

# Habitats Regulations Assessment: Site Report for Oldbury

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



## **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](http://www.energynpsconsultation.decc.gov.uk)

This document is the Habitats Regulations Assessment Site Report for Oldbury

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 HRA of the proposals for Oldbury. This site was nominated into the Strategic Sitings 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<sup>1</sup> 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, 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 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, and the framework by which development consent decisions on these sites should be made by the Infrastructure Planning Commission.

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<sup>1</sup> 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<sup>2</sup> protects habitats and species of European nature conservation importance. Together with the Birds Directive<sup>3</sup>, 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 Sites of Community Importance (SCIs) are designated and defined 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<sup>4</sup>. These sites combine to create a Europe-wide 'Natura 2000' network of European Sites, which are hereafter referred to as 'European Sites'<sup>5</sup> in this and other HRA reports<sup>6</sup>.
- 1.6 HRA tests whether the impacts identified as arising from a proposal, plan or project are likely to have a significant and adverse 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<sup>7</sup> (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 Nuclear NPS and nominated sites are outlined in Part II of the HRA Report. This report covers the HRA Screening and Appropriate Assessment (AA) stages of the HRA for the nominated site at Oldbury, as outlined in Table 1. It takes into account the information contained within the site nomination submitted to Government by the nominator

2 Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>

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.

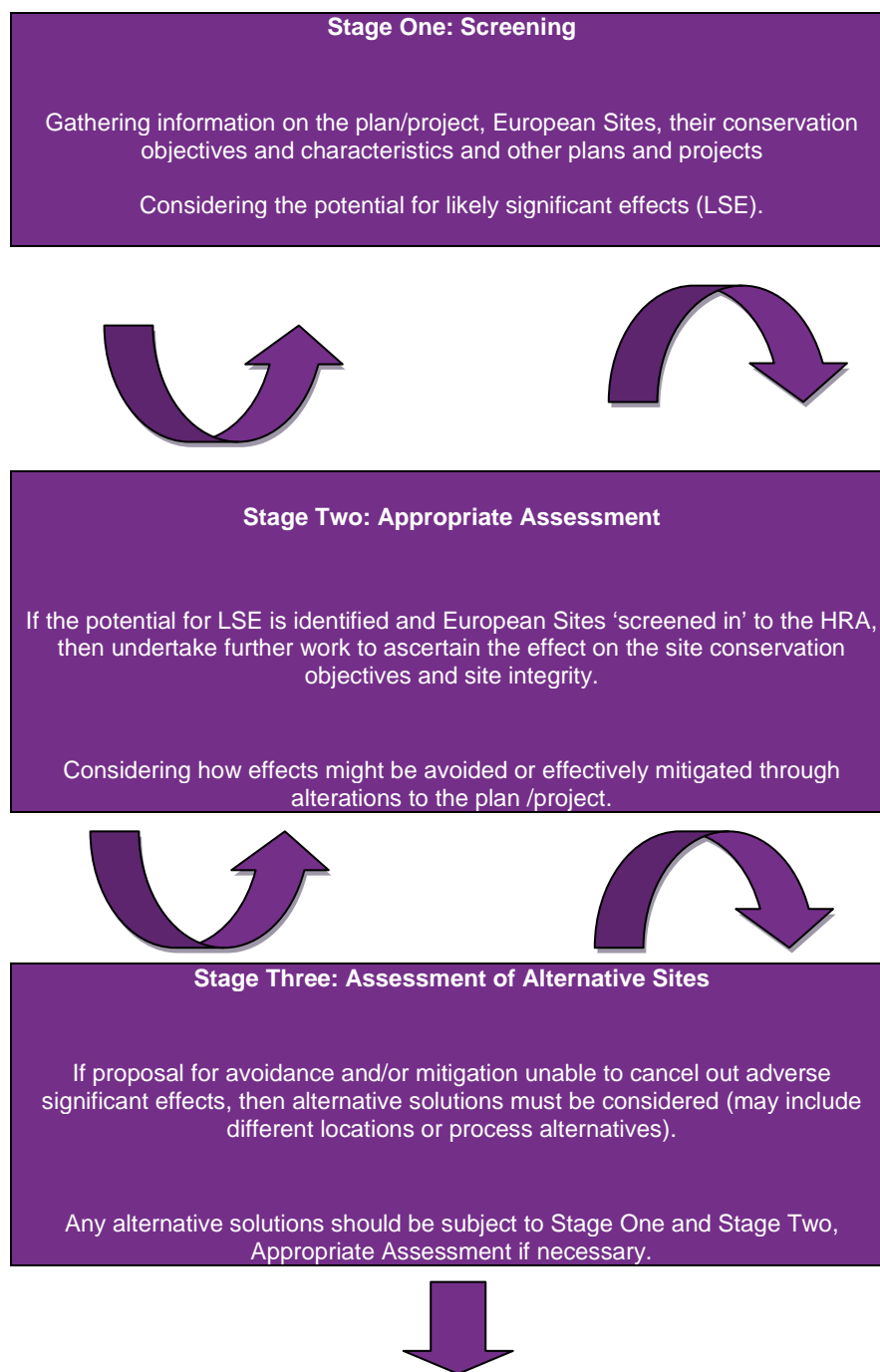
6 The term European Site is used throughout all the Site HRA Reports and in the Main HRA Report, and incorporates SACs, SPAs, SCIs and Ramsar sites.

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



(EDF Energy) on 31 March 2009<sup>8</sup>. The HRA 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<sup>9</sup>**



<sup>8</sup> <http://www.energynpsconsultation.decc.gov.uk>

<sup>9</sup> Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of 6(3) and 6(4) of the Habitats Directive 92/43/EEC. European Commission DG Environment (2001) [http://ec.europa.eu/environment/nature/natura2000/management/guidance\\_en.htm](http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm)

**Stage Four: Assessment where no Alternative Solutions Exist**

If no alternative solutions exist, consideration should be given to whether the sites host priority habitats/species, and if there are important human health/safety considerations or important environmental benefits from delivering the plan.

If Imperative Reasons of Overriding Public Interest (IROPI) are determined, then compensatory measures must be designed, assessed and put in place, prior to the commencement of the plan.

## 2 HRA Screening of Oldbury

2.1 The nominated site<sup>10</sup> is located 10.9km north of Bristol on the south bank of the River Severn in South Gloucestershire, and consists of approximately 150 hectares of land to the north of Oldbury Nuclear Power Station. The approximate centre of the nomination area is at Ordnance Survey reference ST 613 953. 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)<sup>11</sup>. The key questions asked are:

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

2.3 The tasks undertaken to complete the screening process for Oldbury are described below.

### European Site Identification and Characterisation

2.4 European Sites within a 20km<sup>12</sup> radius of the nominated site were scoped into the screening process as set out in Tables 2a and Figure 2. This area of search reflects guidance recommendations<sup>13</sup>, 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. In addition, The River Usk SAC, which falls outside of this search area but has hydrological connections to the other European Site designations, was included in the screening of Oldbury in line with consultation comments provided by Statutory Consultees

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10 as proposed through the nominations process

11 Appropriate Assessment of Plans (Therivel, May 2008)

12 For the purposes of the Oldbury HRA the River Usk SAC, which at 30km from the site, falls outside of this search area but has hydrological connections to the other European site designations, was therefore included in the Screening Assessment

13 Communities and Local Government (2006) Planning for the Protection of European Sites: Appropriate Assessment – Guidance for Regional Spatial Strategies and Local Development Documents.

(Table 2b). It should be noted that an area of land can be covered by more than one European designation.

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

	Designation	Distance from nominated site <sup>14</sup>
Severn Estuary	<b>SAC</b>	Adjacent
Severn Estuary	<b>SPA</b>	Adjacent
Severn Estuary	<b>Ramsar</b>	Adjacent
River Wye	<b>SAC</b>	6.5km
Wye Valley and Forest of Dean Bat Sites	<b>SAC</b>	7.8km
Wye Valley Woodlands	<b>SAC</b>	6.5km
Avon Gorge Woodlands	<b>SAC</b>	19.9km

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

	Designation	Distance from nominated site
River Usk	<b>SAC</b>	30km

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

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

2.6 The existing nuclear power station was due to cease operation in 2008, with decommissioning due to begin in 2009<sup>15</sup>. An announcement on 18 December 2008 by the UK Nuclear Decommissioning Authority stated that the station would continue to operate for around another two years<sup>16</sup>. The nomination report<sup>17</sup> states that the main operational

<sup>14</sup> Distance measured is from nearest site boundary.

