

Appendices to the 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 Report of the revised draft Nuclear NPS

- Introduction
- Methods
- Findings

Annexes to the Main HRA Report: Reports on Sites

- Site HRA Reports
- Technical Appendices

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

This document is the Appendices to the HRA 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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Appendix 1: European Site Characterisations

Natura 2000 Site Identification					
Natura 2000 Designation	Radius (measured from central grid reference point, MAGIC)				
	5km	10km	15km	20km	25km
SAC/SAC	<ul style="list-style-type: none"> • Severn Estuary 	<ul style="list-style-type: none"> • River Wye • Wye Valley and Forest of Dean Bat Sites • Wye Valley Woodlands 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Avon Gorge Woodlands 	<ul style="list-style-type: none"> • River Usk
SPA	<ul style="list-style-type: none"> • Severn Estuary 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None
Ramsar	<ul style="list-style-type: none"> • Severn Estuary 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None

Natura 2000 Site Characterisations

Special Areas of Conservation (SAC)¹

1. Avon Gorge Woodlands
2. River Wye
3. Wye Valley and Forest of Dean Bat Sites
4. Wye Valley Woodlands
5. River Usk
6. [Severn Estuary](#)

Special Protection Areas (SPA)²

1. [Severn Estuary](#)

Ramsar Sites³

1. [Severn Estuary](#)

All core site specific information unless otherwise stated has been referenced from the Countryside Council for Wales and Natural England Sources ([Natura 2000 Management Plans](#)) (Nature on the Map) and the Joint Nature Conservation Committee website ([Protected Sites](#)).

¹ **Special Areas of Conservation (SACs)** are classified under the Habitats Directive and provide rare and vulnerable animals, plants and habitats with increased protection and management

² **Special Protection Areas (SPAs)** are classified under the Birds Directive to help protect and manage areas which are important for rare and vulnerable birds because they use them for breeding, feeding, wintering or migration. Together SAC's and SPA's make up the Natura 2000 series

³ **Ramsar sites** are designated under the Convention on Wetlands of International Importance. The broad objectives are to stem the loss and progressive encroachment on wetlands now and in the future. These are often coincident with SPA sites designated under the Birds Directive. Although RAMSAR sites are not considered part of the Natura

Special Areas of Conservation

Site Name: River Wye

- Location Grid Ref: SO109369
- JNCC Site Code: [UK0012642](#)
- Size: 2234.89 (ha)
- Designation: SAC

	River Wye SAC
<p>Site Description</p>	<p>The River Wye catchment is divided between Wales and England; the river forms the border from south of Monmouth to Chepstow and to the east of Hay-on-Wye. The upper catchment comprises several large sub-catchments, including the Irfon on the generally infertile upland landscape in the north-west, the Ithon in the north-east on more low-lying, fertile terrain, and the Lugg in the east on a predominantly low-lying fertile landscape of which most lies within England.</p> <p>The underlying geology consists predominantly of impermeable, acidic rocks in the north-west and permeable sandstone in the middle and lower catchment. This geology produces low to moderate nutrient status and a low to moderate base-flow index, making the river characteristically flashy. The run-off characteristics and nutrient status are significantly modified by land use in the catchment, which is predominantly pastoral with some woodland and commercial forestry in the headwaters and arable in the lower catchment and the Lugg.</p> <p>Historically, the Wye is the most famous and productive river in Wales for Atlantic salmon <i>Salmo salar</i>, with high-quality spawning grounds and juvenile habitat in both the main channel and tributaries. The Wye salmon population is particularly notable for the very high proportion (around 75%) of multi sea winter (MSW) fish, a stock component which has declined sharply in recent years throughout the UK, with marked decline in the River Wye since the 1980s. However, the Wye salmon population is still of considerable importance in UK terms. The Atlantic salmon is the focus</p>

	River Wye SAC
	<p>for much of the management activity carried out on the Wye. The spawning requirements demand good water quality and spawning substrate such that any reduction in diffuse pollution and siltation impacts is a high priority.</p> <p>The Wye also holds the densest and most well-established otter <i>Lutra lutra</i> population occurring in lowland freshwater habitats in the borders of Wales. The river has bank-side vegetation cover, abundant food supply, clean water and undisturbed areas of dense scrub suitable for breeding, making it particularly favourable habitat for otters. The population remained even during the lowest point of the UK decline, confirming that this site is particularly favourable for otters and likely supports a highly stable population.</p> <p>The site is also considered one of the best in the UK for white-clawed crayfish <i>Austropotamobius pallipes</i>. The tributaries are the main haven for the species, particularly at the confluences of the main river and the Edw, Dulas Brook, Sgithwen and Clettwr Brook. Other importance species supported by the River Wye are twaite shad, bullhead and river, sea and brook lamprey.</p>
Qualifying Features	<p>Annex I habitats primary reason for selection:</p> <ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation <p>Annex I habitats qualifying feature:</p> <ul style="list-style-type: none"> • Transition mires and quaking bogs <p>Annex II species primary reason for selection:</p> <ul style="list-style-type: none"> • White-clawed (or Atlantic stream) crayfish <i>Austropotamobius pallipes</i> • Sea lamprey <i>Petromyzon marinus</i> • Brook lamprey <i>Lampetra planeri</i>

River Wye SAC	
	<ul style="list-style-type: none"> • River lamprey <i>Lampetra fluviatilis</i> • Twaite shad <i>Alosa fallax</i> • Atlantic salmon <i>Salmo salar</i> • Bullhead <i>Cottus gobio</i> • Otter <i>Lutra lutra</i> <p>Annex II Species qualifying feature:</p> <ul style="list-style-type: none"> • Allis shad <i>Alosa alosa</i>
Conservation Objectives	<p>The ecological status of the watercourse is a major determinant of Favourable Condition Status for all features. The required conservation objectives for the watercourse are defined below:</p> <p><u>Conservation Objectives for the watercourse</u></p> <ul style="list-style-type: none"> • To maintain and/or restore where necessary the capacity of the habitats in the SAC to support each feature at near-natural population levels by maintaining unmodified ecological and hydromorphological processes and characteristics; • The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature. This will include elements of water quantity and quality, physical habitat and community composition and structure; • To maintain and/or restore where necessary flow regime, water quality and physical habitat to, a near-natural state, to support the coherence of ecosystem structure and function across the SAC; • To maintain all known breeding, spawning and nursery sites of species features except where natural processes cause them to change; • To maintain flow, water quality, substrate quality and quantity at fish spawning sites and nursery areas and prevent their depletion by abstraction, discharges, engineering or gravel extraction activities or other impacts which may be detrimental to these sites; • To maintain the river platform and profile through minimizing or preventing any physical

	River Wye SAC
	<p>modification to the river such as through the construction of revetments on active alluvial river banks using stone, concrete or waste materials, or through the unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment;</p> <ul style="list-style-type: none"> • To maintain the river habitat SSSI features should in a favourable condition. Where the SAC habitat is not underpinned by a river habitat SSSI feature, the target is to maintain the characteristic physical features of the river channel, banks and riparian zone. • To remove or modify man-made barriers eg. weirs, bridge sills, acoustic barriers to allow the passage of species and their occupation of the full extent of their natural range; • To maintain natural factors such as waterfalls, which may otherwise limit, wholly or partially, the natural range of a species feature or dispersal between naturally isolated populations; • To maintain the natural range of the feature in the SAC; this range to include those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future; • To maintain and increase the population of otters in the SAC over the long term, through the maintenance or increase in the natural carrying capacity of the habitat within the SAC, as determined by natural levels of prey abundance and the presence of suitable riparian habitat; • The population size should not be limited by the availability of suitable undisturbed breeding sites. Where these are insufficient they should be created through habitat enhancement and where necessary the provision of artificial holts. • To maintain or increase the natural range of the plant communities represented within the SAC; • To maintain or increase the natural range of the white-clawed crayfish represented within the SAC; <p>Performance indicators can be found within the River Wye SAC Management Plan.</p>
Component SSSIs	The site has been divided into management units to enable practical communication about features, objectives, and management. Units have been based on the following:

	River Wye SAC
	<ul style="list-style-type: none"> • SSSI boundaries • Natural hydromorphology, where there are significant differences in management issues/key features between reaches • Units partly within England coincide with Natural England’s equivalent units, as far as is practicable • The units include one or more of EA’s River Basin Management Plan water bodies; as far as is practicable, unit boundaries coincide with these water body boundaries. <p>The component SSSIs and management units that comprise to form the River Wye SAC are:</p> <ul style="list-style-type: none"> • River Wye (Lower Wye) SSSI - Management units 1A to 1D; • River Wye (Upper Wye) SSSI - Management units 2A and 2B; • River Wye (Tributaries) SSSI - Management unit 3; • Afon Llynfi SSSI - Management unit 4; • Duhonw SSSI - Management unit 5; • Afon Irfon SSSI - Management unit 6; • River Ithon SSSI - Management unit 7; • Upper Wye Tributaries SSSI - Management unit 8; and • Colwyn Brook Marshes (North and South) SSSI - Management units 9A to 9G and 10A and 10E. <p>Note: a number of smaller SSSI have part of their area included within the River Wye SAC. These are not all included separately here, but management actions for adjacent SAC units also apply to these sites.</p> <p>Maps containing the component SSSIs and management units can be viewed on the CCW website.</p>
Key Environmental	The ecological structure and function of the site are dependent upon hydrological and

	River Wye SAC
<p>Conditions (factors that maintain site integrity)</p>	<p>geomorphological processes, as well as the quality of riparian habitats and connectivity of habitats.</p> <p>Animals that move around and sometimes leave the site, such as migratory fish and otters, may also be affected by factors operating outside the site.</p> <ul style="list-style-type: none"> <p>Hydrological processes particularly river flow (level and variability) and water chemistry, determine a range of habitat factors of importance to the SAC features (for example current velocity, water depth, wetted area, substrate quality, dissolved oxygen levels and water temperature). Maintenance of both high 'spate' flows and base-flows is essential. Reductions in flow may reduce the ability of adult migratory fish to reach spawning sites. Water-crowfoot vegetation thrives in relatively stable, moderate flows and clean water. The flow regime should be characteristic of the river to support the functioning of the river ecosystem.</p> <p>Geomorphological processes of erosion by water and subsequent deposition of eroded sediments downstream create the physical structure of the river habitats. While some sections of the river are naturally stable, others undergo continual and at times rapid change through erosion and deposition as is typical of meandering sections within floodplains (called 'alluvial' rivers). These processes help to sustain the river ecosystem by allowing a continued supply of clean gravels and other important substrates to be transported downstream. In addition, the freshly deposited and eroded surfaces enable ecological succession required by specialist, early-successional species. Processes at the wider catchment scale generally govern processes of erosion and deposition occurring at the reach scale, although locally factors such as the effect of grazing levels on riparian vegetation structure may contribute to enhanced erosion rates. In general, management that interferes with natural geomorphological processes (for example preventing bank erosion through the use of hard revetments or removing large amounts of gravel) are likely to damage ecosystem structure and function.</p>

