA (Cormorant), impacting upon the growth rate, health and size of their populations[55]. However distances over which sediment-bound toxins are transferred are unknown. Moreover the loss and/or fragmentation of buffering habitats such as those within Menai Strait and Conwy Bay SAC may further impact upon the abundance and distribution of designated bird species. Adverse effects on the integrity of these sites must therefore be assumed at this strategic stage.

Effects in Combination with Other Plans and Projects

3.35 Aspects of the following plans and projects that could lead to 'in combination' effects on European sites with regards to Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze are:

- The implementation of the Dwr Cymru Welsh Water draft Water Resources Management Plan may result in in-combination effects upon habitats and species designated within Menai Strait and Conwy Bay SAC in particular, given that the strategies in place

52 Marine Biological Association (2003) The Characterisation of European sites: The Severn Estuary. (possible) Special Area of Conservation and Special Protection Area. Occasional Publication No. 13.
53 Kaiser M.J. (2002) Predicting the displacement of common scoter from benthic feeding areas due to offshore windfarms. http://www.offshorewindfarms.co.uk/Assets/ScoterExecutiveSummary.pdf
54 Webb, A., McSorley, C.A., Dean, B.J., Reid, J.B., (2006), Recommendations for the selection of and boundary options for an SPA in Liverpool Bay, JNCC Report 388 http://www.jncc.gov.uk/pdf/jncc388.pdf
55 Murata M., Iseki N., Masunaga S. & Nakanishi J. (2003) Estimation of effects of dioxins and dioxin-like PCBs on wildlife population: a case study on common cormorant. Chemosphere, 53(4): 337-345

under this plan which aim to reduce current deficits (whereby demand is exceeding or forecast to exceed supply) within the North Eryri- Ynys Mon zone (within which Wylfa sits) may impact upon those European sites dependant upon water resources. Any alterations to water resources and quality at these sites may result in habitat and species loss and fragmentation with adverse effects upon the integrity of these sites.

- In-combination effects upon habitats and species also have the potential to arise from the implementation of the Wales Spatial Plan given that planned housing and employment growth and associated community infrastructure and recreation within the proximity of European sites may result in increased land take and loss of buffer habitats and connectivity. Similar in-combination effects may also arise as a result of the implementation of other development plans including The Ynys Môn (Anglesey) Local Plan (1996) and the Gwynedd Structure Plan (1993), or should a revision of the Unitary Development Plan (originally unadopted, 2005) be prepared for future implementation.
- The Welsh Coastal Tourism Strategy Draft Final Strategy Document (2007) may also have in-combination effects with the proposed nuclear development at Wylfa given that increased levels of tourism, employment and transport infrastructure may result in the direct losses of habitat and associated species, with particular impacts identified for Menai Straits and Conwy Bay SAC. In addition, the Wales Transport Strategy Plan which aims to improve sustainable access to key visitor attractions through the development of better transport links to key visitor attractions may also lead to increased levels of habitat and species loss and fragmentation around or within European sites.
- Decommissioning of the existing nuclear power station at Wylfa scheduled for 2010[56] may also have in-combination effects with the proposed nuclear development at Wylfa upon habitats and species within adjacent European sites; particularly should deconstruction of the existing site coincide with the construction phase of a new nuclear power station. However, information on proposals for the decommissioning was not available at the time of this assessment. Deconstruction may however result in the increase in loss of buffering and connecting habitat, whilst alterations to the extent of sensitive coastal habitats and associated species through additional sediment run-off and discharge loads may exacerbated habitat and species loss, particularly within Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and the Skerries SPA due to their proximity to the existing nuclear power station.
- The Ynsys Enli to Llandudno Shoreline Management Plan which determines coastal defence management and identifies sustainable long-term management policies for the coastline at Wylfa was not available for assessment. However there are likely

56 http://www.nda.gov.uk/news/wylfa.cfm

to be in-combination effects with a new nuclear development at Wylfa with regards to impacts arising from coastal squeeze, should coastal and flood protection measures implemented at the outset as well as during the lifetime of a new nuclear power station at Wylfa result in alterations to the coastline not accounted for within the Shoreline Management plan and Flood Risk Strategies adopted for this area.