<sup>15</sup> Oldbury Site Summary 2006/2007 Lifetime Plan

<sup>16</sup> <http://www.nda.gov.uk/documents/loader.cfm?url=/commonspot/security/getfile.cfm&pageid=4002>

<sup>17</sup> <http://www.nda.gov.uk/news/oldbury-power.cfm>

<sup>17</sup> Nomination documents submitted by the nominators (E.ON and the Nuclear Decommissioning Authority), at <http://www.nuclearpowersiting.decc.gov.uk/nomination/oldbury/>

footprint of one nuclear reactor is likely to be approximately 30 to 50 hectares. This includes cooling towers being required, as the nominator considers a cooling tower system to be more appropriate to the nominated site rather than direct cooling. 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 developers were not required to provide further details of the proposed development at this stage.

2.7 From the nomination documents<sup>18</sup> 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;
- flood defence improvements and coastal protection measures;
- cooling water infrastructure, including the possible construction of cooling towers, and associated and cooling water intake and outfall structures which would extend into the Severn Estuary; and
- interim radioactive waste storage facilities.

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

2.9 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.

2.10 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 process should take account of reasonably foreseeable impacts (as opposed to every conceivable effect)<sup>19</sup>.

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18 Op cit.

19 Tyldesley, D. (2009) Habitats Regulations Assessment of Local Development Documents. Revised Draft Guidance for Natural England. Natural England, Sheffield.

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

- Local Development Framework documents;
- Major Development Schemes (including transport plans/ airport/port expansion/tidal power schemes) where relevant;
- Regional Spatial Strategies; and
- (Coastal) Tourism Strategies.

2.12 Where relevant, reference was also made to:

- Coastal Habitat Management Plans;
- Catchment Abstraction Management Strategies;
- Shoreline Management Plans;
- River Basin Management Plans;
- Water Resource Management Plans;
- Catchment Flood Management Plans;
- Flood Risk Strategies;
- Minerals and waste development frameworks;
- Decommissioning plans for the existing power station; and
- Environment Agency's Review of Consents.

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

## Screening Assessment

2.14 The following sections outline the issues arising from the HRA Screening Assessment (LSE test) undertaken (in **Appendix 3**) for the nominated site at Oldbury. The Screening Assessment indicated that development at the nominated site at Oldbury 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/Vibration, Light and Visual)**

2.15 The Screening Assessment also identified **Air Quality** as a potential issue and considers that while potential significant effects are unlikely; this finding should be confirmed by further information gathering in the Appropriate Assessment stage. 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):

- **Wye Valley and Forest of Dean Bat Sites**
- **Wye Valley Woodlands**
- **Avon Gorge Woodlands**

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

- **Severn Estuary SAC, SPA, Ramsar**
- **River Wye SAC**
- **River Usk SAC**

- 2.16 The quality of fresh and marine water that feeds and supports the protected European Sites at Oldbury 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). 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<sup>20</sup>, leading to altered rates of reproduction and dispersal.
- 2.17 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 to 10°C warmer<sup>21</sup> from the proposed development 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 can result in artificial thermal and chemical barriers to species and communities, significantly affecting the qualifying features of European Sites.
- 2.18 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.

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<sup>20</sup> 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.

<sup>21</sup> 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.

2.1 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;
- routine<sup>22</sup> (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 environment agency under the Radioactive Substances Act 1993)<sup>23</sup> and accidental release of radioactive discharges to water;
- alteration of flow through abstraction and the return of additional water volumes to the aquatic system;
- alterations 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.

2.19 Of the eight European Sites screened, five sites were identified as possessing specific vulnerabilities relating to the water resource (Severn Estuary SAC, SPA, Ramsar; River Wye SAC, River Usk SAC).

### Severn Estuary SAC, Severn Estuary SPA and Ramsar

2.20 The primary qualifying habitat features of the Severn Estuary SAC include the estuaries, intertidal mudflats, sand banks and salt marsh/meadows. These habitats are all particularly vulnerable to alterations in salinity, sedimentation and flow regimes which may be brought about through any increases in levels of drainage arising from earthworks and excavations during the construction and decommissioning periods. Moreover contamination arising from the introduction of synthetic and non-synthetic toxic compounds through routine<sup>24</sup> or accidental radioactive release can bind to particulates and sediment comprising these habitats and remain there over time, adversely affecting habitat structure and associated communities. In addition the influx of excess nutrients into these sensitive systems can alter species composition and affect the structural integrity of these habitats.

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22 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).

23 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.

24 Op. cit.



- 2.21 The qualifying features of the Severn Estuary SPA include Bewick's Swan and other migratory and internationally important assemblages of bird species (Gadwall, White-fronted Goose, Dunlin, Shelduck, Redshank, Curlew, Pintail, Ringed Plover). These species are dependent upon the maintenance of both the extent and quality of salt marsh, intertidal mudflats, sand flats, shingle and rocky shore habitats present. Contamination is a particular issue for these species either through direct contact or accumulation of toxins up through the food chain, including toxins within migratory fish species designated within the Severn Estuary SAC such as Sea Lamprey, River Lamprey, and Twaite Shad, and other migratory species listed under Criterion 4 of the Severn Estuary Ramsar Site (including Allis Shad and Twaite Shad, Eel, Atlantic Salmon, Sea Lamprey, River Lamprey and Sea Trout). Thermal inclines and chemical barriers arising from routine discharge of cooling water can also significantly affect the movement, reproduction and dispersal of migratory species within these European Sites<sup>25</sup>.

### River Wye SAC

- 2.22 The River Wye SAC is particularly vulnerable to alterations to flow-regime, water quality and physical habitat structure, with qualifying features including Annex 1 habitats comprising aquatic plant communities (mires and bogs and water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation) and Annex II species including White-clawed Crayfish, Otter, and a number of migratory fish species including Sea Lamprey, River Lamprey, Brook Lamprey, Twaite Shad, Allis Shad, Atlantic Salmon, and Bullhead. Such communities will be particularly sensitive to alterations to water resources and quality at the mouth of the River Wye SAC, where it discharges into the Severn Estuary at Chepstow, Wales. Furthermore, as many of the qualifying features of the River Wye SAC are shared with the Severn Estuary SAC and Ramsar designations, there is also the potential for the transfer of direct and indirect negative impacts upon these features between designated sites (migratory fish species common to these European Sites include Sea Lamprey, River Lamprey, Twaite Shad, Allis Shad, and Atlantic Salmon).

### River Usk SAC

- 2.23 The River Usk SAC discharges into the Severn Estuary further downstream from the River Wye SAC at Newport, Wales. Similar to the River Wye SAC, this system is vulnerable to alterations to flow-regime, water quality and physical habitat structure, and shares qualifying features including the Annex I habitat comprising water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, and Annex II species including Otter and a number of migratory fish species including Sea Lamprey, River

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<sup>25</sup> [www.english-nature.org.uk/LIFEinUKRivers/publications/shad.pdf](http://www.english-nature.org.uk/LIFEinUKRivers/publications/shad.pdf)

Lamprey Brook Lamprey, Twaites Shad, Allis Shad, Atlantic Salmon, and Bullhead. Migratory species such as shad and lamprey are wide ranging and known to spend time in the Severn Estuary. Consequently adverse impacts upon these migratory species occurring at the River Wye SAC and/or at the Severn Estuary SAC and Ramsar sites upstream may be transferred to the River Usk SAC, with further impacts upon Otter populations. However as this site lies a distance greater than 30km away from the nominated site, significant effects due to changes in water resources and quality are not considered likely. Indirect impacts on migratory fish cannot be ruled out but have been considered further under Habitat (and Species) Loss and Fragmentation.

- 2.24 The nominated site at Oldbury lies directly adjacent to the Severn Estuary SAC, SPA and Ramsar designated sites, with the River Wye SAC discharging into the Severn Estuary. **The Screening Assessment indicates that the potential for adverse effects upon the integrity of these European Sites 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):

- **Wye Valley and Forest of Dean Bat Sites**
- **Wye Valley Woodlands**
- **Avon Gorge Woodlands**

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

- **Severn Estuary SAC, SPA, Ramsar**
- **River Wye SAC**
- **River Usk SAC**

- 2.25 The development of a new nuclear power station at Oldbury would likely impact upon biodiversity, with direct impacts resulting from land take arising from the development of the nominated site itself (including a marine off-loading facility and cooling water infrastructure), 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 proposed development 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 of 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.