	River Wye SAC
	<ul style="list-style-type: none"> • Diverse riparian habitats have a vital role in maintaining SAC features in a favourable condition. The type and condition of riparian vegetation influences shade and water temperature, nutrient run-off from adjacent land, the availability of woody debris to the channel and inputs of leaf litter and invertebrates to support in-stream consumers. Light, temperature and nutrient levels influence in-stream plant production and habitat suitability for the SAC features. Woody debris provides refuge areas from predators, traps sediment to create spawning and juvenile habitat and forms the base of an important aquatic food chain. Otters require sufficient undisturbed riparian habitat for breeding and resting sites. In the urban sections the focus may be on maintaining the river as a communication corridor but this will still require that sufficient riparian habitat is present and managed to enable the river corridor to function effectively. Overhanging trees provide valuable shade and food sources for Atlantic salmon whilst tree root systems provide important cover and flow refuges for juveniles. Bullheads are particularly associated with woody debris in lowland reaches, where it is likely that it provides an alternative source of cover from predators and floods. It may also be used as an alternative spawning substrate. • Habitat connectivity is an important property of river ecosystem structure and function. Many of the fish that spawn in the river are migratory, depending on the maintenance of suitable conditions on their migration routes to allow the adults to reach available spawning habitat and juvenile fish to migrate downstream. For resident species, dispersal to new areas, or the prevention of dispersal causing isolated populations to become genetically distinct, may be important factors. Naturally isolated populations that are identified as having important genetic distinctiveness should be maintained. • External factors operating outside the SAC, may also be influential, particularly for the migratory fish and otters. For example, salmon may be affected by barriers to migration in the Severn Estuary, inshore fishing and environmental conditions prevailing in their north Atlantic feeding

	River Wye SAC
	<p>grounds. Otters may be affected by developments that affect resting and breeding sites outside the SAC boundary.</p>
<p>SAC Condition Assessment</p>	<p>Conservation status (2006) of Feature 1: Sea lamprey <i>Petromyzon marinus</i> Favourable: Unclassified. Catchment density considerably exceeded the JNCC target threshold and also complied with targets for spawning site and ammocoete (juvenile stage) distribution.</p> <p>Conservation status (2006) of Feature 2: Brook lamprey <i>Lampetra planeri</i> and River lamprey <i>Lampetra fluviatilis</i> Favourable: Unclassified. Catchment density considerably exceeded the JNCC target threshold. However, <i>Lampetra</i> ammocoetes were recorded at only 30 of the 54 sample sites (56%) and thus failed to meet the criterion of presence in at least two thirds of sites within their natural range. Consequently, the feature may be in unfavourable condition. Further clarification is needed concerning a number of sample sites in the upper reaches (Upper Wye and Elan), which may reflect unsuitable habitat and/or be outside the natural ranges of the species. It has not been possible to distinguish between these two species during monitoring, due to the reliance on juvenile stages. Anecdotal evidence suggests that both species are likely to be present in many reaches, though brook lamprey are expected to predominate in the headwaters and river lamprey within the main channel and lower reaches of larger tributaries. More information on the relative abundance of these two species in different parts of the Wye SAC is desirable.</p> <p>Conservation status (2006) of Feature 3: Twait shad <i>Alosa fallax</i> and Allis shad <i>Alosa alosa</i> Unfavourable: Unclassified. The current unfavourable status results from a precautionary assessment of feature abundance, and from the presence of adverse factors, in particular the potential for damaging flow depletion and entrainment/impingement in water intakes. Physical barriers to migration are a major cause of unfavourable status of these species in Europe as a whole; however, there are not thought to be any significant barriers to shad migration in the Wye.</p>

	River Wye SAC
	<p>Conservation status (2006) of Feature 4: Atlantic salmon <i>Salmo salar</i> Unfavourable: Unclassified. The current unfavourable status results from failure of the Management Target for adult run size as well as a precautionary assessment of juvenile distribution and abundance and the presence of adverse factors, in particular the potential for flow depletion and localised water quality failures. Acidification due to forestry is a factor in the upper reaches of the Wye and Irfon.</p> <p>Conservation status (2006) of Feature 5: Bullhead <i>Cottus gobio</i> Unfavourable: Unclassified. The current unfavourable status results from the presence of adverse factors, in particular localised water quality failures. Records obtained from juvenile salmon monitoring show that bullhead are widespread in the main river and tributaries.</p> <p>Conservation (2006) status of Feature 6: European otter <i>Lutra lutra</i> Unfavourable. Their current condition is considered unfavourable due a lack of suitable breeding sites around the middle reaches of the river.</p> <p>Conservation status (2006) of Feature 7: Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation Unfavourable: Declining. The present unfavourable status of the feature results from declining water quality in some tributaries of the Wye for example parts of the Ithon and Llynfi sub-catchments, due mainly to diffuse pollution from agriculture. A further adverse factor is the widespread abundance of invasive non-native species (Japanese knotweed and Himalayan balsam) of bankside plant communities, which are included within the feature definition.</p> <p>Conservation status (2006) of Feature 8: White-clawed crayfish <i>Austropotamobius pallipes</i> Unfavourable: Declining. There is considerable anecdotal evidence of a major decline in the distribution and abundance of the native white-clawed crayfish in the Wye catchment over the last</p>

	River Wye SAC
	<p>few decades. Native crayfish may have been lost from the main river channel, from tributaries such as the Duhonw and Ithon and have almost disappeared from the Afon Irfon. Significant populations within the Wye SAC are now confined to the Sgithwen, Cletwr, Edw, Llynfi Dulas and Builth Road Dulas. The most recent assessment of the condition of crayfish in the Wye SAC, using modified Common Standards Monitoring techniques, found that populations are unfavourable.</p>
<p>Vulnerabilities (includes existing pressures and trends)</p>	<ul style="list-style-type: none"> • Abstraction levels - entrainment in water abstractions directly impacts on species population dynamics through reduced recruitment and survival rates. • Eutrophication - Under conditions of prolonged low flows and high nutrient status, epiphytic algae and other species indicative of eutrophication are promoted which may lead to the suppression of the growth of aquatic flowering plants. • Diffuse pollution - the most significant sources of diffuse pollution and siltation are from agriculture (fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land). Preventative measures can include surfacing of tracks and gateways, moving feeding areas, separating clean and dirty water in farmyards, and avoidance of ploughing land vulnerable to soil erosion or leaving such areas without crop cover during the winter. Contamination by synthetic pyrethroid sheep dips, which are extremely toxic to aquatic invertebrates, has a devastating impact on crayfish populations and can deprive fish populations of food over large stretches of river. Pollution from slurry and other agricultural and industrial chemicals, including fuels, can kill all forms of aquatic life. Discharges from sewage treatment works, urban drainage, engineering works such as road improvement schemes, contaminated land, and other domestic and industrial sources can also be significant causes of pollution, and must be managed appropriately. Pollution of rivers with toxic chemicals, such as PCBs, was one of the major factors identified in the widespread decline of otters during the last century. • Barriers to migration - Artificial obstructions can reduce connectivity. In addition, reaches subject to depleted flow levels, pollution, or disturbance due to noise, vibration or light, can all inhibit the movement of sensitive species. The dispersal of semi-terrestrial species, such as otter, can be adversely affected by structures such as bridges under certain flow conditions, therefore

	River Wye SAC
	<p>these must be designed to allow safe passage.</p> <ul style="list-style-type: none"> <p>• Development pressure - can cause temporary physical, acoustic, chemical and sediment barrier effects. Noise/vibration eg. due to impact piling, drilling, salmon fish counters present within or in close proximity to the river can create a barrier to fish migration. Barriers resulting from vibration, chemicals, low dissolved oxygen and artificially high sediment levels must be prevented at key times. Engineering works such as bridge repairs in reaches where white-clawed crayfish are known to occur should include appropriate pollution prevention measures and a crayfish rescue by a suitably licensed person where there is a risk of physical damage to crayfish.</p> <p>• Invasive and non-native species - are a detrimental impact on the water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation. Giant hogweed, Himalayan balsam and Japanese knotweed should be actively managed to control their spread and extent in the SAC. The American signal crayfish is present in the Wye catchment and poses a very serious threat to the continued existence of the native white-clawed crayfish in the site and in Wales. Native crayfish are unable to co-exist where signal crayfish are present, due to the latter's superior competitive ability and a disease, crayfish plague, which it carries but to which native crayfish have no immunity (crayfish plague is widespread in nearby catchments such as the Lugg, Arrow and Severn). Crayfish plague can be transferred to streams on wet fishing gear, boots, canoes, machinery, stocked fish etc., so measures such as raising awareness, disinfection facilities and where appropriate restrictions on access, should be implemented where a significant risk is identified. Signal crayfish are also extremely harmful to fish communities and the overall ecology of the river. Bullhead densities have been found to be negatively correlated with densities of non-native crayfish, suggesting competitive and/or predator-prey interactions.</p> <p>• Artificially enhanced densities of other fish - may introduce unacceptable competition or predation pressure and the aim should be to minimise these risks in considering any proposals for stocking. A small-scale salmon rearing and stocking programme is currently in operation in the Wye, run by the Wye and Usk Foundation. The management objectives for SAC salmon populations are to attain naturally self-sustaining populations. Salmon stocking should not be</p>

	River Wye SAC
	<p>routinely used as a management measure. Salmon stocking represents a loss of naturalness and, if successful, obscures the underlying causes of poor performance (potentially allowing these risks to perpetuate). It carries various ecological risks, including the loss of natural spawning from broodstock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population. Therefore, there is a presumption that salmon stocking in the Wye SAC will be phased out over time. The presence of artificially high densities of salmonids and other fish will create unacceptably high levels of predatory and competitive pressure on juvenile and adult bullhead. Stocking of fish should be avoided in the SAC.</p> <ul style="list-style-type: none"> • External factors - operating outside the SAC, may also be influential, particularly for the migratory fish and otters. For example, salmon may be affected by barriers to migration in the Severn Estuary, inshore fishing and environmental conditions prevailing in their north Atlantic feeding grounds. Otters may be affected by developments that affect resting and breeding sites outside the SAC boundary.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • N/A
HRA/AA Studies undertaken that address this site	<p>HRA Screening of the Torfaen Local Development Plan (2006-2021) January 2008. http://www.torfaen.gov.uk/EnvironmentAndPlanning/Planning/ForwardPlanning/Publications/HabitatsRegulationAssessment.pdf</p> <ul style="list-style-type: none"> • The screening concludes that due to the distance between the SAC and Torfaen (approximately 30-35km) it is considered that the LDP is unlikely to have any significant effects on this SAC. <p>HRA and AA of the Wales Spatial Plan Update June 2008. http://wales.gov.uk/about/strategy/spatial/hra/download/?lang=en</p> <ul style="list-style-type: none"> • The HRA Screening concludes that the WSPU and other plans have the potential to give rise to adverse effects at this site. <p>The AA states that it is not possible to predict in specific terms whether the WSPU would or would</p>

	River Wye SAC
	<p>not give rise to significant adverse effects either alone or in combination with other plans/ strategies and projects upon specific European sites. However, it does identify that this site is likely to come under increasing risk of adverse in combination effects from urban and economic development and recreation and tourism as a result of the WSPU. The AA also identifies that in the WSPU has the potential to have negative effects on water levels, flood protection and water quality issues, which could affect this site.</p>

Site Name: Wye Valley and Forest of Dean Bat

- Location Grid Ref: SO605044
- JNCC Site Code: [UK0014794](#)
- Size: 142.7(ha)
- Designation: SAC

Wye Valley and Forest of Dean Bat SAC	
Site Description	The Wye Valley and Forest of Dean Bats SAC straddles the Wales-England border and covers an area of 142.7ha. It is underpinned by 4 SSSI in Wales and 9 in England, all of which lie entirely within the SAC. This complex of sites contains by far the greatest concentration of lesser horseshoe bat <i>Rhinolophus hipposideros</i> in the UK, totalling about 26% of the national population. It has been selected on the grounds of the exceptional breeding population, and the majority of sites within the complex are maternity roosts. The site also supports the greater horseshoe bat <i>Rhinolophus ferrumequinum</i> in the northern part of its range, with about 6% of the UK population. The site contains the main maternity roost for bats in this area, which are believed to hibernate in the many disused mines in the Forest.
Qualifying Features	Annex II Species primary reason for selection: <ul style="list-style-type: none"> • Lesser horseshoe bat <i>Rhinolophus hipposideros</i> • Greater horseshoe bat <i>Rhinolophus ferrumequinum</i>
Conservation Objectives	Conservation Objective for Feature 1: Greater Horseshoe Bat <i>Rhinolophus ferrumequinum</i>; Feature 2: Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i> <ul style="list-style-type: none"> • The site will support a sustainable population of greater horseshoe bats in the Wye Valley area. • The population will be viable in the long term, acknowledging the population fluctuations of the species. • Buildings, structures and habitats on the site will be in optimal condition to support the