3.36 **Adverse effects on site integrity arising from habitat loss and coastal squeeze from a new nuclear power station development at Wylfa and from effects in-combination with other plans and projects are assumed for Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA Menai Strait and Conwy Bay SAC, Lavan Sands SPA and Puffin Island SPA.**

3.37 **The potential for mitigation measures to effectively address the potential likely significant effects identified is considered further in the avoidance and mitigation section of this report.**

Disturbance (Noise, Light and Visual)

Ynys Feurig, Cemlyn Bay and The Skerries SPA

Liverpool Bay SPA

Lavan Sands SPA

Puffin Island SPA

3.38 Information provided by the CCW Core Management Plan for Ynys Feurig, Cemlyn Bay and The Skerries SPA[57] state that nesting tern species are particularly vulnerable to human disturbance. Levels of human and noise disturbance during all stages of the development will therefore significantly impact upon nesting tern species. It was also noted in the Screening Assessment that disturbance arising from the construction and decommissioning phases also has the potential to alter foraging, roosting and breeding patterns such that designated bird species can be displaced leading to reduced feeding capacity, thereby indirectly impacting upon breeding and survival rates.

3.39 Disturbance during the construction and deconstruction stages of the development at Wylfa may also impact upon fish and cetacean species, particularly if construction works take place off-shore. This may result in a depletion of food resources and foraging opportunities and thereby resulting in indirect adverse impacts upon breeding tern populations designated within Ynys Feurig, Cemlyn Bay and The Skerries SPA.

3.40 Studies suggest that over-wintering populations of Common Scoter within Liverpool Bay SPA are sensitive to disturbance impacts arising from moving vessels within 1 - 2km of the flock, with smaller flocks

57 Core Management Plan for Cemlyn Bay and The Skerries SPA (CCW 2008) http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/aber-to--brecon-sac-list/bae-cemlyn--cemlyn-bay-sac.aspx

being less sensitive to disturbance[58]. The westernmost extent of Liverpool Bay SPA is located greater than 15km from Wylfa, however the area of Liverpool Bay SPA is extensive, covering all of the coastline between Dulas Bay, east coast of Anglesey, to Fleetwood, north of Blackpool, therefore as a precautionary approach, the 'in-combination' effects of noise, light and visual disturbance impacts arising from the development at Wylfa, including the potential for increased shipping movements, should be considered at the detailed project stage, to ensure no adverse effects upon the integrity of this European site.

3.41 Similarly, with both Lavan Sands SPA and Puffin Island SPA located more than 30km from the nominated site, impacts of disturbance arising from the development of the nuclear power station, including any increase in shipping movements, upon designated bird species within these European sites are considered likely to result in adverse impacts upon their integrity.

Effects in Combination with Other Plans and Projects

3.42 Aspects of the following plans and projects that could lead to 'in combination' effects on European sites with regards to Disturbance (Noise, Light and Visual) are:

- There is the potential for in-combination effects with regards to levels of disturbance as a result of the Wales Spatial Plan, given that planned housing and associated community infrastructure, employment growth and increased transport movements detailed within the Wales Spatial Plan may result in increased levels of recreation and disturbance at and around European sites. Similar in-combination effects may also arise as a result of the implementation of other development plans including The Ynys Môn (Anglesey) Local Plan (1996) and the Gwynedd Structure Plan (1993), or should a revision of the Unitary Development Plan (originally unadopted, 2005) be prepared for future implementation.
- Also, the implementation of the Wales Transport Strategy Plan may increase potential disturbance impacts upon European sites given that policies include the provision of improved transport links to key visitor attractions which will likely result in increased levels of recreation and disturbance to adjacent European sites.
- The Welsh Coastal Tourism Strategy Draft Final Strategy Document (2007) may also have in-combination effects with the proposed nuclear development at Wylfa given that increased recreational pressure through water sports and an increased level of waterborne transport and development along the coast has the potential to increase levels of disturbance. Impacts upon adjacent European sites in addition to those arising from the proposed development itself may therefore be exacerbated.

58 Kaiser M.J. (2002) Predicting the displacement of common scoter from benthic feeding areas due to offshore windfarms. http://www.offshorewindfarms.co.uk/Assets/ScoterExecutiveSummary.pdf

- Decommissioning of the existing nuclear power station at Wylfa scheduled for 2010[59] may also have in-combination effects with the proposed new nuclear development upon levels of disturbance within adjacent European sites; particularly should deconstruction of the existing site coincide with the construction phase of a new nuclear power station. However information on proposals for decommissioning was not available at the time of this assessment. Deconstruction will however likely result in the output of high levels of noise, vibration, visual and light disturbance, with such impacts potentially impacting upon Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and the Skerries SPA in particular, given their vicinity to both nuclear power stations.