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

- construction of the power station itself;
- construction of infrastructure and facilities relating to the operation of the power station proposed;
- construction of additional coastal defence measures necessary either at the outset of the development or during the latter stages of operation should those defence measures; and
- the potential requirement for the construction of a marine off-loading facility.

2.27 Of the eight European Sites screened, five sites were identified as possessing specific vulnerabilities relating to habitat and species loss and fragmentation (Severn Estuary SAC, SPA, Ramsar; River Wye SAC, River Usk SAC).

### **Severn Estuary SAC, SPA, and Ramsar**

2.28 The Severn Estuary SAC, SPA and Ramsar sites lie adjacent to the nominated Site at Oldbury and are highly vulnerable to impacts arising from habitat loss and fragmentation, particularly given that the qualifying habitat features of the Severn Estuary SAC (estuaries, mudflats, sand flats, sandbanks, salt meadows and reefs) and Ramsar (Ramsar Criterion 3: estuarine communities) sites comprise transitional habitats which are maintained by natural coastal processes which uphold levels of nutrient and sediment input and output required for their long-term existence. Any land take which include these coastal habitats will therefore adversely impact upon the integrity of these European Sites. Construction of the power station, marine off-loading facility (if required), cooling tower (if required), sea defences and other ancillary and induced developments will require construction at the coastal fringe and will thus likely result in the direct and indirect loss and degradation of the estuary, mud flat, sand flat and salt meadow habitats and associated communities designated within the Severn Estuary SAC and Ramsar site.

2.29 Loss of habitat can also significantly impact upon migratory bird species designated within the Severn Estuary SPA (Bewick's Swan, Gadwall, White-fronted Goose, Dunlin, Shelduck, Redshank, Curlew, Pintail and Ringed Plover) and Ramsar sites (waterfowl species under Criterion 6 include Tundra Swan, Greater White-fronted Goose, Common Shelduck, Gadwall, Dunlin and Common Redshank), resulting in the displacement of bird species from suitable breeding, roosting and foraging grounds to alternative areas.

- 2.30 Moreover the operation of the power station also has implications for fish species designated within the Severn Estuary SAC and Ramsar sites, with the displacement of bird populations potentially resulting in increased pressure upon adjacent and neighbouring foraging grounds which could impact upon prey availability, including designated fish species. Further impacts upon designated fish species within the Severn Estuary SAC and Ramsar site may also arise during abstraction and discharge, including the impingement of fish on cooling water intake screens, the entrainment of fish larvae during the intake cycle<sup>26</sup>, and the creation of thermal inclines and chemical barriers arising from discharge impacting upon the migration and dispersal of fish species. Physical barriers such as the construction of a marine off-loading facility may also present a physical barrier to migrating fish species, thereby impacting upon reproductive success and dispersal, leading to species loss.

### River Wye SAC

- 2.31 Given the distance of both the River Wye SAC from the nominated site, impacts of the development upon habitats and species occurring within the River Wye SAC will be much reduced than for those European Sites which lie adjacent to the nominated site. However given that designated fish species within the River Wye SAC are migratory and are also listed as designated species within the Severn Estuary SAC (Sea Lamprey, River Lamprey and Twaite Shad) and Severn Estuary Ramsar site (Sea Lamprey, River Lamprey, Twaite Shad, Atlantic Salmon), any adverse impacts upon these species within those European Sites adjacent to the nominated site may also be transferred to the River Wye SAC. Impacts upon these fish at the River Wye may also significantly affect Otter populations by altering the quality and quantity of available food resources.

### River Usk SAC

- 2.32 As discussed above for the River Wye, potential impacts occurring upon migratory fish species adjacent to the nominated site may be transferred to those same species present within the River Usk SAC, with further impacts upon Otter. Although this site lies a distance greater than 30km away from the nominated site significant effects on its migratory fish populations cannot be ruled out at this stage. .

- 2.33 The impacts of habitat loss and fragmentation on the conservation objectives and site integrity of the Severn Estuary SAC, SPA and Ramsar, River Wye SAC and River Usk SAC should be considered further through Appropriate Assessment.**

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26 British Energy/ Royal Haskoning (Nov, 2008) Proposed Nuclear Development at Hinkley Point: Environmental Scoping Report

## Coastal Squeeze

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

- River Wye SAC
- River Usk SAC
- Wye Valley and Forest of Dean Bat Sites
- Wye Valley Woodlands
- Avon Gorge Woodlands

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

- Severn Estuary SAC, SPA, Ramsar

2.34 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.

### Severn Estuary SAC, SPA, Ramsar

2.35 Current protection measures are in place along the estuary edge to protect the coastline fronting the existing nuclear power station from tidal inundation. However with the nominated site located within low lying, reclaimed marshland adjacent to the existing site, there is potential for further loss of sub-tidal habitats, reducing the extent of natural defences along this coastline. In addition to maintaining current coastal defence measures, the extension of existing defences, construction of new sections of wall defences, raising areas of the new site, and construction of appropriate drainage will likely be required to ensure protection of the new nuclear power station and of the existing power station during its decommissioning phase from tidal inundation. Adverse impacts upon the habitats within the Severn Estuary SAC, SPA and Ramsar sites will therefore likely occur given their proximity and sensitivity of their habitats to alterations in hydrology and sediment transport regimes. Such alterations will likely reduce their extent and form, impacting upon associated species and community assemblages.

**2.36 The impacts of coastal squeeze on the conservation objectives and site integrity of the Severn Estuary SAC, SPA, and Ramsar site should be considered alongside habitat loss and fragmentation through further Appropriate Assessment.**

## Disturbance (Noise/Vibration, Light and Visual)

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

- Wye Valley and Forest of Dean Bat Sites
- Wye Valley Woodlands
- Avon Gorge Woodlands

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

- Severn Estuary SAC, SPA, Ramsar
- River Wye SAC
- River Usk SAC

2.37 Disturbance to habitats and species arising from a new nuclear power 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 (and efflux) 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 the nominated 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). 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<sup>27</sup>.

### Severn Estuary SPA, Ramsar

2.38 The Screening Assessment identified disturbance as being of potential significance for the interest features of the Severn Estuary SPA (Bewick's Swan, Gadwall, White-fronted Goose, Dunlin, Shelduck, Redshank, Curlew, Pintail, Ringed Plover) and Ramsar site (waterfowl species cited under Criteria 5 and 6) throughout all phases of the development. Over-wintering birds expend unnecessary energy and have reduced feeding times as a result of responding to disturbance events. Displacement from chosen roosting and feeding sites from their usual coastal habitats can ultimately affect the designation of these European Sites, and the need to find alternative forage and roosting resources elsewhere will also put greater pressure onto those

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<sup>27</sup> Scott Wilson (Nov 2008) EcoTowns: Sustainability Appraisal and Habitats Regulations Assessment.

resources present in adjacent buffering habitats<sup>28</sup>. Such disturbance events over the longer term can have direct negative impacts on species survival.

### Severn Estuary SAC, Ramsar

#### River Usk SAC

#### River Wye SAC

2.39 Disturbance can also significantly impact upon the behaviour and distribution of migratory fish species and Otters. Low frequency noise and regular, frequent vibration arising throughout all stages of the development during construction, operation and decommissioning can impact upon the movement and reproductive success of migratory fish species within the Severn Estuary SAC (Sea Lamprey, River Lamprey, Twaite Shad) and Ramsar site (Sea Lamprey, River Lamprey, Twaite Shad, Allis Shad, Eel, Atlantic Salmon, Sea Trout) and River Wye SAC, given their proximity to the nominated site. However given that disturbance arising from the development is likely to be localised, significant impacts on the River Usk SAC are not considered likely due to its distance from the site. Indirect impacts on the migratory fish species within the River Usk cannot be ruled out but have been considered further under 'Habitat (and Species) Loss and Fragmentation'.

**2.40 Given the extended construction phase of the development and identified sensitivities of the designated species to disturbance events, the potential for adverse impacts upon site integrity of the Severn Estuary SAC, SPA and Ramsar and River Wye SAC site should be considered further through Appropriate Assessment.**

## Air Quality Impacts

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

- River Wye SAC
- River Usk SAC
- Wye Valley and Forest of Dean Bat Sites
- Wye Valley Woodlands
- Avon Gorge Woodlands

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

- Severn Estuary SAC, SPA, Ramsar

2.41 The effects of changing and poor air quality at European Sites vary according to the pollutant type, (acid deposition, ammonia, nitrogen

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<sup>28</sup> Gill, Sutherland and Norris (1998) The consequences of human disturbance for estuarine birds. RSPB Conservation Review 12. 67-72.

oxides, ozone and sulphur dioxide) and the nature of the receiving environment. Key pollutants that are of concern for terrestrial habitats are sulphur dioxide (SO<sub>2</sub>), ammonia (NH<sub>3</sub>) and nitrogen oxide (NO<sub>x</sub>). Deposition of nitrogen can lead to soil enrichment and sulphur dioxide to acidification which may alter species composition with impacts on associated species.