Wye Valley and Forest of Dean Bat SAC	
	<p>populations.</p> <ul style="list-style-type: none"> • Sufficient foraging habitat is available, in which factors such as disturbance, interruption to flight lines (hedgerows, tree lines and other linear features), mortality from predation or vehicle collision, and changes in habitat management that would reduce the available food source are not at levels which could cause any decline in population size or range. • Management of the surrounding habitats is of the appropriate type and sufficiently secure to ensure there is likely to be no reduction in population size or range, nor any decline in the extent or quality of breeding, foraging or hibernating habitat. <p>The performance indicators can be found within the Wye Valley and Forest of Dean Bat Sites SAC Management Plan.</p>
Component SSSIs	<ul style="list-style-type: none"> • Component SSSIs in Wales <ul style="list-style-type: none"> • Llangovan Church • Mwyngloddfa Mynydd-bach • Newton Court Stable Block • Wye Valley Lesser Horseshoe Bat Sites • Component SSSIs in England <ul style="list-style-type: none"> • Blaisdon Hall • Buckshraft Mine and Bradley Hill Railway Tunnel • Caerwood and Ashberry Goose House • Dean Hall Coach House and Cellar • Devil's Chapel Scowles • Old Bow and Old Ham Mines • Sylvan House Barn • Westbury Brook Ironstone Mine

Wye Valley and Forest of Dean Bat SAC	
	<ul style="list-style-type: none"> • Wigpool Ironstone Mine <p>A map of the component SSSIs is available on the CCW website.</p>
<p>Key Environmental Conditions (factors that maintain site integrity)</p>	<ul style="list-style-type: none"> • Site security - of buildings/structures that bats use should be maintained. • External condition of the building - Fabric of building sufficient to maintain roost conditions internally with: <ul style="list-style-type: none"> • Weatherproof roof. • No holes allowing excessive heat loss or high light levels in the roost area. • Walls sound, rainwater goods in adequate condition. • Solar heating sufficient to maintain adequate roost temperature, with no significant shading of the roost. • The building is structurally stable. • Internal condition of building - The internal fabric of the building is sufficient to maintain the roost location with: <ul style="list-style-type: none"> • No significant water penetration. • Low light levels with no through draught. • No toxic substances present which would adversely affect the health of the bats. • Roost access -The roost access is in a suitable condition to allow emergence by bats with: <ul style="list-style-type: none"> • A greater horseshoe bat entrance a minimum of 400mm x 300mm. • An entrance that is unobstructed and allows the bats to fly through unimpeded. • No artificial lights shining on access or associated flight paths.

Wye Valley and Forest of Dean Bat SAC	
	<ul style="list-style-type: none"> • Minimal disturbance - Human access to roost controlled and limited. Lesser horseshoe bats are very sensitive to disturbance and even the presence of a single person in close proximity can cause problems. • Temperature of roost area - Site specific requirements based on site monitoring. • Flight Lines - Bats require connectivity of habitat features for commuting and foraging. Active management of the habitats used by bats for these activities may be required. The importance of linear habitat features off site for bat flight lines should be recognised. • Management of surrounding habitat - The loss of flight lines in the form of walls, hedges or woodland rides within 1km around the roost should be prevented, as this is where juvenile bats learn to forage and navigate. There should be a similar aim to maintain or improve the quality of woodland and grazed pasture around and between areas identified as being used by the bats. Management of river habitats in the area is also critical due to the diversity of insect life that sustains the bats. The River Wye has also been shown to be an important flight line/feeding habitat for greater horseshoe bats. Increases in the amount of land that is cattle grazed, development of 'less managed' bushier hedgerows and conversion of improved grassland to semi-improved grassland, particularly close to the notified nursery roost, would improve the extent and quality of available greater horseshoe bat feeding habitat. Surrounding habitat management important for all units. • Hibernaculum access - These limits cover only the Mwyngloddfa Mynydd-Bach SSSI. Horseshoe bats prefer to fly through an entrance. The site entrance is in suitable condition to allow continued use by bats with: <ul style="list-style-type: none"> • Existing access unobstructed. • No unplanned new access causing a change to the ventilation.

Wye Valley and Forest of Dean Bat SAC	
	<ul style="list-style-type: none"> • No change in the size sufficient to affect the airflow and internal temperature. • The access used by the bats is stable. • No recent falls or signs of geological instability. • Vegetation present close to the access but not obstructing it. • No artificial lights shining on access or associated flight paths.
SAC Condition Assessment	<p>The following condition assessments only account for the component SSSIs that are situated in Wales:</p> <p>Conservation Status of Feature 1: Greater Horseshoe Bat <i>Rhinolophus ferrumequinum</i></p> <p>The greater horseshoe bat numbers of Newton Court Stable Block SSSI are monitored annually in June. The assessment found the SSSI to be in Favourable condition. But Favourable Condition Status is Unfavourable declining.</p> <p>Conservation Status of Feature 2: Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i></p> <p>The lesser horseshoe bat numbers for all component SSSIs are annually monitored. The assessment of all 3 component SSSIs showed lesser horseshoe bats to be favourable in two of the three areas. As all of the three SSSIs units have to be in good condition for the Lesser Horseshoe Bat overall to be favourable the feature is in unfavourable condition, and in this case we can give condition information at the unit level.</p> <p>Llangovan Church SSSI Current assessments are: MU1 Favourable maintained</p> <p>Mwyngloddfa Mynydd Bach SSSI Current assessments are: MU1 Favourable maintained</p>

Wye Valley and Forest of Dean Bat SAC						
Wye Valley Lesser Horseshoe Bats SSSI Current assessments are: MU1 Favourable maintained MU2 Unfavourable declining MU3 Unfavourable maintained MU4 Unfavourable declining						
The following table containing condition assessments only accounts for the component SSSIs that are situated in England:						
% Area meeting PSA ⁴ target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed	
Blaisdon Hall SSSI condition summary ⁵ (compiled 01 August 2008).						
100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	
Buckshraft Mine and Bradley Hill Railway Tunnel SSSI condition summary ⁶ (compiled 01 August 2008).						
100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	
Caerwood and Ashberry Goose House SSSI condition summary ⁷ (compiled 01 August 2008).						
100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	

⁴ PSA target - The Government's Public Service Agreement (PSA) target to have 95% of the SSSI area in favourable or recovering condition by 2010.

⁵ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1007183>

⁶ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=2000192>

⁷ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1005562>

Wye Valley and Forest of Dean Bat SAC						
	Dean Hall Coach House and Cellar SSSI condition summary ⁸ (compiled 01 August 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Devil's Chapel Scowles SSSI condition summary ⁹ (compiled 01 August 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Old Bow and Old Ham Mines SSSI condition summary ¹⁰ (compiled 01 August 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Sylvan House Barn SSSI condition of units ¹¹ (compiled 31 January 2006): Favourable Condition summary data for this area is currently unavailable.					
	Westbury Brook Ironstone Mine SSSI condition summary ¹² (compiled 01 August 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Wigpool Ironstone Mine SSSI condition summary ¹³ (compiled 01 August 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Vulnerabilities (includes existing pressures and trends)	<ul style="list-style-type: none"> • Deterioration of buildings used to roost - Alterations/neglect to the structure of the buildings could result in the site becoming unsuitable as a nursery roost by causing changes to the internal conditions of the roost. 				

⁸ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1001562>

⁹ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=2000189>

¹⁰ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=2000187>

¹¹ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt13&category=S&reference=1007184>

¹² Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=2000188>

¹³ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=2000191>

Wye Valley and Forest of Dean Bat SAC	
	<ul style="list-style-type: none"> • Disturbance - It is important that access to the mine systems and roosts is managed to protect the bats. Lesser horseshoe bats are very sensitive to disturbance, such as light and noise pollution and even the presence of a single person in close proximity can cause problems. Where there is a risk of disturbance by unauthorised persons, grilling the cave entrances should be considered. Any structures placed at cave entrances to prevent unauthorised access should not hinder the passage of bats. • Temperature change - Underground hibernation roosts should be dark, cool and humid with stable temperature (8 -12°C) beyond the entrance zone. • Habitat fragmentation - Development allocations pressures and transport development could lead to the loss or decline in quality of linear features (such as hedgerows and tree lines) which the bats use as flight lines. Connectivity of woodland, hedgerows, linear habitat and field boundary features are important as lesser horseshoe bats tend to feed in wooded areas and use linear features to navigate their way between roosts and foraging habitat.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • N/A
HRA/AA Studies undertaken that address this site	<p>HRA Screening of the Torfaen Local Development Plan (2006-2021) January 2008. http://www.torfaen.gov.uk/EnvironmentAndPlanning/Planning/ForwardPlanning/Publications/HabitatsRegulationAssessment.pdf</p> <ul style="list-style-type: none"> • Due to the distance between this SAC and Torfaen it is concluded that the LDP is unlikely to have any significant effects on this SAC. <p>HRA of the Draft South West Regional Spatial Strategy Proposed Changes (Land Use Consultants) July 2008. http://gosw.limehouse.co.uk/portal/regional_strategies/drss</p>

	Wye Valley and Forest of Dean Bat SAC
	<p>HRA and AA of the Wales Spatial Plan Update June 2008. http://wales.gov.uk/about/strategy/spatial/hra/download/?lang=en</p> <ul style="list-style-type: none">• The HRA Screening concludes that the WSPU and other plans have the potential to give rise to adverse effects at this site.• The AA states that it is not possible to predict in specific terms whether the WSPU would or would not give rise to significant adverse effects either alone or in combination with other plans/ strategies and projects upon specific European sites. However, it does identify that this site is likely to come under increasing risk of adverse in combination effects from recreation and tourism as a result of the WSPU and English RSSs.•

Site Name: Wye Valley Woodlands

Location Grid Ref: ST530957

JNCC Site Code: [UK0012727](#)

Size: 916.24 (ha)

Designation: SAC

Wye Valley Woodlands SAC	
Site Description	<p>The Wye Valley Woodlands SAC is a large woodland SAC that straddles the Wales–England border. The site covers an area of 914ha and is underpinned by 9 SSSIs in Wales and 7 in England, all of which lie entirely within the SAC.</p> <p>The Wye Valley contains abundant and near-continuous semi-natural woodland along the gorge. Beech stands occur as part of a mosaic with a wide range of other woodland types, and represent the western range of <i>Asperulo-Fagetum</i> beech forests. Such a variety of woodland types is rare within the UK. In places lime <i>Tilia</i> sp., elm <i>Ulmus</i> sp. and oak <i>Quercus</i> sp. share dominance with the beech. Structurally the woods include old coppice, pollards and high forest types. Lady Park Wood, one of the component sites, is an outstanding example of near-natural old-growth structure in mixed broad-leaved woodland, and has been the subject of detailed long-term monitoring studies.</p> <p>The woods of the lower Wye Valley on the border of south Wales and England form one of the most important areas for woodland conservation in the UK and provide the most extensive examples of <i>Tilio-Acerion</i> forest in the west of its range. A wide range of ecological variation is associated with slope, aspect and landform. The woodland occurs here as a mosaic with other types, including beech <i>Fagus sylvatica</i> and pedunculate oak <i>Quercus robur</i> stands. Uncommon trees, including large-leaved lime <i>Tilia platyphyllos</i> and rare whitebeams such as <i>Sorbus porrigentiformis</i> and <i>S. rupicola</i> are found here, as well as locally uncommon herbs, including wood barley <i>Hordelymus europaeus</i>, stinking hellebore <i>Helleborus foetidus</i>, narrow-leaved bitter-cress <i>Cardamine impatiens</i> and wood fescue <i>Festuca altissima</i>.</p>