3.43 **Adverse effects on site integrity arising from disturbance levels (noise/vibration/ light/ visual) and from effects of a new nuclear power station at the nominated site at Wylfa, in-combination with other plans and projects, must be considered likely at this strategic stage for the Ynys Feurig, Cemlyn Bay and The Skerries SPA, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA.**

3.44 **The potential for mitigation measures to effectively address the significant effects identified is considered further in the avoidance and mitigation section of this report.**

Air Quality Impacts

3.45 Information provided by the Welsh Air Quality Forum[60] indicates that air quality for the Isle of Anglesey is generally good with low levels of ozone, nitrogen dioxide and PM_{10} levels (fine particulate matter) relative to the rest of Wales.

3.46 Information provided by the UK Air Pollution Information System (APIS)[61] indicate that the habitats designated within Cemlyn Bay SAC (coastal lagoons and perennial vegetation of stony banks) which also support designated bird species (Common, Arctic, Roseate and Sandwich Terns) within Cemlyn Bay and The Skerries SPA are highly sensitive to nitrogen loads, such that any increase in NOx levels within the atmosphere may lead to increased atmospheric deposition and nutrient loading within these habitats.

3.47 Furthermore the EA assesses that non-radioactive aerial emissions (sulphur dioxide, nitrogen oxides and volatile organic compounds) from nuclear power stations are extremely low compared with other regulated industries and the Agency does not consider them to be an environmental priority. The Agency's most recent available assessment

59 http://www.nda.gov.uk/news/wylfa.cfm
60 Air Quality in Wales: Website of the Welsh Air Quality Forum http://www.welshairquality.co.uk/trend.php?t=4
61 http://www.apis.ac.uk/

of radioactive aerial emissions indicates that all fall within authorised limits.[62]

3.48 Air quality issues around Wylfa are anticipated to arise during the construction and decommissioning phases of the development, although the full extent of this impact remains unknown. Air pollution is also an identified vulnerability for designated habitats within Cemlyn Bay SAC and for habitats which support designated bird species within Ynys Feurig, Cemlyn Bay and The Skerries SPA.

Effects in Combination with Other Plans and Projects

3.49 Aspects of the following plans and projects that could lead to 'in combination' effects on European sites with regards to Air Quality are:

- The Wales Spatial Plan has the potential to lead to in-combination effects with regard to air quality, given that planned housing and associated community infrastructure, employment growth and increased transport movements detailed within the Wales Spatial Plan may result in increased levels of air pollution at and around European sites. Similar in-combination effects may also arise as a result of the implementation of other development plans including The Ynys Môn (Anglesey) Local Plan (1996) and the Gwynedd Structure Plan (1993), or should a revision of the Unitary Development Plan (originally unadopted, 2005) be prepared for future implementation.
- The implementation of the Wales Transport Strategy Plan however may reduce potential disturbance impacts upon European sites given that policies include the provision of sustainable access routes and improved transport links to key visitor attractions which aim to reduce levels of pollution and other harmful emissions.
- The Welsh Coastal Tourism Strategy Draft Final Strategy Document (2007) may also have in-combination effects with a new nuclear development at Wylfa given that increased recreational pressure through water sports and an increased level of waterborne transport and development along the coast has the potential to reduce air quality within these areas. Impacts upon adjacent European sites in addition to those arising from a new nuclear power station development itself may therefore be exacerbated.
- Decommissioning of the existing nuclear power station at Wylfa scheduled for 2010[63] may also have in-combination effects with a new nuclear development at Wylfa with regards to air quality and impacts upon adjacent European sites, particularly should deconstruction of the existing site coincide with the construction phase of a new nuclear power station. However information on proposals for decommissioning was not available at the time of this

62 Measuring Environmental Performance: Sector Report for the Nuclear Industry (Environment Agency, Nov 2005).
63 http://www.nda.gov.uk/news/wylfa.cfm

assessment. Deconstruction will however likely result in the output of high levels of noise, vibration, visual and light disturbance, with such impacts potentially impacting upon Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and the Skerries SPA in particular, given their vicinity to the existing nuclear power station and the nominated site.