- 2.42 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.
- 2.43 The screening noted the potential for impacts on air quality at a local level arising from the construction, operation and decommissioning phases of Oldbury. The mobilisation of dust particles and increased emissions from associated traffic (typically nitrogen dioxide, PM<sub>10</sub>, carbon monoxide, benzene, and 1,3-butadiene)<sup>29</sup> and use of diesel generators and boilers (combustion gases) during construction, operation and decommissioning of the site can adversely affect those sensitive habitats adjacent to the development site. Dust particles can be of a different acidity to the surrounding habitats, and major roads within 200m have the potential to increase nitrogen and carbon emissions impacts from vehicles<sup>30</sup>.
- 2.44 The operation of the nuclear reactor would also result in gaseous radioactive emissions (noble gases, carbon-14, tritium and iodines)<sup>31</sup> 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<sup>32</sup>. 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<sup>33</sup>. 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.
- 2.45 The HRA Screening Assessment of sites that may be impacted by potential changes to local air quality (Severn Estuary SAC, SPA and

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29 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.

30 Department for Transport (2003) Transport Analysis Guidance, the Local Air Quality Sub-Objective TAG Unit 3.3.3.

31 See footnote 20.

32 See footnote 20.

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



Ramsar) 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.

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

**2.47 In line with the precautionary principle further information should be gathered as part of the Appropriate Assessment scoping stage to address potential uncertainties identified in relation to air quality issues with regards to the Severn Estuary SAC, SPA and Ramsar sites.**

## Conclusions and Recommendations

2.48 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 Oldbury on the seven European Sites that lie within 20km of the nominated site as well as the River Usk SAC. The River Usk SAC falls outside of this search area but has hydrological connections to the other European Site designations and was included in the Screening Assessment in line with consultation comments provided by Statutory Consultees. The HRA Screening assessment and conclusions were :

- The information gathered on the European Sites – **Appendix 1**;
- The summary analysis of potential environmental impacts generated by the development activities arising from Oldbury;
- Consideration, where necessary, of other plans and programmes that have spatial/ contextual relevance – **Appendix 2**;
- Government guidance<sup>34</sup> 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.

2.49 The HRA Screening Assessment identified a number of key impacts arising from the development of the nominated site and the potential for significant effects at four of the European Sites scoped into the HRA screening process. These findings are summarised in Table 3 below.

### Table 3: Summary of Likely Significant Effect Screening Assessment

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34 "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>

European Sites within 30km of Oldbury	Water Resources and Quality	Habitat Loss and Fragmentation	Coastal Squeeze	Disturbance (Noise/Vibration, Light, Visual)	Air Quality
Severn Estuary SAC	✓	✓	✓	✓	?
Severn Estuary SPA	✓	✓	✓	✓	?
Severn Estuary Ramsar	✓	✓	✓	✓	?
River Wye SAC	✓	✓	✗	✓	✗
River Usk SAC	✗	✓	✗	✗	✗
Wye Valley and Forest of Dean Bat Sites SAC	✗	✗	✗	✗	✗
Wye Valley Woodlands SAC	✗	✗	✗	✗	✗
Avon Gorge Woodlands 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

2.50 It is recommended that the HRA proceeds to the next stage of 'Appropriate Assessment' in relation to the four European Sites where the potential for likely significant effects (✓) or significant effect uncertain (?) has been identified. Further work should also be undertaken to determine whether the effect on air quality should be considered as part of the Appropriate Assessment for the Severn Estuary SAC, SPA and Ramsar sites. This next stage of the HRA process is outlined in the section 3 of this report.

## 3 HRA Appropriate Assessment of Oldbury

### Scoping and Additional Information Gathering

- 3.3 To support the Appropriate Assessment (AA) phase, additional information was gathered on the European Sites and 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 (APIS) and water quality and abstraction data produced by the Environment Agency.

### Assessing the Impacts (in-combination) Appropriate Assessment

- 3.4 The HRA Screening Assessment considered whether the impacts arising from development at Oldbury have the potential to affect the integrity of the European Sites scoped into the assessment process. This was done by making an assessment against the conservation objectives for each European Site (detailed in Appendix 1). The following sections summarise the analysis undertaken 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 (detailed in Appendix 2).

### Water Resources and Quality

#### Severn Estuary SAC, SPA, Ramsar

#### River Wye SAC

- 3.5 Current Environment Agency data<sup>35</sup> indicates that the ecological status of the estuarine environments near to Oldbury range between 'good' at the mouth of the River Wye and 'moderate' towards the mouth of the River Severn, these assessment points are located southwest and northeast of the nominated site respectively. The Environment Agency considers the ecological potential of the Severn Estuary as a whole to be of 'moderate' status, whilst the ecological status of the River Wye as a whole is currently assessed as 'moderate'. By 2015, the Environment Agency predicts that the ecological status and chemical quality of the River Wye will increase to 'good' status by 2027 and 2015 respectively. Groundwater quantity and chemical quality around Oldbury are currently assessed as 'good'.
- 3.6 Radioactive discharges are subject to limits monitored by the Environment Agency and of the non-radioactive discharges, nitrate contributions are considered to be the most significant (research cited

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<sup>35</sup> Environment Agency River Basin Management Plans: Severn River Basin District, 2008: <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/severn/Intro.aspx>

by the Environment Agency in the nuclear sector report<sup>36</sup>). In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges.

- 3.7 Environmental condition data for the Severn Estuary SAC, SPA and Ramsar site, and for the River Wye SAC (Appendix 1, Site Characterisations) indicate that increases in nutrient loading through the discharge of synthetic and non-synthetic toxic compounds and increases in sediment loading through runoff during construction (and deconstruction) should therefore be avoided given their likely impact upon the sensitive habitats designated within these European Sites, as well as upon the migratory fish species designated within the Severn Estuary SAC (Sea Lamprey, River Lamprey, Twaite Shad), Severn Estuary Ramsar (Sea Lamprey, River Lamprey, Allis Shad, Twaite Shad, Eel, Atlantic Salmon) and upon Otter and migratory fish species (Sea Lamprey, River Lamprey, Brook Lamprey, Twaite Shad, Atlantic Salmon and Bullhead) designated within the River Wye SAC. Impacts of increased nutrient loading will also adversely impact upon the breeding, over wintering and migratory bird species designated within the SPA and Ramsar Sites through the potential contamination through the food chain and the degradation of invertebrate and fish populations arising from adverse impacts upon the intertidal habitats upon which they depend.

### Effects in Combination with Other Plans and Projects

- 3.8 Aspects of the following plans and projects could lead to 'in combination' effects on European Sites with regards to water resources and quality:
- 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 Oldbury be reduced, impacts upon water quality and resources within European Sites around Oldbury may be reduced such that adverse effects upon site integrity become unlikely.
  - The Environmental Statement for the proposed Bristol Deep Sea Container Terminal<sup>37</sup> at Avonmouth and the estuary approach channel identifies a number of impacts which are likely to have in-combination effects with a nuclear development on the Severn Estuary European Sites and the River Wye SAC in relation to water

<sup>36</sup> Environment Agency (2005) Measuring Environmental Performance, Sector Report for the Nuclear Industry

<sup>37</sup> Bristol Port Company (2008) Bristol Deep Sea Container Terminal Environmental Statement - Non Technical Summary.

resources and quality. In particular, capital dredging within the turning area and main estuary channel and disposal of the arisings can modify local hydrodynamics and sediment transport around the container terminal, leading to an increase in accretion over SPA and SAC upstream intertidal mudflats. Subtidal and potentially intertidal deposition of fine sediment within the estuary as a result of dredging and disposal of sediment may also result.