Wye Valley Woodlands SAC	
	<p>Wye Valley is representative of yew <i>Taxus baccata</i> woods in the south-west of the habitat's range. It lies on the southern Carboniferous limestone, and yew occurs both as an understorey to other woodland trees and as major yew-dominated groves, particularly on the more stony slopes and crags.</p>
Qualifying Features	<p>Annex I habitats primary reason for selection:</p> <ul style="list-style-type: none"> • Asperulo-Fagetum beech forests • Tilio-Acerion forests of slopes, screes and ravines* Priority feature • Taxus baccata woods of the British Isles* Priority feature <p>Annex II species qualifying feature:</p> <ul style="list-style-type: none"> • Lesser horseshoe bat <i>Rhinolophus hipposideros</i>
Conservation Objectives	<p>Conservation Objective for Feature 1: <i>Tilio–Acerion</i> forests of slopes, screes and ravines</p> <ul style="list-style-type: none"> • <i>Tilio-Acerion</i> woodland maintained in all eight of the Welsh SSSIs that contribute to the Wye Valley Woodlands SAC. • The woodland area covers the entire site and is maintained as far as possible by natural processes. • The location of open glades varies over time. • Trees and shrubs are mainly locally native broadleaved species, are of a wide range of ages and sizes, and the abundance and density of individual native species varies across the site. • Tree seedlings are plentiful throughout the site and develop into saplings in the open glades. • There are abundant dead and dying trees with holes and hollows, rot columns, torn off limbs and rotten branches, with some dead and dying trees partially or completely hollow. • Fallen dead wood is dense enough to obstruct progress by foot across the entire site, except on established maintained paths.

	Wye Valley Woodlands SAC
	<ul style="list-style-type: none"> • Dead wood dependent species of moss, liverwort, fungi and specialised invertebrates are present, in spatially and temporally variable abundance, throughout the site. • Field and ground layers are well developed with a patchwork of vegetation communities characteristic of local soil and humidity conditions. <p>Conservation Objective for Feature 2: <i>Asperulo–Fagetum</i> beech forests; Feature 3: <i>Taxus Baccata</i> woods of the British Isles</p> <ul style="list-style-type: none"> • <i>Asperulo–Fagetum</i> woodland continues to be present in Fiddler’s Elbow, Harper’s Grove-Lord’s Grove, Lower Hael, Cleddon Shoots and Blackcliff Wyndcliff, woods that contribute to the Wye Valley Woodlands SAC. • The woodland area covers the entire site and is maintained as far as possible by natural processes. • One quarter of the woodland canopy is open at any time, with the location of open glades varying over time. • Trees and shrubs are mainly locally native broadleaved species, are of a wide range of ages and sizes, and the abundance and density of individual native species varies across the site. • Tree seedlings are plentiful throughout the site and develop into saplings in the open glades. • There are abundant dead and dying trees with holes and hollows, rot columns, torn off limbs and rotten branches, with some dead and dying trees partially or completely hollow. • Fallen dead wood is dense enough to obstruct progress by foot across the entire site, except on established maintained paths. • Field and ground layers are a patchwork of vegetation communities characteristic of local soil and humidity conditions. • The woodland supports populations of birds (including pied flycatchers, redstarts, wood warblers) and mammals (including several bat species, otters and badgers).

Wye Valley Woodlands SAC	
	<p>Conservation Objective for Feature 4: Lesser horseshoe bat <i>Rhinolophus hipposideros</i></p> <ul style="list-style-type: none"> • The woodlands continue to support populations of lesser horseshoe bat. • Sufficient foraging habitat is available, in which factors such as disturbance, interruption to flight lines (hedgerows, tree lines), mortality from predation or vehicle collision, and changes in habitat management that would reduce the available food source are not at levels, which could cause any decline in population size. • Management of the woodland SAC is of the appropriate type and sufficiently secure to ensure there is likely to be no reduction in population size or range, nor any decline in the extent or quality of breeding, foraging or hibernating habitat, for example due to over-intensive woodland management. • Disturbance to roost sites both within the site and in the surrounding area, especially from human physical presence, noise and lighting, is minimized. <p>The performance indicators can be found within the Wye Valley Woodlands SAC Management Plan.</p>
Component SSSIs	<ul style="list-style-type: none"> • Component SSSIs: <ul style="list-style-type: none"> • Blackcliff-Wyndcliff • Cleddon Shoots Woodland • Fiddlers Elbow • Graig Wood • Harper's Grove-Lord's Grove • Livox Wood • Lower Hael Wood • Pierce, Alcove and Piercefield Woods • Upper Wye Gorge (In Wales but managed by NE)

Wye Valley Woodlands SAC	
	<ul style="list-style-type: none"> • Component SSSIs in England <ul style="list-style-type: none"> • Astridge Wood • Bigsweir Wood • Highbury Wood • Lower Wye Gorge • Shorn Cliff and Caswell Woods • Swanpool Wood and Furnace Grove • The Hudnalls <p>A map of the component SSSIs is available on the CCW website.</p>
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Habitat management - The <i>Tilio–Acerion</i> woodland should be maintained through traditional woodland management, a combination of minimum intervention, coppice with standards and managed high forest. The <i>Asperulo–Fagetum</i> woodlands should be maintained through minimum intervention, with some areas also using traditional management practices of coppice with standards and managed high forest. The <i>Taxus baccata</i> woods should be maintained through minimum intervention. All the habitat management requirements for the lesser horseshoe bat will be met through the appropriate management of the features above. • Grazing management - Deer management and protection from rabbits or livestock is necessary.
SAC Condition Assessment	<p>The following condition assessments only account for the component SSSIs that are situated in Wales:</p> <p>Conservation Status of Feature 1: <i>Tilio–Acerion</i> forests of slopes, screes and ravines The <i>Tilio-Acerion</i> forests and associated non-SAC semi natural broadleaved woodland features were monitored in detail in the summer 2005-6. In this case CCW can give condition information at the unit level. As all of the five areas have to be in good condition for the <i>Tilio-Acerion</i> overall to be</p>

Wye Valley Woodlands SAC						
<p>favourable the feature is in unfavourable condition.</p> <p>Conservation Status of Feature 2: <i>Asperulo-Fagetum</i> beech forests The <i>Asperulo-Fagetum</i> forests and associated non-SAC semi natural broadleaved woodland features were monitored in detail in the 2005-6. The assessment on all 5 component SSSIs showed <i>Asperulo-Fagetum</i> to be unfavourable in one of the three key areas. As all of the three areas have to be in good condition for the <i>Asperulo-Fagetum</i> overall to be favourable the feature is in unfavourable condition.</p> <p>Conservation Status of Feature 3: <i>Taxus baccata</i> woods of the British Isles The <i>Taxus baccata</i> woods were monitored in detail in the Winter 2005. The assessment of Blackcliff- Wyndcliff component SSSI was that the feature was in favourable condition.</p> <p>Conservation Status of Feature 4: <i>Rhinolophus hipposideros</i> lesser horse shoe bat CCW need to speak with Natural England to get monitoring results of this feature.</p>						
<p>The following table containing condition assessments only accounts for the component SSSIs that are situated in England:</p>						
% Area meeting PSA¹⁴ target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed	
<p>Astridge Wood SSSI condition summary¹⁵ (compiled 01 July 2008).</p>						

¹⁴ PSA target - The Government's Public Service Agreement (PSA) target to have 95% of the SSSI area in favourable or recovering condition by 2010.

¹⁵ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/sssi/reportAction.cfm?report=sdrt18&category=S&reference=1003696>

Wye Valley Woodlands SAC						
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Bigswear Wood SSSI condition summary ¹⁶ (compiled 01 July 2008).					
	100.00%	11.90%	88.10%	0.00%	0.00%	0.00%
	Highbury Wood SSSI condition summary ¹⁷ (compiled 01 July 2008).					
	40.20%	40.20%	0.00%	0.00%	59.80%	0.00%
	Lower Wye Gorge Wood SSSI condition summary ¹⁸ (compiled 01 July 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Shorn Cliff and Caswell Woods SSSI condition summary ¹⁹ (compiled 01 July 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
	Swanpool Wood and Furnace Grove SSSI condition summary ²⁰ (compiled 01 July 2008).					
	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%
	The Hudnalls SSSI condition summary ²¹ (compiled 01 July 2008).					
	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Vulnerabilities (includes existing pressures and	<ul style="list-style-type: none"> • Inappropriate management - Principal pressures are from lack of management (particularly 					

¹⁶ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdr18&category=S&reference=1003764>

¹⁷ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdr18&category=S&reference=1000049>

¹⁸ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdr18&category=S&reference=1003607>

¹⁹ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdr18&category=S&reference=1002428>

²⁰ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdr18&category=S&reference=1000840>

²¹ Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdr18&category=S&reference=1001654>

Wye Valley Woodlands SAC	
trends)	<p>traditional management, for example coppice) and inappropriate management proposals which would alter the recognised woodland stand types.</p> <ul style="list-style-type: none"> • Grazing - When woodland is grazed for many years it can prevent the natural regeneration of the woodland, since seedlings and coppice stools are given no opportunity to grow into viable trees. There is a serious problem with deer grazing in these woodlands. It is necessary to control the number of animals grazing in the wood using appropriate measures. Fences and gates should be erected and maintained around areas of regeneration in order to prevent damage. In the future, light grazing by stock may be considered to help reduce the competition from other species allowing seedling regeneration to replace older stools. • Off-site pollution - The effects of the releases of quarry dust into the atmosphere from the works adjacent to the Blackcliff -Wyndcliff SSSI are not known; these emissions are subject to the authorisation of other competent authorities, particularly the Environment Agency.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • N/A
HRA/AA Studies undertaken that address this site	<p>HRA Screening of the Torfaen Local Development Plan (2006-2021) January 2008. http://www.torfaen.gov.uk/EnvironmentAndPlanning/Planning/ForwardPlanning/Publications/HabitatsRegulationAssessment.pdf</p> <ul style="list-style-type: none"> • Due to the distance between this SAC and Torfaen it is concluded that the LDP is unlikely to have any significant effects on this SAC. <p>HRA of the Draft South West Regional Spatial Strategy Proposed Changes (Land Use Consultants) July 2008. http://gosw.limehouse.co.uk/portal/regional_strategies/drss</p>

	Wye Valley Woodlands SAC
	<p>HRA and AA of the Wales Spatial Plan Update June 2008. http://wales.gov.uk/about/strategy/spatial/hra/download/?lang=en</p> <ul style="list-style-type: none">• The HRA Screening concludes that the WSPU and other plans have the potential to give rise to adverse effects at this site.• The AA states that it is not possible to predict in specific terms whether the WSPU would or would not give rise to significant adverse effects either alone or in combination with other plans/ strategies and projects upon specific European sites.•

Site Name: Avon Gorge Woodlands

Location Grid Ref: 023801W/ 512750N

JNCC Site Code [UK0012734](#)