3.50 **Given that the nominated site at Wylfa lies within 0.7km of Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and The Skerries SPA, and that the full extent of air pollution impacts arising from a new nuclear power station are currently unknown, a precautionary approach requires that adverse impacts upon site integrity be assumed for these European sites until further information of the development (including details on technology and specific mitigation measures implemented) is obtained.**

3.51 **The potential for mitigation measures to effectively address the significant effects identified is considered further in the avoidance and mitigation section of this report.**

Avoidance and Mitigation Measures

3.52 Avoidance and mitigation measures can apply both at a strategic policy level in the form of policy amendments/caveats, and in more detail at project level, where they are specific measures applicable to the identified issues at individual sites. This HRA is being undertaken at a strategic level where there are development uncertainties. Uncertainties remaining at this stage include: the location of the finalised boundaries of the development site, the location and extent of the marine off-loading facility and cooling towers (if required), the type of reactor to be built and levels of discharges and emissions to be authorised, the extent and location of induced and ancillary developments required (such as transport infrastructure and additional housing and community facilities), and the location of additional sea defences to be constructed along the coastal frontage of the site[64].

3.53 At this strategic stage, the HRA for Wylfa can make avoidance and mitigation recommendations in relation to Wylfa to inform the strategic siting assessment process, and therefore the overall development of the NPS. These recommendations may also subsequently provide guidance to the IPC and potential future developers to ensure that any future development at Wylfa takes into account the findings of this strategic level assessment in a more detailed project-level HRA.

3.54 The HRA recommendations for avoidance and mitigation measures in relation to Wylfa are outlined below and summarised in Table 3. The main HRA report also summaries the measures identified in this report alongside those proposed by other individual site HRAs.

64 The key principles and any assumptions made in this plan level HRA of the revised draft Nuclear NPS and nominated sites are outlined in Part II of the HRA Report.

3.55 This HRA is part of an ongoing assessment process that will continue with a detailed, project level HRA to be undertaken at development consent stage and informed by detailed information regarding the development plans at Wylfa including consideration of the impact on local defined habitats not covered by the HRA plan process,. Should project-specific findings during the undertaking of the project level HRA result in additional impacts arising which cannot be mitigated by the avoidance and mitigation measures recommended here, then changes to the development design may be required to ensure adverse effects on the integrity of the European Sites considered are adequately avoided. This could include changes to the scale and layout of the development, the technology applied, and/or alterations to the site boundary and location at Wylfa. Such changes required at the project level should be sufficiently flexible to ensure that all identified impacts are addressed.

Water Resources and Quality

3.56 Avoiding adverse effects upon surface, ground and estuarine waters is the responsibility of the developer, but is subject to a stringent management and regulatory frameworks by the Water Companies (resource planning) and the Environment Agency (abstraction licensing and discharge consents, to be reviewed under the Review of Consents process to be completed by 2010).

3.57 Thermal, radioactive and non-radioactive discharges should go beyond complying with existing standards, with radioactive discharges required to be As Low As Reasonably Achievable (ALARA)[65] and that all other discharge levels are required to be an improvement on existing standards. All discharges which lead to adverse effects on the integrity of European sites should not be permitted.

3.58 The use of cooling towers instead of direct intake methods used in cooling water intake should be considered if environmental impacts arising from the use of cooling towers (whereby additional land take is necessary and visual impacts are likely) can be more effectively avoided or mitigated than for those impacts arising from the use of direct intake methods (where there are much greater abstraction requirements, a need for large culverts which extend a long way out into the water source, and result in higher thermal discharges). Should this not be the case, cooling water culverts should be designed to avoid effects on the existing thermal regime at Wylfa. Furthermore the volume of cooling water returned to the estuary should be required to be within the capacity of the immediate receiving environment such that sediment flow is not adversely affected.

65 ALARA is not a dose limit; it is a practice that has as its objective the attainment of dose levels as far below applicable limits as possible.

3.59 It should also be noted that, in addition to the thermal effects resulting from direct cooling, there are potential water quality issues, in particular nutrient enrichment from anti-fouling agents, which may be associated with the treatment of this cooling water. This should be considered within any detailed project level assessment.

3.60 The IPC, as guided by the NPS, can also direct requirements for the efficiency of water use and the protection of water quality. This may include requiring that management measures relating to supply and discharge (including potential effects on European sites), are in place prior site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments.