- The Severn Tidal Power HRA preliminary screening<sup>38</sup> identified the risk of a number of effects on the proposed tidal range power generation schemes. These may have in-combination effects upon the Severn Estuary SAC, SPA, Ramsar and the River Wye SAC arising from possible impacts to water resources and quality. Identified impacts include alterations to water resources as a result of changes to tidal range and flow upstream and downstream of the proposed barrage or lagoon, and alterations to water quality as a result of changes in land drainage capacity and chemical parameters (including salinity, dissolved oxygen and the dispersion of regulated discharges). The Severn Tidal Power HRA preliminary screening report covers all five options but does not distinguish between the individual options where impacts will vary<sup>39</sup>.
- Decommissioning of the existing Oldbury power station originally scheduled for 2009<sup>40</sup> but now potentially extended for another two years<sup>41</sup> may also have in-combination effects with the proposed nuclear development at Oldbury upon water quality and resources within the Severn Estuary SAC, SPA and Ramsar site, and within the River Wye SAC, particularly should deconstruction of the existing site coincide with construction of any potential new nuclear power station. However the Environmental Statement has not been made available for this assessment. Information provided by the nominator however suggests that decommissioning of the existing power station may involve the removal of the silt lagoons fronting the existing nuclear power station. Deconstruction of these structures may, in the short term, result in the release of large quantities of sediment and discharge to alternative receptor sites, with disturbances to surrounding sediment deposits resulting in the additional release of sediment-bound contaminants previously accumulated. Impacts to the Severn Estuary may therefore be exacerbated, leading to adverse effects upon the integrity of

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38 DECC (2008) Severn Tidal Power HRA Preliminary Screening

39 The Department of Energy and Climate Change led a two year cross-departmental study to determine whether a tidal power project in the Severn Estuary could be supported. Within the study, a range of five different schemes were assessed, and the scope and scale of environmental, economic and social effects is likely to vary widely between them. Separate environmental studies into these impacts and whether they could be mitigated have been carried out. The assessment in this report is based upon the potential effects outlined in the habitats screening report for Severn Tidal Power. It covers all short-listed schemes but does not distinguish between the individual schemes where environmental impacts will vary. The Severn Tidal environmental study findings are expected to be published in Autumn 2010 and the Government will consider, after the consultation period, if any changes to this assessment are required in light of those findings.

40 Oldbury Site Summary 2006/2007 Lifetime Plan

<http://www.nda.gov.uk/documents/loader.cfm?url=/commons/spot/security/getfile.cfm&pageid=4002>

41 <http://www.nda.gov.uk/news/oldbury-power.cfm>

adjacent European Sites. Alternatively, any new nuclear power station may require the retention of these lagoons, thereby avoiding such impacts arising from their removal. However the lagoons pose a major constraint to the natural geomorphological processes in the Severn Estuary and their retention would continue to influence the coastal processes.

- Development of a new nuclear power station at Hinkley Point may result in in-combination effects, if new nuclear power stations are built at both Oldbury and Hinkley Point. An assessment of these potential effects is included in the Habitats Regulations Assessment Main Report.

**3.9 Current water quality indicators confirm “moderate” to “good” ecological and chemical status around Oldbury. However given that no information regarding the quality and levels of discharge is currently available, and that in-combination effects with other plans and projects are likely, adverse effects on site integrity are assumed for the Severn Estuary SAC, SPA and Ramsar and the River Wye SAC in relation to water quality and water supply and abstraction.**

**3.10 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**

### **Severn Estuary SAC, SPA, Ramsar**

### **River Wye SAC, River Usk SAC**

- 3.11 Direct loss of estuarine, mud flat, sand flat and salt meadow habitats from the Severn Estuary SAC, SPA and Ramsar sites 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. Saltmarsh and mudflat habitats are extensive within the estuary to the coastal frontage of the nominated site, and are important feeding grounds for wading birds (including species of international importance), migratory wildfowl and fish (at some or all stages of their life cycles).
- 3.12 Indirect loss and degradation of habitats and species will also have adverse effects on site integrity. Increased levels of turbidity 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. Altered levels of oxygen and changes in water temperature can affect spawning cycles of migratory fish species designated within the Severn Estuary SAC and Ramsar site, the River Wye SAC and

within the River Usk SAC, such as for shad species, where upstream migration to spawning sites is triggered earlier in the season by increased water temperatures<sup>42</sup>. 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<sup>43</sup>, suggesting the potential for the discharge of warmer waters at Oldbury to detrimentally alter species composition within the Severn Estuary European Sites, River Wye SAC and River Usk SAC.

- 3.13 The potential construction of a marine off-loading facility 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. These impacts may be further exacerbated by the proposed Bristol Deep Sea Container Terminal<sup>44</sup> whereby extensive dredging works are required as part of the development to the south of the proposed new nuclear power station at Avonmouth. Extensive dredging may increase erosion as the estuary tries to rebalance the sediment budget, whilst the re-dispersal of sediment can increase turbidity at receptor areas and result in the release of sediment-bound contaminants, with impacts potentially transferred up the estuary. Additional physical barriers created through the presence of a marine off-loading facility and cooling tower infrastructure at Oldbury can also affect the migratory movements, reproductive success and recruitment of migratory fish species and Otters which move through the estuary within the Severn Estuary European Sites and within the River Wye SAC and River Usk SAC, with abstraction impacting directly on species survival.
- 3.14 The Severn Estuary Coastal Habitat Management Plan (CHaMP)<sup>45</sup> produced by the Environment Agency<sup>46</sup> indicates that the upstream areas of the Severn Estuary are most likely to demonstrate change by 2025, with the estuary tending towards migration upstream. In particular, sea level rise is resulting in coastal squeeze and a net loss of intertidal habitat. Analysis indicates that the salt marsh and intertidal mudflat and sand flat habitats around Oldbury (Habitat Behaviour Unit 4 and 5) will likely be subject to a net decrease over the next 20 years, leading to substantial habitat loss, particularly since mudflats alone make up over 93% of the intertidal area of the Severn Estuary.
- 3.15 Currently the constituent SSSI units of the Severn Estuary SPA are mostly in favourable condition, with a minority in unfavourable condition due to other factors including coastal squeeze and recreational

42 <http://www.english-nature.org.uk/lifeinukrivers/publications/shad.pdf>

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

44 <http://www.mfa.gov.uk/environment/works/documents/screening%20scoping/construction-07/Bristol-Container-Terminal.pdf>

45 CHaMPs are specifically focused on the integrity of European sites.

46 The Severn Estuary Coastal Habitat Management Plan: Technical Summary (EA, 2006)

disturbance. However the overall trend in the proportions of waders that winter in south-west Britain is one of decline, and has been correlated to increasing temperature and climate change. This trend is predicted to continue, though populations currently wintering further south could move north to winter in the Severn Estuary. Moreover declines in five of the 16 species that contribute to the overall assemblage for which the Severn Estuary SPA is designated, including white fronted goose and dunlin, mirror declines occurring regionally and nationally, suggesting that factors such as climate change are at least partially responsible.

### Effects in Combination with Other Plans and Projects

3.16 Aspects of the following plans and projects could lead to 'in combination' effects on European Sites with regards to Habitat (and species) Loss and Fragmentation/ Coastal Squeeze:

- The construction of the new nuclear power station and associated development is proposed within an area of low lying, reclaimed marshland along the coastline from the existing station. This area is included within the Severn Estuary CHaMP as part of the total extent of habitat within Habitat Behavioural Units 4 and 5 suitable for habitat creation and reclamation as part of a managed coastal retreat given their regular tidal inundation. The development of this otherwise natural floodplain area, including the requirements for further coastal defence (thereby restricting landward migration of habitat)<sup>47</sup>, together with the additional loss and fragmentation of designated habitats arising from the development may act cumulatively or accelerate changes identified by the CHaMP in relation to designated features of the Severn Estuary SAC, SPA and Ramsar sites, the River Wye SAC<sup>48</sup>, with potential adverse effects on site integrity likely. There is also a risk that impacts on migratory fish species may be transferred to and adversely affect populations within the River Usk SAC.
- The Shoreline Management Plan<sup>49</sup> for the Severn Estuary identifies the proposed development to be located within Sub-Unit MU9/8 'Chapel House to the South of Oldbury Power Station' which is a subsection of Process Unit 9 – Beachley to Sharpness. The short – to medium- term management options for the coastal defences along the coastal edge of this site as determined within this SMP is to 'hold the line' (maintain, improve or construct sea defences to maintain the existing line of defences), such that local defences should be maintained, improved, or constructed to maintain the existing defences of the coastal sub unit. The longer term management options considered suitable for this section are to 'retreat the line' (allow for the managed retreat of the coastline) or to 'hold the line'. In-combination impacts may arise should the