Size: 152.35

Designation: SAC

Avon Gorge Woodlands SAC	
Site Description	<p>Avon Gorge is representative of <i>Tilio-Acerion</i> forests in south-west England on the limestone cliffs and screes of a large river gorge. It is important because of the high concentration of small-leaved lime <i>Tilia cordata</i>, compared with other sites in the region, the presence of rare whitebeams <i>Sorbus</i> spp., including two unique to the Avon Gorge (<i>S. bristoliensis</i> and <i>S. wilmottiana</i>), and other uncommon plants, such as green hellebore <i>Helleborus viridis</i>. Other characteristic species include soft shield-fern <i>Polystichum setiferum</i> and hart's-tongue <i>Phyllitis scolopendrium</i>. Species-rich transitions to scrub and grasslands are associated with the woodland. Small groves of yew <i>Taxus baccata</i> also occur on some of the stonier situations.</p>
Qualifying Features	<p>Annex I habitats that are a primary reason for selection of this site</p> <p>9180 <u><i>Tilio-Acerion</i> forests of slopes, screes and ravines</u></p> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site</p> <p>6210 <u>Semi-natural dry grasslands and scrubland facies: on calcareous substrates (<i>Festuco-Brometalia</i>)</u></p>

Avon Gorge Woodlands SAC	
Conservation Objectives	<p>Conservation Objective for <i>Tilio–Acerion</i> forests of slopes, screes and ravines</p> <p>This habitat mainly forms part the UK BAP Habitat Action Plan for upland mixed ashwoods (see http://www.ukbap.org.uk), which has targets to maintain existing areas of such woodland, restore some areas that have been replanted with non-native species, initiate measures to improve its condition, and expand the resource by natural colonisation or planting.</p> <p>This habitat is subject to a number of legal instruments, national policy measures and grant-aid schemes. These prevent clear-felling for conversion to other land uses, and aim to maintain and restore their ecological diversity and expand remnant and new native woods. All woodland is expected to be managed according to the UK Forestry Standard, with ancient and semi-natural woodland receiving special provision. Felling of trees and grant aid are controlled by the Forestry Authority and are conditional upon management achieving these aims in accordance with published guidance. The Woodland Grant Scheme provides finance for regenerating, planting and other management activities.</p> <p>About 20-30% of upland mixed ashwoods are protected in whole or as part of SSSIs under the Wildlife and Countryside Act 1981 or the Nature Conservation and Amenity Lands Order (Northern Ireland) 1985.</p> <p>Other conservation objectives for this habitat type include the following:</p> <ul style="list-style-type: none"> • The woodland area covers the entire site and is maintained as far as possible by natural processes. • The location of open glades varies over time. • Trees and shrubs are mainly locally native broadleaved species, are of a wide range of ages and sizes, and the abundance and density of individual native species varies across the site. • Tree seedlings are plentiful throughout the site and develop into saplings in the open glades. • There are abundant dead and dying trees with holes and hollows, rot columns, torn off limbs and

Avon Gorge Woodlands SAC	
	<p>rotten branches, with some dead and dying trees partially or completely hollow.</p> <ul style="list-style-type: none"> • Fallen dead wood is dense enough to obstruct progress by foot across the entire site, except on established maintained paths. <p><u>Conservation Objective for Semi-natural dry grasslands and scrubland facies: on calcareous substrates (<i>Festuco-Brometalia</i>)</u></p> <p>This habitat is covered by a national action plan under the UK BAP with targets to maintain, improve, restore and expand the resource. Relevant actions under the BAP include:</p> <ul style="list-style-type: none"> • programmes to facilitate and encourage grazing of semi-natural grasslands for conservation • socio-economic/marketing research and initiatives to investigate and promote the benefits of food produced from such grassland <p>The habitat is also covered by agri-environment schemes in the UK, most notably the Higher Level Environmental Stewardship in England, which can contract landowners to maintain, restore and create this type of grassland. Around two-thirds of designated sites (by number) are managed under agrienvironment schemes or other management agreements.</p> <p>Research to determine the long-term requirements of lowland calcareous grassland has been proposed by the JNCC lowland grassland LCN and the HAP steering group. In the absence of better information the latter group is recommending a series of targets for increasing the extent of Lowland calcareous grassland by targeting existing patches of related vegetation.</p>
Component SSSIs	<ul style="list-style-type: none"> • Avon Gorge SSSI
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Scrub management/ prevent of scrub encroachment • Appropriate management regime for unimproved grassland • Managing recreational (walking, climbing, cycling access) to prevent erosion/ disturbance

Avon Gorge Woodlands SAC													
SAC Condition Assessment	<p>Avon Gorge SSSI Condition Status:</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="background-color: #d3d3d3;">% Area meeting PSA target</th> <th style="background-color: #d3d3d3;">% Area favourable</th> <th style="background-color: #d3d3d3;">% Area unfavourable recovering</th> <th style="background-color: #d3d3d3;">% Area unfavourable no change</th> <th style="background-color: #d3d3d3;">% Area unfavourable declining</th> <th style="background-color: #d3d3d3;">% Area destroyed / part destroyed</th> </tr> </thead> <tbody> <tr> <td>96.41%</td> <td>73.49%</td> <td>22.92%</td> <td>0.00%</td> <td>3.59%</td> <td>0.00%</td> </tr> </tbody> </table>	% Area meeting PSA target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed	96.41%	73.49%	22.92%	0.00%	3.59%	0.00%
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96.41%	73.49%	22.92%	0.00%	3.59%	0.00%								
Vulnerabilities (includes existing pressures and trends)	<ul style="list-style-type: none"> • There are no significant threats to the Annex I habitat on this site. Part is managed as a National Nature Reserve (NNR) and the management of the remainder is being addressed through a Site Management Statement, which is being negotiated. • The presence of non-native trees throughout the site needs to be assessed. • In addition, scrub invasion on calcareous grasslands is a problem. Both of these have begun to be tackled through the Avon Gorge and Downs Wildlife Project. 												
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • Bristol City Council/ National Trust 												
HRA/AA Studies undertaken that address this site	<p>HRA of the Draft Regional Spatial Strategy for the South West, South West Regional Assembly (February, 2007, LUC)</p> <p>.</p>												

Site Name: River Usk

- Location Grid Ref: SO126219
- JNCC Site Code: [UK0013007](#)
- Size: 1008.26 (ha)
- Designation: SAC

River Usk SAC	
Site Description	<p>The Usk catchment is entirely within Wales, rising in the Black Mountain range in the west of the Brecon Beacons National Park and flows east and then south, to enter the Severn Estuary at Newport. The overall form of the catchment is long and narrow, with short, generally steep tributaries flowing north from the Black Mountain, Fforest Fawr and Brecon Beacons, and south from Mynydd Epynt and the Black Mountains. The underlying geology consists predominantly of Devonian Old Red Sandstone with a moderate base status, resulting in waters that are generally well buffered against acidity. This geology also produces a generally low to moderate nutrient status, and a moderate base-flow index, intermediate between base-flow dominated rivers and more flashy rivers on less permeable geology. The run-off characteristics and nutrient status are significantly modified by land use in the catchment, which is predominantly pastoral with some woodland and commercial forestry in the headwaters and arable in the lower catchment. The ecological structure and functions of the site are dependent on hydrological and geomorphological processes as well as the quality of riparian habitats and connectivity of habitats. Animals that move around and sometimes leave the site, such as migratory fish and otters, may also be affected by factors operating outside the site.</p> <p>Hydrological processes, in particular river flow (level and variability) and water chemistry, determine a range of habitat factors of critical importance to the SAC features, including current velocity, water depth, wetted area, substrate quality, dissolved oxygen levels and water temperature. Reduction in flows may reduce the ability of the adults of migratory fish to reach spawning sites. Watercrowfoot vegetation thrives in relatively stable, moderate flows and clean water. In general, management that interferes with natural geomorphological processes, for example preventing bank erosion through</p>

	River Usk SAC
	<p>the use of hard revetments or removing large amounts of gravel, are likely to be damaging to the coherence of the ecosystem structure and functions.</p> <p>Riparian habitats, including bank sides and habitats on adjacent land, are an integral part of the river ecosystem. Diverse and high quality riparian habitats have a vital role in maintaining the SAC features in a favourable condition. Woody debris is very important as it provides refuge areas from predators, traps sediment to create spawning and juvenile habitat and forms the base of an important aquatic food chain. Otters require sufficient undisturbed riparian habitats as breeding and resting sites. It is important that appropriate amounts of tree cover, in general at least 50% high canopy cover, tall vegetation and other semi-natural habitats are maintained on the riverbanks and in adjacent areas, and that they are properly managed to support the SAC features.</p> <p>Habitat connectivity is an important property of river ecosystem structure and function. Many of the fish that spawn in the river are migratory, depending on the maintenance of suitable conditions on their migration routes to allow the adults to reach available spawning habitat and juvenile fish to migrate downstream. For resident species, dispersal to new areas, or the prevention of dispersal causing isolated populations to become genetically distinct, may be important factors. Naturally isolated feature populations that are identified as having important genetic distinctiveness should be maintained. Artificial obstructions including weirs and bridge sills can reduce connectivity for some species. In addition, reaches subject to depleted flow levels, pollution, or disturbance due to noise, vibration or light, can all inhibit the movement of sensitive species. The dispersal of semi-terrestrial species, such as the otter, can be adversely affected by structures such as bridges under certain flow conditions; therefore, these must be designed to allow safe passage. The continuity of riparian habitats enables a wide range of terrestrial species, for example lesser horseshoe bats, to migrate and disperse through the landscape. Connectivity should be maintained or restored where necessary as a means to ensure access for the features to sufficient habitat within the SAC.</p> <p>External factors, operating outside the SAC, may also be influential, particularly for the migratory fish</p>

River Usk SAC	
	and otters. For example, salmon may be affected by barriers to migration in the Severn Estuary, inshore fishing and environmental conditions prevailing in their north Atlantic feeding grounds. Otters may be affected by developments that affect resting and breeding sites outside the SAC boundary.
Qualifying Features	<p>Annex II species primary reason for selection:</p> <ul style="list-style-type: none"> • Sea lamprey <i>Petromyzon marinus</i> • Brook lamprey <i>Lampetra planeri</i> • River lamprey <i>Lampetra fluviatilis</i> • Twaite shad <i>Alosa fallax</i> • Atlantic salmon <i>Salmo salar</i> • Bullhead <i>Cottus gobio</i> • Otter <i>Lutra lutra</i> <p>Annex II Species qualifying feature:</p> <ul style="list-style-type: none"> • Allis shad <i>Alosa alosa</i> <p>Annex I habitats qualifying feature:</p> <ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
Conservation Objectives	<p>The ecological status of the watercourse is a major determinant of Favourable Condition Status for all features. The required conservation objectives for the watercourse are defined below:</p> <p><u>Conservation Objectives for the watercourse</u></p> <ul style="list-style-type: none"> • The capacity of the habitats in the SAC to support each feature at near-natural population levels, as determined by predominantly unmodified ecological and hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary.