3.61 Adverse effects upon water quality and resources will effectively be mitigated for through the implementation of suitable design (including use of Sustainable Urban Drainage Systems (SuDS)) and through the required selection of appropriate construction measures. Impacts upon groundwater flow should also be avoided or mitigated by requiring that suitable design in abstraction mechanisms is employed.

Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze

3.62 Direct loss and fragmentation of habitat (and species) arising from land take from the development of a new nuclear power station together with induced and ancillary infrastructure can be mitigated against by the implementation of a number of requirements, which include:

- a requirement for the site layout/ design to avoid areas of known importance or sensitivities and to protect existing habitats which are to be retained;
- a requirement for habitat connectivity of wildlife corridors around the nominated site and around induced/ ancillary developments to be maintained and enhanced to reduce the extent of indirect impacts arising from direct land take at these developments;
- a requirement for the avoidance of adverse environmental impacts arising from general construction/ operation/ deconstruction activities through the safe operation and decommissioning of the development and of interim waste storage management;
- a requirement for adequate ecological mitigation and construction environmental management plans to be produced for the nominated site to minimise further direct and indirect impacts upon habitats and species (such as disturbance, pollution, run-off and drainage etc.), and for such plans to link to existing integrated land and coastal management plans. The interest features and conservation objectives of the European sites should guide the identification of potential mitigation and compensation measures.
- In addition, the reinstatement of a non-working railtrack connecting to the existing power station could reduce the need for additional

infrastructure during construction, operation and decommissioning, whilst a new 3rd crossing over the Menai Strait could further reduce pressures on the existing transport infrastructure.

3.63 Avoidance and/or mitigation against any additional losses and fragmentation of habitats and species resulting from the movement of coastal habitat due to changes to the geomorphological processes at the coastal frontage of the site and beyond (as a result of maintenance of/ improvements to existing coastal defences and the construction of additional defences and a marine off-loading facility), is required. Mitigation measures would include:

- a requirement for the layout/ design of additional sea defence measures and marine off-shore landing facilities to avoid areas of known importance or sensitivities and to protect existing habitats which are to be retained;
- a requirement for ecological mitigation and construction environmental management plans to ensure the protection of the coastal fringe and for such plans to link to existing integrated coastal management plans;
- a requirement for the consultation of strategic coastal management documents such as the CHaMP, Shoreline Management Plan (and the developing SMP2) and Flood Risk Strategy when determining the location and type of coastal defence required and where such efforts should be concentrated; and
- a requirement for other soft engineering techniques such as managed retreat and foreshore recharge to be considered as possible flood defence techniques.

3.64 In addition, the construction and generation of physical, chemical and thermal barriers to the migration, commuting and dispersal of fish and bird species and of Otters will require adequate mitigation to ensure no adverse impacts upon the integrity of European sites. Effective mitigation will require the following to ensure no adverse effects on site integrity is likely:

- a requirement for works areas to be screened appropriately with height restrictions implemented where necessary to limit disturbance impacts upon migratory paths;
- a requirement for the minimisation of the extent of cooling water culverts and that modern tunnelling and discharge techniques are applied to reduce the impact of thermal plumes;
- a requirement for the height of cooling towers (if required) to be kept to a minimum height considered practicable; and
- a requirement for the incorporation of fish protection measures within the cooling water intake/system design.

Disturbance (Noise, Light, Visual)

3.65 The implementation of avoidance and mitigation measures aimed to reduce noise, vibration, light and visual disturbance arising from the development of the site and associated induced and ancillary infrastructure during construction, operation and decommissioning is required to ensure no adverse impacts upon the integrity of European sites will occur. Mitigation measures would include:

- the requirement for technologies and operating practices which take account identified sensitivities in fish and cetacean (particularly in relation to vibration impacts and low frequency noise) and bird populations (particularly in regard to the regularity of disturbance) in the estuarine environment to be implemented where practicable;
- the requirement to restrict encroachment of construction areas into sensitive habitats (particularly coastal) through site design; the requirement to implement appropriate screening of disturbance impacts arising during construction (and deconstruction) works;
- the requirement for the phasing and timing of development works which take into account breeding and feeding cycles and habitats, and the flight lines and migration routes of sensitive species including birds, fish and cetaceans; and
- the requirement for construction environmental management plans to be implemented at the site level which require the management of disturbance impacts through appropriate avoidance or mitigation to ensure no adverse impacts upon site integrity will arise. There is also a role for the IPC to ensure that developments at Wylfa incorporate technologies and operating practices which take into account identified sensitivities of species in the coastal environment around the proposed development at Wylfa.