47 <http://www.severnestuary.net/frms/docs/severn%20scoping%20report%20jan%2009%20v2.pdf>

48 [http://www.severnestuary.net/secg/docs/executive\\_summary.pdf](http://www.severnestuary.net/secg/docs/executive_summary.pdf)

49 <http://www.severnestuary.net/secg/NON%20TECHNICAL%20SUMMARY.pdf>



- construction of additional sea defence infrastructure required by the development of the new nuclear power station result in moving the line of defences seaward, equating to an 'advance the line' approach, a management option considered inappropriate within the SMP with regard to coastal processes or natural environment interests. Any alterations to the management of the coastline here will likely lead to coastal erosion issues upon sensitive shoreline habitats and species further along the coast, with impacts upon the integrity of the Severn Estuary European Sites.
- The Environmental Statement for the proposed Bristol Deep Sea Container Terminal<sup>50</sup> at Avonmouth and the estuary approach channel identifies further in-combination impacts upon the Severn Estuary European Sites in relation to habitat and species loss/fragmentation and coastal squeeze. Direct impacts include the loss of a small area of designated SPA and SAC habitat (approximately 2ha) arising from the reclamation of intertidal habitat, and the impacts of capital dredging within the estuary and disposal of its arising upon the subtidal animal communities. Indirect impacts include the modification of local hydrodynamics and sediment transport leading to changes to the structure of intertidal mudflats as a result of accretion upstream within the Severn Estuary SPA and SAC sites.
  - The preliminary screening for the HRA of the Severn Tidal Power Feasibility Scheme<sup>51</sup> has identified the risk of a number of effects of the proposed tidal range power generation schemes. These may have in-combination effects upon the Severn Estuary SAC, SPA, Ramsar, and the River Wye SAC relating to habitat and species loss/fragmentation and coastal squeeze. Possible impacts include the direct permanent loss of habitat and associated species arising from the placement of the power generation infrastructure itself, and from alterations in the tidal range and flow upstream and downstream of the proposed barrage or lagoon. This could also result in species mortality and/or the restriction of species movement and dispersal arising from the presence of additional physical barriers (sluices and turbines), with associated displacement of species and reduction in prey availability. Again there is a risk that impacts on migratory fish species may be transferred to and adversely affect populations within the River Usk SAC. Alterations to the extent of intertidal habitat through changes to sediment transport patterns arising from the barrage/lagoon structure may also cause the additional displacement of waterfowl. The Severn Tidal Power HRA preliminary screening report is not final and will be reviewed in the light of the feasibility study's findings. It covers all five options but does not distinguish between the individual options where impacts will vary<sup>52</sup>.

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50 Bristol Port Company (2008) Bristol Deep Sea Container Terminal Environmental Statement - Non Technical Summary.

51 DECC (2008) Severn Tidal Power HRA Preliminary Screening

52 The Department of Energy and Climate Change led a two year cross-departmental study to determine whether a tidal power project in the Severn Estuary could be supported. Within the study, a

- Decommissioning of the existing Oldbury power station may also have in-combination effects with a new nuclear development at Oldbury relating to habitat and species loss and coastal squeeze at the Severn Estuary SAC, SPA and Ramsar site, and within the River Wye SAC and for reasons previously mentioned the River Usk SAC. Although the Environmental Statement for the decommissioning project has not been made available for this assessment, information provided by the nominator suggests that decommissioning is likely to involve the removal of the silt lagoons fronting the existing nuclear power station. Since its operation, three lagoons have been operated in sequence, receiving silt dredged during cooling water intake from the River Severn tidal reservoir. As such, these lagoons provide the main high tide roost for waders feeding in the upper reaches of the Severn Estuary, with noted populations of Ringed Plover, Dunlin and Curlew<sup>53</sup>, these species being qualifying features of the Severn Estuary SPA. Two of these lagoons have since been locally designated as non-statutory Sites of Nature Conservation Interest due to the large range of plant and bird life they support<sup>54</sup>; their removal may therefore result in the displacement of feeding and roosting birds to alternative areas. However the removal of the lagoons may also allow for the return of natural geomorphological processes to this area, with natural regimes of sediment transport, deposition and erosion allowed to be re-instated, reducing coastal squeeze impacts at this coastline. Alternatively, a new nuclear power station may require the retention of these lagoons, thereby avoiding impacts of their removal. However impacts arising from their retention may instead arise, such as the continued maintenance of altered geomorphological processes around these structures, with implications for the management and maintenance of coastal processes.
- Development of a new nuclear power station at Hinkley Point may result in in-combination effects, if new nuclear power stations are built at both Oldbury and Hinkley Point. An assessment of these potential effects is included in the Habitats Regulations Assessment Main Report.

### **3.17 Adverse effects on site integrity arising from habitat loss and coastal squeeze from the proposed development and from in-combination effects of other plans and projects are therefore considered likely for the Severn Estuary SAC, SPA and Ramsar**

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range of five different schemes were assessed, and the scope and scale of environmental, economic and social effects is likely to vary widely between them. Separate environmental studies into these impacts and whether they could be mitigated have been carried out. The assessment in this report is based upon the potential effects outlined in the habitats screening report for Severn Tidal Power. It covers all short-listed schemes but does not distinguish between the individual schemes where environmental impacts will vary. The Severn Tidal environmental study findings are expected to be published in Autumn 2010 and the Government will consider, after the consultation period, if any changes to this assessment are required in light of those findings.

53 Merritt, A (1994) Wetlands, Industry and Wildlife - a manual of principles and practices. Wildfowl and Wetlands Trust

54 <http://publications.environment-agency.gov.uk/pdf/GEHO1208BPDQ-e-e.pdf>

**site and on the River Wye SAC. Adverse effects on site integrity in relation to migratory fish populations within the River Usk SAC can also not be ruled out.**

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

## **Disturbance (Noise/Vibration, Light, Visual)**

### **Severn Estuary SPA, SAC Ramsar**

#### **River Wye SAC**

- 3.19 Site information for the SSSI units underpinning the Severn Estuary SPA and Ramsar site indicates that currently over 95% of the habitats supporting the designated species within the Severn Estuary SPA and Ramsar site are in favourable condition. However information provided by the Severn Estuary Partnership<sup>55</sup> show that wading birds and waterfowl supported by the rich and diverse habitats of the Severn Estuary are particularly vulnerable to human disturbance. Disturbance arising from the construction and decommissioning phases can alter foraging, roosting and breeding patterns, resulting in displacement from their chosen feeding and roosting areas. Extensive periods of high noise and vibration activity, such as during percussive piling, can restrict birds to feeding during limited periods when the tidal state is unsuitable and cause take constant flight, decreasing their feeding efficiency with impacts on breeding and survival.
- 3.20 Extensive construction activity will be concentrated at the coastal fringe and within the estuary (i.e. the construction of off-shore infrastructure), resulting in vibration disturbance to marine communities adjacent to the proposed nomination site. Adverse effects of this disturbance on the migration and behaviour of migratory fish species designated within the Severn Estuary SAC and Ramsar site are likely given that fish nursery areas are concentrated here, with invertebrate food resources being most abundant within intertidal mudflat and upper estuarine habitats<sup>56</sup>. Few species are dependent on the deep-water channel for feeding where disturbance impacts are likely to be reduced. Adverse impacts upon fish species within the River Wye may also occur given that some of the fish species designated within the Severn Estuary SAC are shared with the River Wye SAC (Sea Lamprey, River Lamprey, Twaite Shad), such that any adverse impacts to their migratory and reproductive behaviour arising near the source of the disturbance may be transferred to the River Wye SAC, with further impacts upon Otters designated within this site.