	River Usk SAC
	<ul style="list-style-type: none"> • The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature. This will include elements of water quantity and quality, physical habitat and community composition and structure. • Flow regime, water quality and physical habitat should be maintained in, or restored as far as possible to, a near-natural state, in order to support the coherence of ecosystem structure and function across the whole area of the SAC. • All known breeding, spawning and nursery sites of species features should be maintained as suitable habitat as far as possible, except where natural processes cause them to change. • Flows, water quality, substrate quality and quantity at fish spawning sites and nursery areas will not be depleted by abstraction, discharges, engineering or gravel extraction activities or other impacts to the extent that these sites are damaged or destroyed. • The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC, including, but not limited to, revetments on active alluvial river banks using stone, concrete or waste materials, unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment, will be avoided. • River habitat SSSI features should be in favourable condition. In the case of the Usk Tributaries SSSI, the SAC habitat is not underpinned by a river habitat SSSI feature. In this case, the target is to maintain the characteristic physical features of the river channel, banks and riparian zone. • Artificial factors impacting on the capability of each species feature to occupy the full extent of its natural range should be modified where necessary to allow passage, eg. weirs, bridge sills, acoustic barriers. • Natural factors such as waterfalls, which may limit the natural range of a species feature or dispersal between naturally isolated populations, should not be modified. • Flows during the normal migration periods of each migratory fish species feature will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered. • Flow objectives for assessment points in the Usk Catchment Abstraction Management Strategy will be agreed between EA and CCW as necessary. It is anticipated that these limits will concur

	River Usk SAC
	<p>with the standards used by the Review of Consents process.</p> <ul style="list-style-type: none"> • Levels of nutrients, in particular phosphate, will be agreed between EA and CCW for each Water Framework Directive water body in the Usk SAC, and measures taken to maintain nutrients below these levels. It is anticipated that these limits will concur with the standards used by the Review of Consents process. • Levels of water quality parameters that are known to affect the distribution and abundance of SAC features will be agreed between EA and CCW for each Water Framework Directive water body in the Usk SAC, and measures taken to maintain pollution below these levels. It is anticipated that these limits will concur with the standards used by the Review of Consents process. • Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects. • Levels of suspended solids will be agreed between EA and CCW for each Water Framework Directive water body in the Usk SAC. Measures including, but not limited to, the control of suspended sediment generated by agriculture, forestry and engineering works, will be taken to maintain suspended solids below these levels. <p>The performance indicators can be found within the River Usk SAC Management Plan.</p>
Component SSSIs	<p>The component SSSIs and management units that comprise to form the River Usk SAC are:</p> <ul style="list-style-type: none"> • River Usk (Upper Usk) SSSI • River Usk (Lower Usk) SSSI • River Usk (Tributaries) SSSI • Penllwyn-yr-hendy SSSI • Coed Dyrysiog SSSI • Coed Nant Menascin SSSI

	River Usk SAC
	<ul style="list-style-type: none"> • Coed Ynysfaen SSSI <p>The SAC has been divided into 10 management units:</p> <ul style="list-style-type: none"> • Units 1 to 3 - River Usk (Lower Usk) SSSI. • Units 4 to 6 - River Usk (Upper Usk) SSSI. • Units 7 to 10 - River Usk (Tributaries) SSSI. <p>Maps containing the component SSSIs and management units can be viewed on the CCW website.</p>
<p>Key Environmental Conditions (factors that maintain site integrity)</p>	<ul style="list-style-type: none"> • Hydrological processes: <ul style="list-style-type: none"> • River flow (level and variability) and water chemistry, determine a range of habitat factors of critical importance to the SAC features, including current velocity, water depth, wetted area, substrate quality, dissolved oxygen levels and water temperature. Maintenance of both high 'spate' flows and base-flows is essential. Reduction in flows may reduce the ability of the adults of migratory fish to reach spawning sites. Water-crowfoot vegetation thrives in relatively stable, moderate flows and clean water. The flow regime should be characteristic of the river in order to support the functioning of the river ecosystem. • Geomorphological processes - of erosion by water and subsequent deposition of eroded sediments downstream, create the physical structure of the river habitats. Whilst some sections of the river are naturally stable, especially where they flow over bedrock, others undergo constant and at times rapid change through the erosion and deposition of bed and bank sediments as is typical of meandering sections within floodplains (called 'alluvial' rivers). These processes help to sustain the river ecosystem by allowing a continued supply of clean gravels and other important substrates to be transported downstream. In addition, the freshly deposited and eroded surfaces, such as shingle banks and earth cliffs, enable processes of ecological succession to begin again, providing an essential habitat for specialist, early-successional species. Lampreys need clean

	River Usk SAC
	<p>gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes. Processes at the wider catchment scale generally govern processes of erosion and deposition occurring at the reach scale, although locally, factors such as the effect of grazing levels on riparian vegetation structure may contribute to enhanced erosion rates. In general, management that interferes with natural geomorphological processes, for example preventing bank erosion through the use of hard revetments or removing large amounts of gravel, are likely to be damaging to the coherence of the ecosystem structure and functions.</p> <ul style="list-style-type: none"> <p>Riparian habitats - including bank sides and habitats on adjacent land, are an integral part of the river ecosystem. Diverse and high quality riparian habitats have a vital role in maintaining the SAC features in a favourable condition. The type and condition of riparian vegetation influences shade and water temperature, nutrient run-off from adjacent land, the availability of woody debris to the channel and inputs of leaf litter and invertebrates to support in-stream consumers. Light, temperature and nutrient levels influence in-stream plant production and habitat suitability for the SAC features. Woody debris is very important as it provides refuge areas from predators, traps sediment to create spawning and juvenile habitat and forms the base of an important aquatic food chain. Otters require sufficient undisturbed riparian habitats as breeding and resting sites. It is important that appropriate amounts of tree cover, in general at least 50% high canopy cover, tall vegetation and other semi-natural habitats are maintained on the riverbanks and in adjacent areas, and that they are properly managed to support the SAC features. This may be achieved, for example, through managing grazing levels, selective coppicing of riparian trees and restoring adjacent wetlands. In the urban sections the focus may be on maintaining the river as a communication corridor but this will still require that sufficient riparian habitat is present and managed to enable the river corridor to function effectively.</p> <p>Habitat connectivity - is an important property of a river ecosystem structure and function. Many of the fish that spawn in the river are migratory, depending on the maintenance of suitable</p>

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	<p>conditions on their migration routes to allow the adults to reach available spawning habitat and juvenile fish to migrate downstream. For resident species, dispersal to new areas, or the prevention of dispersal causing isolated populations to become genetically distinct, may be important factors. Naturally isolated feature populations that are identified as having important genetic distinctiveness should be maintained. Artificial obstructions including weirs and bridge sills can reduce connectivity for some species. In addition, reaches subject to depleted flow levels, pollution, or disturbance due to noise, vibration or light, can all inhibit the movement of sensitive species. The dispersal of semi-terrestrial species such as the otter can be adversely affected by structures such as bridges under certain flow conditions; therefore, these must be designed to allow safe passage. The continuity of riparian habitats enables a wide range of terrestrial species, for example lesser horseshoe bats, to migrate and disperse through the landscape. Connectivity should be maintained or restored where necessary as a means to ensure access for the features to sufficient habitat within the SAC.</p>
<p>SAC Condition Assessment</p>	<p>Conservation status (2006) of Feature 1: Sea lamprey <i>Petromyzon marinus</i> Unfavourable: Unclassified. Sea lamprey monitoring showed that overall catchment mean ammocoete density considerably exceeded the JNCC target threshold and also complied with targets for spawning site and ammocoete distribution.</p> <p>Factors leading to an unfavourable assessment are the presence of probable partial barriers further downstream (notably Crickhowell Bridge), and flow depletion resulting from abstractions including Brecon canal and Prioress Mill public water supply abstraction. The latter in particular has been shown to have effects both on a seasonal timescale by reducing spate flows during the migration period and on a diurnal timescale by substantially depleting flows during the night time to the extent that sea lamprey nests and nursery areas are likely to be exposed above the water level. The effect of the Brecon canal abstraction has been shown to comprise a substantial depletion of flows, at least locally, during low flow periods with a resulting reduction in river depth downstream of the off-take</p>

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	<p>weir.</p> <p>Conservation status (2006) of Feature 2: Brook lamprey <i>Lampetra planeri</i> and River lamprey <i>Lampetra fluviatilis</i> Favourable: Unclassified. Catchment density considerably exceeded the JNCC target threshold and also complied with targets for ammocoete distribution.</p> <p>It has not been possible to distinguish between these two species during monitoring, due to the reliance on juvenile stages (ammocoetes). Anecdotal evidence suggests that both species are likely to be present in many reaches, though brook lamprey are expected to predominate in the headwaters and river lamprey may be the more abundant species in the main channel and the lower reaches of larger tributaries. More information on the relative abundance of these two species in different parts of the Usk SAC is desirable. Records of spawning adult river lamprey would be particularly useful.</p> <p>Conservation status (2006) of Feature 3: Twait shad <i>Alosa fallax</i> and Allis shad <i>Alosa alosa</i> Unfavourable: Unclassified. The current unfavourable status results from a precautionary assessment of feature distribution and abundance, and from the presence of adverse factors, in particular flow depletion and physical barriers to migration.</p> <p>These methods do not distinguish between the two species. Allis shad is thought to be rare, with no recent records in the Usk, while twait shad is relatively common. Kick sampling for eggs is only able to give a broad scale indication of presence or absence at sampled locations. Netting for juveniles gives a quantitative estimate of abundance, though may be subject to a high degree of uncertainty due to sampling error. This uncertainty is likely to be compounded by variation between years in the size of the adult run, spawning success and resulting numbers of juveniles. Poor adult runs are likely to result from unsuitable flows during the March to June migration period, in particular prolonged low flows, while poor survival of eggs and juveniles is related to spate flows in the mid to late summer</p>

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	<p>which can flush them into the estuary prematurely.</p> <p>CSM guidance states that adult run size should comply with an agreed target for each river, with no drop in the annual run greater than would be expected from variations in natural mortality alone. This attribute is not currently assessed in the Usk due to the absence of a fish counter.</p> <p>The current unfavourable status results from a precautionary assessment of feature distribution and abundance, and from the presence of adverse factors, in particular flow depletion and physical barriers to migration.</p> <p>Conservation status (2006) of Feature 4: Atlantic salmon <i>Salmo salar</i> Unfavourable: Unclassified. The current unfavourable status results from a precautionary assessment of feature distribution and abundance, in particular the results of juvenile surveys, and from the presence of adverse factors, in particular flow depletion and localised water quality failures.</p> <p>The estimate of adult numbers is converted into an estimate of numbers of eggs deposited which is compared against an Egg Deposition Target (EDT), calculated by considering the area of suitable spawning habitat within the catchment. The equivalent adult run to achieve the EDT is described in terms of a Conservation Limit, which must be exceeded 4 years in 5 for the Management Target to be considered attained. Electro-fishing for juveniles is either quantitative or semi-quantitative, and estimated juvenile densities are classified in one of six categories A to F. The monitoring guidance produced by the LIFE in UK Rivers project recommends that ideally juvenile densities should be compared to predicted densities for the sample reach using the HABSCORE model⁶. These targets are calculated and monitored by the Environment Agency as part of the Salmon Action Plan for the Usk.</p> <p>The current unfavourable status results from a precautionary assessment of feature distribution and abundance, in particular the results of juvenile surveys, and from the presence of adverse factors, in</p>

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	<p>particular flow depletion and localised water quality failures.</p> <p>Conservation status (2006) of Feature 5: Bullhead <i>Cottus gobio</i> Unfavourable: Unclassified. The current unfavourable status results from the presence of adverse factors, in particular flow depletion and localised water quality failures. Records obtained from juvenile salmon monitoring show that bullhead are widespread in the main river and tributaries.</p> <p>Conservation (2006) status of Feature 6: European otter <i>Lutra lutra</i> Favourable. The conservation status of otters in the Usk SAC is determined by monitoring their distribution, breeding success, and the condition of potential breeding and feeding habitat outlined in the Performance Indicators. Their current condition can be considered favourable, but with scope for further improvement, if habitat and other natural factors can be maintained and enhanced.</p> <p>Conservation status (2006) of Feature 7: Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation Unfavourable: Unclassified. This feature is not identified as one of the primary reasons for designation of the River Usk SAC; its distribution being apparently limited by the availability of suitable hydromorphological conditions. Important stands have been identified in the lower reaches of the main river below Abergavenny down to the tidal limit, and in the upper reaches of a headwater stream, the Afon Senni. These reaches may represent a sub-type of the feature where large submerged and floating leaved flowering plants, in particular <i>Ranunculus</i>, are dominant. Habitat suitability studies suggest that the natural range of the feature may be more widespread within the SAC. The present unfavourable status of the feature results from the over-abundance of invasive non-native species of bankside plant communities, which are included within the feature definition. These are predominantly giant hogweed and Himalayan balsam in the lower reaches of the main river.</p>