3.66 The precise detail and the nature of the mitigation measures required would need to be agreed with relevant Statutory Bodies prior to any commencement of the development. Such mitigation measures would form part of a wider site management plan to ensure their implementation prior to the commencement of any development works.

Air Quality

3.67 Whilst air quality impacts are not assessed as being a significant vulnerability at Cemlyn Bay SAC and Ynys Feurig, Cemlyn Bay and The Skerries SPA it is appropriate that potential air quality impacts arising from development are addressed as part of the development plan process. Requirements should include the following:

- a requirement that sustainable transport plans are available which include the requirement for the use of non-road transport where possible;
- a requirement for the phasing of the development to minimise emissions and dust generation;

- a requirement for the use of carbon-efficient forms of transport and construction during the power station lifecycle;
- a requirement for emissions to be offset where appropriate;
- a requirement for appropriate air quality management plans to be implemented, with recommendations for mitigation and avoidance to take into account the potential for cumulative impacts where phasing between the existing power station and a new nuclear power station overlap such that no adverse impacts upon site integrity will occur.
- In addition, the reinstatement of a non-working railtrack connecting to the existing power station could reduce the need for additional infrastructure during construction, operation and decommissioning, whilst a proposed 3rd crossing over the Menai strait could further reduce pressures on the existing transport infrastructure.

3.68 The assessment has noted that radioactive emissions from the current nuclear power station around Wylfa are low and are strictly controlled through regulation and the risk assessments undertaken for the consenting process. However additional measures are required to ensure no adverse impacts upon site integrity will occur. These measures include:

- a requirement for management measures/ plans relating to emissions to be in place prior to site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments;
- a requirement for all recommendations for mitigation and avoidance within management plans to take into account the potential for cumulative impacts where phasing between the existing power station and a new nuclear power station overlaps;
- a requirement to seek opportunities to offset emissions where appropriate;
- a requirement for radioactive emissions to be ALARA with non-radioactive emissions expected to be an improvement upon existing standards; and
- the requirement that any emissions which lead to adverse effects on the integrity of European sites will not be permitted by the relevant regulatory authority.

Table 4: Summary of Avoidance and Mitigation Recommendations

Potential Effects	Suggested Avoidance and Mitigation Measures – Recommendations for the IPC
Water Resources and Quality	
• Impacts on water quality	• Direct requirements for the protection of water quality. Management measures relating to supply and discharge should be in place prior to site development, with decisions made taking into account BAT which ensure protection of the sensitivities of

Potential Effects	Suggested Avoidance and Mitigation Measures – Recommendations for the IPC
	the receiving environments. • Thermal, radioactive and non-radioactive discharges should go beyond complying with existing standards, with radioactive discharges required to be ALARA and all other discharge levels required to be an improvement on existing standards. • Discharges (thermal or otherwise) which lead to adverse effects on the integrity of European sites should not be permitted. • Cooling water towers should be used where additional land take required by its construction will not result in adverse impacts to site integrity. Should this not be possible, cooling water culverts should be designed to avoid effects on the existing thermal regime at Wylfa.
• Impacts on water quantity	• Direct requirements for the efficiency of water use. • Ensure that the volume of cooling water returned to the estuary is within the capacity of the immediate receiving environment and does not adversely affect sediment flow. • Direct the selection of appropriate construction methods which minimise impacts of the development upon water resources.
• Impacts on surface and groundwater flow	• Require suitable design to be implemented including the use of Sustainable Drainage Systems (SuDS). • Require suitable design within abstraction mechanisms to ensure potential impacts upon groundwater flow are avoided.
Habitat Loss and Fragmentation/ Coastal Squeeze	
• Direct loss of habitat	• Require site layout/ design to avoid areas of known importance or sensitivities and to protect existing habitats which are to be retained. • Require habitat connectivity of wildlife corridors around the nominated site to be maintained and enhanced to ensure reduce the extent of indirect impacts arising from direct land take. • Avoidance of adverse environmental impacts through the safe operation and decommissioning of the development and of interim waste storage management should