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55 The Habitats and Species of the Severn Estuary: A basic introduction for developers and decision makers. Severn Estuary Partnership

56 <http://www.english-nature.org.uk/science/natural/profiles%5CnaProfile116.pdf>

## Effects in Combination with Other Plans and Projects

3.21 Aspects of the following plans and programmes could lead to 'in combination' effects on European Sites with regards to disturbance:

- The Environmental Statement for the proposed Bristol Deep Sea Container Terminal<sup>57</sup> at Avonmouth and the estuary approach channel identifies impacts upon the qualifying features of the Severn Estuary European Sites in relation to disturbance, with activities during the construction process likely to impact upon the bird populations designated within the Severn Estuary SPA and Ramsar site and upon fish populations designated within the Severn Estuary SAC and Ramsar site and within the River Wye SAC.
- The Severn Tidal Power HRA preliminary screening<sup>58</sup> identified the risk of a number of effects of the proposed tidal range power generation schemes. These may have in-combination effects upon the Severn Estuary SAC, SPA, Ramsar and the River Wye SAC in relation to disturbance. Possible impacts include noise, vibration and light pollution during construction and operation (gates, sluices, turbines and permanent lighting installations), and disturbance from electromagnetic fields generated from power transmission cables. The Severn Tidal Power HRA preliminary screening report is not final and will be reviewed in the light of the feasibility study's findings. It covers all five options but does not distinguish between the individual options where impacts will vary<sup>59</sup>.
- Decommissioning of the existing Oldbury power station may have in-combination effects with a new nuclear development at Oldbury upon levels of disturbance within the Severn Estuary SAC, SPA and Ramsar site, and within the River Wye SAC, although the Environmental Statement for the decommissioning project has not been made available for 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 these European Sites.
- Development of a new nuclear power station at Hinkley Point may result in in-combination effects, if new nuclear power stations are built at both Oldbury and Hinkley Point. An assessment of these potential effects is included in the Habitats Regulations Assessment Main Report.

57 Bristol Port Company (2008) Bristol Deep Sea Container Terminal Environmental Statement - Non Technical Summary.

58 DECC (2008) Severn Tidal Power HRA Preliminary Screening

59 The Department of Energy and Climate Change led a two year cross-departmental study to determine whether a tidal power project in the Severn Estuary could be supported. Within the study, a range of five different schemes were assessed, and the scope and scale of environmental, economic and social effects is likely to vary widely between them. Separate environmental studies into these impacts and whether they could be mitigated have been carried out. The assessment in this report is based upon the potential effects outlined in the habitats screening report for Severn Tidal Power. It covers all short-listed schemes but does not distinguish between the individual schemes where environmental impacts will vary. The Severn Tidal environmental study findings are expected to be published in Autumn 2010 and the Government will consider, after the consultation period, if any changes to this assessment are required in light of those findings.

- 3.22 Adverse effects on site integrity arising from disturbance levels (noise/vibration/ light/ visual) and from in-combination effects of other plans and projects must be considered likely at this strategic stage for the Severn Estuary SAC, SPA and Ramsar site and for the River Wye SAC.**
- 3.23 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

### Severn Estuary SAC, SPA, Ramsar

- 3.24 Information provided by the South West Observatory 2008<sup>60</sup> indicates that current levels of air quality in the south west is generally good with low levels of sulphur, nitrogen dioxide and particulates in comparison to the rest of England. Pollution levels for all key pollutants in the rural area around Oldbury are typically low.
- 3.25 Information provided by the UK Air Pollution Information System (APIS)<sup>61</sup> indicate that a range of habitats within the Severn Estuary SPA, particularly salt marsh, littoral and open water habitats which are known to support wintering populations of Shelduck, Gadwall, Dunlin, and Common Redshank are highly sensitive to nitrogen loads.
- 3.26 However the Environment Agency assesses that non-radioactive aerial emissions (sulphur dioxide, nitrogen oxides and volatile organic compounds) from nuclear power stations are extremely low compared with other regulated industries and the Agency does not consider them to be an environmental priority. The Environment Agency's most recent available assessment of radioactive aerial emissions indicates that all fall within authorised limits<sup>62</sup>.
- 3.27 Air quality issues around Oldbury will arise during construction and decommissioning phases; however air quality and changes to local and diffuse air quality conditions are not identified as vulnerabilities for the Severn Estuary SAC, SPA or Ramsar sites.

### Effects in Combination with Other Plans and Projects

- 3.28 Aspects of the plans and projects outlined in Appendix 2 could lead to 'in combination' effects on European sites with regards to air quality.
- 3.29 Decommissioning of the existing nuclear power station at Oldbury may have in-combination effects with a new nuclear development on the

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60 <http://www.swo.org.uk/information-publications/state-of-the-south-west/>

61 <http://www.apis.ac.uk/>

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

nominated site with regards to air quality and effects locally upon adjacent European sites, particularly should deconstruction of the existing site coincide with the construction phase of a new nuclear power station.

- 3.30 Deconstruction will likely result in the increase in dust emissions during excavations, demolition, and storage and handling of soils and materials, whilst increased vehicular usage will also contribute to this. Such impacts may potentially impact upon the Severn Estuary European sites in particular, given their vicinity to the nominated site.
- 3.31 Potential for cumulative effects arising from other plans and programs in the Local Development Framework are likely to be minimal, if any, given that measures set out are pertinent only to built-up areas located some distance away from Oldbury (Gloucester and Bristol). However, the Core Strategy within the Bristol Local Development Framework promotes the continued redevelopment and renewal of Avonmouth's established industrial areas, including a number of new waste recycling and energy from waste/biofuel facilities. These may result in increased traffic movements and contributions to atmospheric pollution loading.
- 3.32 It is not possible to rule out the possibility of cumulative effects particularly associated with plans and programs at Avonmouth. A precautionary approach requires that at the strategic level, potential adverse effects be assumed for Severn Estuary SAC, SPA, Ramsar until greater detail (including on technology and mitigation measures) is known.**
- 3.33 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

- 3.34 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 nominated site<sup>63</sup>.

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<sup>63</sup> The key principles and any assumptions made in this plan level HRA of the Nuclear NPS and nominated sites are outlined in Part II of the HRA Report.

- 3.35 At this strategic stage, the HRA for Oldbury can make recommendations for avoidance and mitigation recommendations in relation to Oldbury to inform the strategic siting assessment process, and therefore the overall development of the Nuclear NPS. These recommendations may also subsequently provide guidance to the IPC and potential future developers to ensure that any future development at Oldbury takes into account the findings of this strategic level assessment in a more detailed project-level HRA.
- 3.36 The HRA recommendations for avoidance and mitigation measures in relation to Oldbury are detailed below, and summarised in Table 4. Part II of the main HRA report also summarises the measures identified in this report alongside those proposed by other individual site HRA reports.
- 3.37 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 Oldbury 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 Oldbury. Such changes required at the project level should be sufficiently flexible to ensure that all identified impacts are addressed.

## Water Resources and Quality

- 3.38 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).
- 3.39 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)<sup>64</sup> 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. In addition to thermal effects, if direct cooling methods are selected by the developer, there

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64 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.

are potential water quality issues, in particular nutrient enrichment from anti-fouling agents, which may be associated with the cooling water process.

- 3.40 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 direct cooling be required, cooling water culverts should be designed to avoid effects on the existing thermal regime in the Severn Estuary at Oldbury. 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.
- 3.41 The IPC, as guided by the Nuclear 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 to site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments.
- 3.42 Adverse effects upon water quality and resources will be effectively 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 effectively avoided or mitigated by requiring that suitable design in abstraction mechanisms is employed.

## **Habitat (and species) Loss and Fragmentation/Coastal Squeeze**

- 3.43 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 key mitigation requirements. These include:
- the requirement for the site layout/ design to avoid areas of known importance or sensitivities and to protect existing habitats which are to be retained;
  - the 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;



- the 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; and
- the 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 qualifying interest features and conservation objectives of the designated sites should guide the identification of potential mitigation and compensation measures.

3.44 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 nominated 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. Effective mitigation measures include:

- the 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;
- the 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;
- the 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 the requirement for other soft engineering techniques such as managed retreat and foreshore recharge to be considered as possible flood defence techniques.

3.45 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 within the Severn Estuary 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:

- the requirement for works areas to be screened appropriately with height restrictions implemented where necessary to limit disturbance impacts upon migratory paths;

- the 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;
- the requirement for the height of cooling towers (if required) to be kept to a minimum height considered practicable; and
- the requirement for the incorporation of fish protection measures within the cooling water intake/system design.

## Disturbance (Noise/Vibration, Light, Visual)

3.46 The implementation of avoidance and mitigation measures aimed to reduce noise, vibration, light and visual disturbance arising from the development of the nominated 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 required include:

- the requirement for technologies and operating practices which take account identified sensitivities in fish (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 or avoidance measures identified to adequately avoid, cancel or reduce any adverse effects;
- 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 Otter; and to identify any construction/operational constraints that may be necessary;
- 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 any proposed development at Oldbury incorporates technologies and operating practices which take into account identified sensitivities of species in the estuarine environment around the nominated site.

3.47 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 the wider site management plan which requires agreement from developers to ensure their implementation prior to the commencement of any development works. Suitable avoidance, cancellation and reduction measures should be required and effectively

implemented so as to ensure potential adverse effects on site integrity are avoided.