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<p>Vulnerabilities (includes existing pressures and trends)</p>	<ul style="list-style-type: none"> • Abstraction levels - entrainment in water abstractions directly impacts on species population dynamics through reduced recruitment and survival rates. Hydrological processes in the Usk are currently affected by large abstractions, especially at Prioress Mill and Brecon Weir. This has been shown to have effects both on a seasonal timescale by reducing spate flows during the migration period and on a diurnal timescale by substantially depleting flows during the night time to the extent that sea lamprey nests and nursery areas are likely to be exposed above the water level. The effect of the Brecon canal abstraction has been shown to comprise a substantial depletion of flows, at least locally, during low flow periods with a resulting reduction in river depth downstream of the off-take weir. However, there are many smaller abstractions not considered to cause a problem at present. • Fish stocking - can adversely affect population dynamics through competition, predation, and alteration of population genetics and introduction of disease. • Alterations to channel morphology - The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age. • Barriers to migration - Artificial obstructions can reduce connectivity. In addition, reaches subject to depleted flow levels, pollution, or disturbance due to noise, vibration or light, can all inhibit the movement of sensitive species. The dispersal of semi-terrestrial species, such as otter, can be adversely affected by structures such as bridges under certain flow conditions, therefore these must be designed to allow safe passage. Restrictions on the movement of otters around the SAC, and between adjoining sites are currently a particular concern in the reach through Newport as a result of a continued decrease in undisturbed suitable riparian habitat. Certain areas of the SAC are critical to the movement of otters both within the system and to adjacent sites. The Usk SAC

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	<p>provides a key movement corridor for otters passing between the relatively high densities in mid Wales and the south-east Wales coastal strip (Seven Estuary and Gwent Levels). Allis and twaite shad are affected by range contraction due to artificial barriers to migration in the Usk, whilst more generally, spawning locations may move within and between sites due to natural processes or new sites may be discovered over time. It is likely that this loss of habitat affects their maintenance in the SAC on a long-term basis. The presence of hard bank revetments in a number of active alluvial reaches for example through Brecon and upstream of Abergavenny, adversely affects the processes that maintain suitable habitat for the SAC features. Crickhowell Bridge downstream from the River Usk is considered to be the most significant barrier to fish migration in the Usk. Management to reduce or remove the effect of this barrier is a high priority for the River Usk SAC.</p> <ul style="list-style-type: none"> • Development pressure – construction works can cause temporary physical, acoustic, chemical and sediment barrier effects, and if in close proximity to the river can create a barrier to fish migration. Barriers resulting from vibration, chemicals, low dissolved oxygen and artificially high sediment levels can impact on Shad and salmon migration. • Diffuse Pollution - The Atlantic salmon is the focus for much of the management activity carried out on the Usk. The relatively demanding water quality and spawning substrate quality requirements of this feature mean that reduction in diffuse pollution and siltation impacts is a high priority. In the Usk catchment, the most significant sources of diffuse pollution and siltation are from agriculture, including fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land. The most intensively used areas such as heavily trampled gateways and tracks can be especially significant sources of polluting run-off. Farm operations should avoid ploughing land which is vulnerable to soil erosion or leaving such areas without crop cover during the winter. Contamination by synthetic pyrethroid sheep dips, which are extremely toxic to aquatic invertebrates, has a devastating impact on crayfish populations and can deprive fish populations

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	<p>of food over large stretches of river. These impacts can arise if recently dipped sheep are allowed access to a stream or hard standing area, which drains into a watercourse. Pollution from organophosphate sheep dips and silage effluent can be very damaging locally. Pollution from slurry and other agricultural and industrial chemicals, including fuels, can kill all forms of aquatic life. All sheep dips and silage, fuel and chemical storage areas should be sited away from watercourses or bunded to contain leakage. Recently dipped sheep should be kept off stream banks. Discharges from sewage treatment works, urban drainage, engineering works such as road improvement schemes, contaminated land, and other domestic and industrial sources can also be significant causes of pollution, and must be managed appropriately. Pollution of rivers with toxic chemicals, such as PCBs, was one of the major factors identified in the widespread decline of otters during the last century. Pollution of rivers with toxic chemicals, such as PCBs, was one of the major factors identified in the widespread decline of otters during the last century.</p> <ul style="list-style-type: none"> • Eutrophication - Under conditions of prolonged low flows and high nutrient status, epiphytic algae and other species indicative of eutrophication are promoted which may lead to the suppression of the growth of aquatic flowering plants. Adverse factors may include elevated nutrient levels, shading or altered flow and/or sediment transport regimes. Filamentous algae associated with eutrophication and invasive non-native species, need to be maintained or restored to below an acceptable threshold level to ensure that the natural range of <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation is stable or increasing in the SAC. The present unfavourable status of this feature results from the over-abundance of invasive non-native species of bankside plant communities, which are included within the feature definition. These are predominantly giant hogweed and Himalayan balsam in the lower reaches of the main river. • External factors - operating outside the SAC, may also be influential, particularly for the migratory fish and otters. For example, salmon may be affected by barriers to migration in the Severn Estuary, inshore fishing and environmental conditions prevailing in their north Atlantic

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	feeding grounds. Otters may be affected by developments that affect resting and breeding sites outside the SAC boundary.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • CCW
HRA/AA Studies undertaken that address this site	<p>HRA Screening of the County Council of the City and County of Cardiff Local Development Plan Preferred Strategy Sept 2007. www.cardiff.gov.uk/ObjView.asp?Object_ID=9788</p> <ul style="list-style-type: none"> • The Screening states that the most likely mechanism for the Preferred Strategy to have a significant effect on this site is through airborne pollution. <p>HRA Screening of the Torfaen Local Development Plan (2006-2021) January 2008. http://www.torfaen.gov.uk/EnvironmentAndPlanning/Planning/ForwardPlanning/Publications/HabitatsRegulationAssessment.pdf</p> <ul style="list-style-type: none"> • The Screening concludes that there is potential for significant effects on this site through discharge of sewerage, increased surface run-off and an increase in airborne pollutants. <p>HRA and AA of the Wales Spatial Plan Update June 2008. http://wales.gov.uk/about/strategy/spatial/hra/download/?lang=en</p> <ul style="list-style-type: none"> • The HRA Screening concludes that the WSPU and other plans have the potential to give rise to adverse effects at this site. • The AA states that it is not possible to predict in specific terms whether the WSPU would or would not give rise to significant adverse effects either alone or in combination with other plans/ strategies and projects upon specific European sites. However, it does identify that this site is likely to come under increasing risk of adverse effects from urban and economic development and recreation and tourism as a result of the WSPU. The AA also identifies that transport infrastructure has the potential to have negative effects on this site as a consequence of the WSPU.

Site Name: Severn Estuary

- Location Grid Ref: **ST321748**
- JNCC Site Code: **UK0013030**
- Size: **73715.4 (ha)**
- Designation: **SAC**

Severn Estuary SAC	
Site Description	<p>The Severn Estuary is the largest coastal plain estuary in the UK with extensive mudflats and sandflats, rocky shore platforms, shingle and islands. Saltmarsh fringes the coast, backed by grazing marsh with freshwater and occasional brackish ditches. The estuary’s classic funnel shape, unique in the UK, is a factor causing the Severn to have the second highest tidal range in the world (after the Bay of Fundy in Canada) at more than 12 meters. This tidal regime results in plant and animal communities typical of the extreme physical conditions of strong flows, mobile sediments, changing salinity, high turbidity and heavy scouring. The resultant low diversity invertebrate communities, that frequently include populations of ragworms, lugworms and other invertebrates in high densities, form an important food source for passage and wintering birds. The site is important in the spring and autumn migration periods for waders moving along the west coast of Europe, as well as in winter for large numbers of waterbirds including swans, geese, ducks and waders. These bird populations are regarded as internationally important.</p> <p>The intertidal habitats include saltmarsh, mud and sandflats, mixed mud and sand, rock outcrops, boulder and shingle shores. The intertidal zone of mudflats, sandbanks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The extensive intertidal mudflats and sandflats covering the fourth largest area in a UK estuary. Whilst the diversity of species is often low, in places the mudflats and sandflats support dense populations of marine invertebrate species, which provide a food source for the large populations of waterfowl and the many species of fish. There are areas of rocky shore consisting of boulders, rock, mussel/cobble scars, rocky pools and shingle covering 1,500 ha in total which are also highly productive and diverse areas biologically and</p>

	Severn Estuary SAC
	<p>provide valuable feeding and roosting sites for birds. Beds of eelgrass (<i>Zostera</i> spp.), the largest in Wales, occur on some of the more sheltered areas around the Welsh side of the Second Severn Crossing. Both species of eelgrass, <i>Zostera marina</i>, and <i>Z. noltei</i> have been recorded in the estuary. These are of restricted distribution in British estuaries. It is unusual to have both species in one location. The estuarine fauna includes internationally important populations of waterfowl, important invertebrate populations and large populations of fish.</p> <p>Saltmarshes and mudflats have an important role to play in estuarine processes, both through the recycling of nutrients within the estuary and through their role as soft sea defences, dissipating wave energy. They are highly productive biologically, providing organic material that support other features within the marine ecosystem. They also have an important physical role, acting as a sediment store to the estuary as a whole and in providing feeding and roosting sites for waders and wildfowl particularly at high tide. The subtidal sediments of the Severn Estuary, including the sandbanks, vary from gravely to muddy sediments and are influenced by the strong tidal currents. The mobility of these sediments means that they only support animals that can tolerate the shifting seabed and scouring action of suspended sand. The communities therefore reflect the high turbidity and strong tidal streams of the Severn Estuary. The sand banks of the Middle and Welsh Grounds are relatively permanent sandbank features in the Severn Estuary, and are intertidal. More ephemeral sandbanks also occur in the estuary, including areas offshore from Avonmouth and at English Grounds (near Clevedon).</p> <p>The subtidal area supports honeycomb worm reefs, composed of tubes built by small worms (<i>Sabellaria</i> spp.) that use sand particles to build honeycomb-like structures. <i>Sabellaria alveolata</i> is predominantly an intertidal species but the Severn Estuary is one of the few places in the UK where <i>S. alveolata</i> occurs extensively in the subtidal, as well as the intertidal. These biogenic reefs tend to increase habitat diversity for other species, leading to higher species diversity within <i>Sabellaria</i> reefs compared to the surrounding sediment or rock</p> <p>The fish fauna of the Severn Estuary is very diverse. More than 110 species of fish have been</p>