Potential Effects	Suggested Avoidance and Mitigation Measures – Recommendations for the IPC
	be sought. • Require ecological mitigation and construction environmental management plans to be prepared for the site, and for such plans to link to existing integrated land and coastal management plans.
• Loss of surrounding habitat due to construction of associated infrastructure	• Require layout/ design of induced and ancillary developments to avoid areas of known importance or sensitivities and to protect existing habitats which are to be retained. • Require habitat connectivity of wildlife corridors to be maintained and enhanced within areas of ancillary and induced developments to reduce the extent of impacts arising from these developments. • Require ecological mitigation and management plans to be produced for the site, and for such plans to link to existing integrated land and coastal management plans. • The reinstatement of a non-working railtrack connecting to the existing power station could reduce the need for additional infrastructure during construction, operation and decommissioning. A new 3rd crossing over the Menai Strait could also reduce pressures on the existing transport infrastructure.
• Barriers to the migration, commuting and dispersal of fish and bird species	• Require the screening of works areas, including the implementation of height restrictions where necessary to limit disturbance impacts upon migratory paths. • Ensure that the extent of cooling water culverts (if required) are minimised and that modern tunnelling and discharge techniques are applied to reduce the impact of thermal plumes. • Restrict the height of cooling towers (if required) to minimum required heights considered practicable. • Require the incorporation of fish protection measures within the cooling water intake/system design.

Potential Effects	Suggested Avoidance and Mitigation Measures – Recommendations for the IPC
• Movement of habitat arising from changes to geomorphological processes caused by the construction of additional coastal defences and marine off-shore landing facilities	• Require layout/ design of additional sea defence measures and marine off-shore landing facilities to avoid areas of known importance or sensitivities and to protect existing habitats which are to be retained during their construction. • Require ecological mitigation and management plans to ensure protection of the coastal fringe, and for such plans to link to existing integrated coastal management plans. Strategic coastal management documents such as the CHaMP, Shoreline Management Plan (and the developing SMP2) and Flood Risk Strategy should be consulted when determining the location and type of coastal defence that is to be constructed, and in determining where efforts should be concentrated in the maintenance and improvements to existing structures. • Other soft engineering techniques such as managed retreat and foreshore recharge should be considered as possible flood defence techniques.
Disturbance (Noise/Vibration, Light, Visual)	
• Increased noise/vibration, light and visual disturbance arising from development of the site and of associated induced and ancillary infrastructure through construction, operation and decommissioning	• Direct requirements for technologies and operating practices which take account of identified sensitivities in fish, cetacean and bird populations in the estuarine environment. • Restrict encroachment of construction areas into sensitive habitats through site design. • Require the visual/noise screening of construction (and deconstruction) works. • Require the phasing and timing of development works which take into account breeding and feeding cycles and habitats, and flight lines and migration routes of sensitive species including birds, fish and cetaceans. • Require construction environmental management plans to be implemented at the site level which aim to avoid or mitigate against impacts of disturbance to ensure no adverse impacts upon site integrity.
Air Quality	

Potential Effects	Suggested Avoidance and Mitigation Measures – Recommendations for the IPC
• Increased development/traffic growth and increased release of dust and particulates arising from construction, operation and decommissioning	• Require sustainable transport plans which include the use of non-road transport where possible. • Require that the development is phased to minimise emissions and dust generation. • Promote the use of carbon-efficient forms of transport and construction during the power station lifecycle. • Ensure that appropriate air quality management plans are in place, with recommendations for mitigation and avoidance taking into account the potential for cumulative impacts where phasing between the existing power station and a new nuclear power station overlap such that no adverse impacts upon site integrity will occur. • The reinstatement of a non-working railtrack connecting to the existing power station could reduce the need for additional infrastructure during construction, operation and decommissioning. A proposed 3rd crossing over the Menai strait could also reduce pressures on the existing transport infrastructure.
• Planned and accidental emissions	• Direct requirements for the protection of air quality. Management measures/ plans relating to emissions should be in place prior to site development, with decisions made taking into account BAT which ensure protection of the sensitivities of the receiving environments. Recommendations for mitigation and avoidance within management plans should take into account the potential for cumulative impacts where phasing between the existing power station and a new nuclear power station overlaps. • Support opportunities to offsett emissions where appropriate. • Radioactive emissions should be ALARA with non-radioactive emissions required to be an improvement upon existing standards. • Emissions which lead to adverse effects on the integrity of European sites should not be permitted.