## Air Quality

3.48 Whilst air quality impacts are not assessed as being a significant vulnerability at the Severn Estuary SAC, SPA and Ramsar sites around the nominated site at Oldbury it is appropriate that potential air quality impacts arising from developments 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;
- and the 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 the new build overlap such that no adverse impacts upon site integrity will occur.

3.49 The assessment has noted that radioactive emissions from the current nuclear power station around Oldbury 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 the new build overlaps;
- a requirement to seek opportunities to offset emissions where appropriate;
- the requirement for radioactive emissions to be As Low As Reasonably Achievable (ALARA)<sup>65</sup> with non-radioactive emissions expected to be an improvement upon existing standards;

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<sup>65</sup> 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.

- 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
<b>Water Resources and Quality</b>	
<ul style="list-style-type: none"> <li>Impacts on water quality</li> </ul>	<ul style="list-style-type: none"> <li>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 Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments.</li> <li>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.</li> <li>Discharges (thermal or otherwise) which lead to adverse effects on the integrity of European Sites should not be permitted.</li> <li>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 in the Severn Estuary at Oldbury.</li> </ul>
<ul style="list-style-type: none"> <li>Impacts on water quantity</li> </ul>	<ul style="list-style-type: none"> <li>Direct requirements for the efficiency of water use.</li> <li>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.</li> <li>Direct the selection of appropriate construction methods which minimise impacts of the development upon water resources.</li> </ul>
<ul style="list-style-type: none"> <li>Impacts on surface and groundwater flow</li> </ul>	<ul style="list-style-type: none"> <li>Require suitable design to be implemented including the use of Sustainable Drainage Systems (SuDS).</li> <li>Require suitable design within abstraction mechanisms to ensure potential impacts upon groundwater flow are avoided.</li> </ul>
<b>Habitat Loss and Fragmentation/ Coastal Squeeze</b>	
<ul style="list-style-type: none"> <li>Direct loss of habitat</li> </ul>	<ul style="list-style-type: none"> <li>Require site layout/ design to avoid areas of known importance or sensitivities and to protect existing habitats which are to be</li> </ul>

Potential Effects	Suggested Avoidance and Mitigation Measures: Recommendations for the IPC
	<p>retained.</p> <ul style="list-style-type: none"> <li>• Require habitat connectivity of wildlife corridors around nominated site to be maintained and enhanced to ensure reduce the extent of indirect impacts arising from direct land take.</li> <li>• Avoidance of adverse environmental impacts through the safe operation and decommissioning of the development and of interim waste storage management should be sought.</li> <li>• Require ecological mitigation and construction environmental management plans to be produced for the nominated site, and for such plans to link to existing integrated land and coastal management plans.</li> </ul>
<ul style="list-style-type: none"> <li>• Loss of surrounding habitat due to construction of associated infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Require ecological mitigation and management plans to be produced for the nominated site, and for such plans to link to existing integrated land and coastal management plans.</li> </ul>
<ul style="list-style-type: none"> <li>• Barriers to the migration, commuting and dispersal of fish and bird species</li> </ul>	<ul style="list-style-type: none"> <li>• Require the screening of works areas, including the implementation of height restrictions where necessary to limit disturbance impacts upon migratory paths.</li> <li>• 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.</li> <li>• Restrict the height of cooling towers (if required) to minimum required heights considered practicable.</li> <li>• Require the incorporation of fish protection measures within the cooling water intake/system design.</li> </ul>

Potential Effects	Suggested Avoidance and Mitigation Measures: Recommendations for the IPC
<ul style="list-style-type: none"> <li>• Movement of habitat arising from changes to geomorphological processes caused by the construction of additional coastal defences and marine off-shore landing facilities</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Other soft engineering techniques such as managed retreat and foreshore recharge should be considered as possible flood defence techniques.</li> </ul>
<b>Disturbance (Noise/Vibration, Light, Visual)</b>	
<ul style="list-style-type: none"> <li>• 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</li> </ul>	<ul style="list-style-type: none"> <li>• Direct requirements for technologies and operating practices which take account of identified sensitivities in fish and bird populations in the estuarine environment.</li> <li>• Restrict encroachment of construction areas into sensitive habitats through site design.</li> <li>• Require the visual/noise screening of construction (and deconstruction) works.</li> <li>• 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 Otter.</li> <li>• 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.</li> </ul>
<b>Air Quality</b>	
<ul style="list-style-type: none"> <li>• Increased development/traffic growth and increased</li> </ul>	<ul style="list-style-type: none"> <li>• Require sustainable transport plans which include the use of non-road transport where possible.</li> </ul>

Potential Effects	Suggested Avoidance and Mitigation Measures: Recommendations for the IPC
<p>release of dust and particulates arising from construction, operation and decommissioning</p>	<ul style="list-style-type: none"> <li>• Require that the development is phased to minimise emissions and dust generation.</li> <li>• Promote the use of carbon-efficient forms of transport and construction during the power station lifecycle.</li> <li>• 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 the new build overlap such that no adverse impacts upon site integrity will occur.</li> </ul>
<ul style="list-style-type: none"> <li>• Planned and accidental emissions</li> </ul>	<ul style="list-style-type: none"> <li>• 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 Best Available Technology (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 the new build overlaps.</li> <li>• Support opportunities to offset emissions where appropriate.</li> <li>• Radioactive emissions should be As Low As Reasonably Achievable (ALARA)<sup>66</sup> with non-radioactive emissions required to be an improvement upon existing standards.</li> <li>• Emissions which lead to adverse effects on the integrity of European Sites should not be permitted.</li> </ul>

## Summary of HRA Findings and Recommendations

3.50 The HRA Screening Assessment identified the likely significant effects on site integrity at 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 and projects ‘in-combination’; in coming to a conclusion on the

<sup>66</sup> 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.



likelihood that the development of the nominated site for a new nuclear power station will have an adverse effect on European Site integrity.

- 3.51 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.
- 3.52 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 five European Sites, the Severn Estuary SAC, SPA and Ramsar site, the River Wye SAC and the River Usk SAC through impacts on water resources and quality, habitat and species loss and fragmentation/ coastal squeeze and disturbance (noise/vibration, light and visual).
- 3.53 Table 5 below illustrates those sites where adverse effects on site integrity arising from the development cannot be ruled out.

**Table 5: Summary of Appropriate Assessment**

Potential Effects Arising from Development	European Sites at which potential adverse effects cannot be ruled out
<b>Water resources and quality</b>	<ul style="list-style-type: none"> <li>• Severn Estuary SAC</li> <li>• Severn Estuary SPA</li> <li>• Severn Estuary Ramsar</li> <li>• River Wye SAC</li> </ul>
<b>Habitat (and species) loss and fragmentation/ coastal squeeze</b>	<ul style="list-style-type: none"> <li>• Severn Estuary SAC</li> <li>• Severn Estuary SPA</li> <li>• Severn Estuary Ramsar</li> <li>• River Wye SAC</li> <li>• River Usk SAC</li> </ul>
<b>Disturbance (noise/vibration, light, visual)</b>	<ul style="list-style-type: none"> <li>• Severn Estuary SAC</li> <li>• Severn Estuary SPA</li> <li>• Severn Estuary Ramsar</li> <li>• River Wye SAC</li> </ul>

- 3.54 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.

- 3.55 Further assessment supported by detailed data at project level is therefore required to determine whether nuclear power development at this nominated site could be undertaken without adversely affecting the integrity of European Sites at Oldbury.**
- 3.56 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
EA	Environment Agency
EIA	Environmental Impact Assessment
HRA	Habitats Regulations Assessment
ICZM	Integrated Coastal Zone Management
IPC	Infrastructure Planning Commission
LA	Local Authority
LDF	Local Development Framework
LSE	Likely Significant Effect
LTP	Local Transport Plan
NE	Natural England
NH <sub>3</sub>	Ammonia
N2K	Natura 2000 sites
NO <sub>x</sub>	Nitrogen Oxides
NPS	National Policy Statement
PP	Plans and Projects
pSPA	Potential Special Protection Area
Ramsar	Wetland Sites designated by the Ramsar Convention
RoC	Review of Consents
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SO <sub>2</sub>	Sulphur Dioxide
SPA	Special Protection Area
SSA	Strategic Siting Assessment
SSSI	Site of Special Scientific Interest

SuDS	Sustainable Drainage Systems
WC	Water Companies
WRMU	Water Resource Management Unit

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