Summary of HRA Findings and Recommendations

3.69 The HRA Screening Assessment identified the likely significant effects on four European sites as a result of impacts that may arise from the development of a new nuclear power station at the nominated site. These effects were assessed further through the AA stage of the HRA which considered: European site data, available environmental condition data, and the potential effects of other plans 'in-combination', in coming to a conclusion on the likelihood that the development of a new nuclear power station at the nominated site will have adverse effects on European site integrity.

3.70 Based on HRA experience, professional judgement, and the consultation advice received from the Statutory Consultees, it is reasonable to conclude that the suggested measures may be sufficient to avoid and/ or mitigate the adverse effects on the integrity of European Sites identified. However, the effectiveness of the measures proposed can only be ascertained with certainty through HRA at a project level, where the specific details of developments and primary data sources will be available.

3.71 The conclusions of the HRA are limited by the strategic nature of the assessment process and the information available, which does not allow for a definitive prediction of effects on the European sites considered. A precautionary approach suggests that AA at this strategic level cannot rule out the potential for adverse effects on site integrity at six European sites, Cemlyn Bay SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool Bay SPA, Lavan Sands SPA and Puffin Island SPA through impacts on water resources and quality, habitat (and species) loss and fragmentation/ coastal squeeze, disturbance (noise, light and visual), and air quality.

3.72 Table 5 below illustrates those sites where adverse effects arising from the development cannot be ruled out.

Table 5: Summary of Appropriate Assessment

Potential Effects Arising from Development	European sites at which adverse effects cannot be ruled out
Water resources and quality	• Cemlyn Bay SAC • Ynys Feurig, Cemlyn Bay and The Skerries SPA • Menai Strait and Conwy Bay SAC • Liverpool Bay SPA • Lavan Sands SPA Puffin Island SPA
Habitat (and Species) loss and fragmentation/ coastal squeeze	• Cemlyn Bay SAC • Ynys Feurig, Cemlyn Bay and The Skerries SPA • Menai Strait and Conwy Bay SAC • Lavan Sands SPA Puffin Island SPA
Disturbance (noise, light, visual)	• Ynys Feurig, Cemlyn Bay and The Skerries SPA
Air quality	• Cemlyn Bay SAC • Ynys Feurig, Cemlyn Bay and The Skerries SPA

3.73 To address the uncertainties inherent in a strategic level HRA, the AA has proposed a suite of avoidance and mitigation measures to be considered as part of any project level HRA (Table 4). At this stage, it is assessed that the effective implementation of these strategic mitigation measures may help to address the identified adverse effects on European Site integrity, but that more detailed project level HRA is required in order to draw conclusions on their efficacy.

3.74 **Further assessment supported by detailed data at the project level will be required before it can be concluded whether nuclear power development at this nominated site can be undertaken without adversely impacting upon the integrity of the European sites at Wylfa.**

3.75 **Only at the project level HRA can a conclusion of no adverse effect on site integrity be made with any confidence.**

Glossary

AA	Appropriate Assessment
AoS	Appraisal of Sustainability
APIS	UK Air Pollution Information System
DECC	Department for Energy and Climate Change
CAMS	Catchment Abstraction Management Strategy
CCW	Countryside Council for Wales
CHaMPs	Coastal Habitat Management Plans
cSAC	Candidate Special Area of Conservation
EA	Environment Agency
EIA	Environmental Impact Assessment
HRA	Habitats Regulations Assessment
ICZM	Integrated Coastal Zone Management
IPC	Infrastructure Planning Commission
JNCC	Joint Nature Conservation Committee
LA	Local Authority
LDF	Local Development Framework
LSE	Likely Significant Effect
LTP	Local Transport Plan
NE	Natural England
NH_3	Ammonia
N2K	Natura 2000 sites
NO_x	Nitrogen Oxide
NNR	National Nature Reserve
NPS	National Policy Statement
PP	Plans and Projects
Ramsar	Wetland Sites designated by the Ramsar Convention
RSPB	Royal Society for the Protection of Birds
RoC	Review of Consents
SAC	Special Area of Conservation
SMP	Shoreline Management Plan
SPA	Special Protection Area
SSA	Strategic Siting Assessment
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
WRMU	Water Resource Management Unit
WSPU	Welsh Spatial Plan Update

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