	Severn Estuary SAC
	<p>identified, which include seven different species of migratory fish, more than any other British estuary. The estuary is one of the most important British estuaries for several rare species, including river lamprey <i>Lampetra fluviatilis</i>, sea lamprey <i>Petromyzon marinus</i> and twaite shad <i>Alosa fallax</i>. The river and sea lamprey are a primitive type of fish having a distinctive suckered mouth but no jaws. Although numbers of lamprey have declined over the last 100 years, the UK is still one of their strongholds. Sea and river lampreys spend their adult life in the sea or estuaries but spawn and spend the juvenile phase in rivers. They use the Severn Estuary as a migratory passage to and from their spawning and nursery grounds in the rivers. Allis and twaite shad are the only two members of the herring family found in fresh water in the UK. Three of the four confirmed UK spawning populations of twaite shad are in the rivers Severn, Usk and Wye respectively. The major part of the spawning population of Twaite shad consists of fish that have spawned and passed up and down through the estuary more than once. The shad enter estuaries in spring and move up into the rivers to spawn. The estuary serves as a nursery area for juvenile shad where they feed on plankton. The Severn Estuary also supports an important run of migratory salmon. These fish pass through the estuary on their way to and from their spawning grounds in the upper reaches of the rivers and the open sea. The Severn Estuary also has the largest eel run in Great Britain.</p> <p>Many estuaries in the UK are of great importance to migratory and wintering wildfowl and waders. The Severn Estuary forms part of the complex chain of estuary sites along the western coast of the UK that provide habitats for migratory waterfowl. The relatively mild winter weather conditions found here compared to continental Europe at similar latitudes can be of additional importance to the survival of wintering waterfowl during periods of severe weather. The Severn Estuary ranks amongst the top ten British estuaries for the size of visiting waterfowl populations that it supports over winter. Outside of this period, it is of particular importance as a staging area in autumn and spring for migratory waterfowl species as it lies on the East Atlantic Flyway route.</p>

Severn Estuary SAC	
Qualifying Features	<p>Annex I Habitats primary reason for selection:</p> <ul style="list-style-type: none"> • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) <p>Annex I Habitats qualifying feature:</p> <ul style="list-style-type: none"> • Sandbanks which are slightly covered by sea water all the time • Reefs <p>Annex II Species primary reason for selection:</p> <ul style="list-style-type: none"> • Sea lamprey <i>Petromyzon marinus</i> • River lamprey <i>Lampetra fluviatilis</i> • Twaite shad <i>Alosa fallax</i>
Conservation Objectives	<p>The conservation objective for the “estuaries” feature of the Severn Estuary SAC is to maintain the feature in favourable condition, as defined below:</p> <p><u>Interest feature 1: Estuaries</u></p> <ul style="list-style-type: none"> • the total extent of the estuary is maintained; • the characteristic physical form (tidal prism/cross sectional area) and flow (tidal regime)of the estuary is maintained; • the characteristic range and relative proportions of sediment sizes and sediment budget within the site is maintained; • the extent, variety and spatial distribution of estuarine habitat communities (i.e. subtidal

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	<p>sandbanks, intertidal mudflats and sandflats, atlantic salt meadows, and reefs of <i>Sabellaria alveolata</i>) within the site is maintained;</p> <ul style="list-style-type: none"> • the extent, variety, spatial distribution and community composition of the following notable communities is maintained: <i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock; <i>Hydroids</i>, <i>ephemeral seaweeds</i> and <i>Littorina littorea</i> in shallow eulittoral mixed substrata pools; <i>Balanus crenatus</i> and <i>Tubularia indivisa</i> on extremely tide-swept circalittoral rock; <i>Fucus serratus</i> and piddocks on lower eulittoral soft rock; <i>Mytilus edulis</i> and piddocks on eulittoral firm clay; <i>Balanus crenatus</i>, <i>Halichondrea panicea</i> and <i>Alcyonidium diaphanum</i> on extremely tide-swept sheltered circalittoral rock; <i>Sertularia cupressina</i> and <i>Hydrallmania falcate</i> on tide-swept sublittoral cobbles or pebbles in coarse sand; Peat and clay exposures; <i>Corralina officinalis</i> and coralline crusts in shallow eulittoral rockpools; Eel grass (<i>Zostera</i>) beds; andaany other notable hard substrata; • the abundance of the following notable estuarine species assemblages is maintained or increased: Migratory fish species (River and Sea Lamprey, Twaite shad, Allis shad, Sea trout, salmon, eel); Estuarine species (species typically occurring and breeding in estuaries); Marine species, predominantly those occurring infrequently in the Severn; Freshwater species occurring and breeding within the Severn SAC; Assemblage of waterfowl species (Bewicks' swan, dunlin, redshank, shelduck, European whitefronted goose); Nationally important bird populations (wigeon, teal, pintail, pochard, tufted duck, ringed plover, grey plover, curlew, whimbrel and spotted redshank); Assemblage of vascular plant species (salt marsh species; Eel grass (<i>Zostera</i>) species) • the physico-chemical characteristics of the water column (nutrients, oxygen, turbidity, temperature and salinity) support the ecological objectives described above; • Toxic contaminants in water column (including contributory water flows into the estuary such as

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	<p>surface flows over mudflats and saltmarsh) and sediment are below levels which would pose a risk to the ecological objectives described above.</p> <p><u>Interest feature 2: Subtidal Sandbanks</u></p> <ul style="list-style-type: none"> • the total extent of the subtidal sandbanks within the site is maintained; • the extent and distribution of the individual subtidal sandbank communities (Sublittoral Sands and Muddy Sands; Sublittoral cohesive mud and sandy mud communities) within the site is maintained; • the community composition of the sub tidal sandbank feature within the site is maintained; • the variety and distribution of sediment types across the subtidal sandbank feature is maintained; • the gross morphology (depth, distribution and profile) of the subtidal sandbank feature within the site is maintained. <p><u>Interest feature 3 : Mudflats and sandflats not covered by seawater at low tide (mudflats and sandflats)</u></p> <ul style="list-style-type: none"> • The total extent of the mudflats and sandflats feature is maintained; • the variety and extent of individual mudflats and sandflats communities (Intertidal gravel and clean sand communities; Intertidal muddy sand communities; Intertidal mud communities) within the site is maintained; • the distribution of individual mudflats and sandflats communities (within the site is maintained;

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	<ul style="list-style-type: none"> • the community composition of the mudflats and sandflats feature within the site is maintained; • the topography of the intertidal flats and the morphology (dynamic processes of sediment movement and channel migration across the flats) are maintained. <p><u>Interest feature 4: Atlantic salt meadow</u></p> <ul style="list-style-type: none"> • the total extent of Atlantic salt meadow and associated transitional vegetation communities within the site is maintained; • the extent and distribution of the individual Atlantic salt meadow and associated transitional vegetation communities within the site is maintained; • the zonation of Atlantic salt meadow vegetation communities and their associated transitions to other estuary habitats is maintained; • the relative abundance of the typical species of the Atlantic salt meadow and associated transitional vegetation communities is maintained; • the abundance of the notable species of the Atlantic salt meadow and associated transitional vegetation communities is maintained; • the structural variation of the salt marsh sward (resulting from grazing) is maintained within limits sufficient to satisfy the requirements of conditions above and the requirements of the Ramsar and SPA features;

	Severn Estuary SAC
	<ul style="list-style-type: none"> • the characteristic stepped morphology of the salt marshes and associated creeks, pills, drainage ditches and pans, and the estuarine processes that enable their development, is maintained. • Any areas of <i>Spartina anglica</i> salt marsh are capable of developing naturally into other saltmarsh communities. <p><u>Interest feature 5: Reefs</u></p> <ul style="list-style-type: none"> • the total extent and distribution of <i>Sabellaria</i> reef is maintained; • the community composition of the <i>Sabellaria</i> reef is maintained; • the full range of different age structures of <i>Sabellaria</i> reef are present; • the physical (abundance of suitable coarse sediments to support reef growth (tube building) and the availability of suitable substrates where <i>Sabellaria</i> has been known to occur in the past) and ecological processes (supply of <i>Sabellaria</i> larvae (within the water column) and abundance of food (suspended detritus material) within the water column to support feeding) necessary to support <i>Sabellaria</i> reef are maintained. <p><u>Interest feature 6 : River lamprey <i>Lampetra fluviatilis</i></u></p> <ul style="list-style-type: none"> • the migratory passage of both adult and juvenile river lamprey through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality; • the size of the river lamprey population in the Severn Estuary and the rivers which drain into it, is at least maintained and is at a level that is sustainable in the long term;

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	<ul style="list-style-type: none"> • the abundance of prey species forming the river lamprey’s food resource within the estuary, is maintained; • Toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above. <p>Note : The river lamprey population of the Severn depends on habitat in the adjacent River Usk SAC, River Wye SAC and River Severn. The habitats in these rivers, including spawning and nursery areas, are essential for the fulfilment of the species’ lifecycle and therefore the Severn Estuary river lamprey feature can only be in favourable condition if the conservation objectives pertaining to the River Usk SAC and River Wye SAC river lamprey feature are also met in full and there is a continued recorded presence of this species in the River Severn.</p> <p><u>Interest feature 7: The conservation objective for sea lamprey <i>Petromyzon marinus</i></u></p> <ul style="list-style-type: none"> • the migratory passage of both adult and juvenile sea lamprey through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality; • the size of the sea lamprey population in the Severn Estuary and the rivers which drain into it, is at least maintained as is at a level that is sustainable in the long term; • the abundance of prey species forming the sea lamprey’s food resource within the estuary, is maintained; • Toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above.

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	<p><u>Interest feature 8: The conservation objective for twaite shad <i>Alosa fallax</i></u></p> <ul style="list-style-type: none"> • the migratory passage of both adult and juvenile twaite shad through the Severn Estuary between the Bristol Channel and their spawning rivers is not obstructed or impeded by physical barriers, changes in flows or poor water quality; • the size of the twaite shad population within the Severn Estuary and the rivers draining into it is at least maintained and is at a level that is sustainable in the long term; • the abundance of prey species forming the twaite shad’s food resource within the estuary, in particular at the salt wedge, is maintained; • Toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above.
Component SSSIs	<ul style="list-style-type: none"> • N/A
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Hydrodynamic and sedimentary regime - The conservation of the site features is dependent on the tidal regime. The tidal range in the Severn Estuary is the second-highest in the world and the scouring of the seabed and strong tidal streams result in natural erosion of the habitats and the presence of high sediment loads. • Maintain suitable distance between the site and development - to allow for managed retreat of intertidal habitats and avoid coastal squeeze • Manage/restrict public access and activities - at certain times of the year. Significant disturbance attributable to human activities can result in reduced food intake and/or increased energy expenditure.

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SAC Condition Assessment	<ul style="list-style-type: none"> • N/A
Vulnerabilities (includes existing pressures and trends)	<ul style="list-style-type: none"> • Physical loss of supporting habitats through removal - The physical loss of areas of intertidal habitats may be caused directly through change of land use or indirectly as a consequence of changes to sedimentation processes (for example coastal defences) as well as via the effects of smothering by artificial structures (for example jetties) or the disposal of spoils. The intertidal mudflats and sandflats and the saltmarsh are highly sensitive to removal by land reclamation and barrage construction. Information provided by NE and CCW states that large areas of the European marine site are not currently under threat, however when combined with a high level of sensitivity this leads to a moderate vulnerability. • Contamination by synthetic and/or non-synthetic toxic compounds - At the moment there is no evidence to show that this is the case on the Severn Estuary, but the estuary is vulnerable to oil spills and there is a continuous discharge of toxins into the estuary, some of which bind to the sediments. NE and CCW identify this is an area which requires further assessment. The intertidal mudflats and sandflats and the saltmarsh are currently highly vulnerable to the introduction of synthetic and non-synthetic compounds. • Damage by abrasion or selective extraction - Saltmarsh may be physically damaged from overgrazing or eroded when boats are moored on it and when paths are worn through it to reach moored boats on foot or via vehicles. Currently all supporting habitats are considered to be moderately vulnerable to abrasion. Intertidal habitats are highly sensitive to damage by direct and indirect effects of aggregate dredging. The intertidal mudflats and sandflats and the shingle and rocky shore are therefore considered by NE and CCW to be highly vulnerable to selective extraction. • Changes in nutrient and/or organic loading - Changes in organic or nutrient loading can change the species composition of the plants on the saltmarsh and thus the structure of the sward. Increases in nutrients can also cause excessive algal growth on the mudflats, denying the birds access to their invertebrate prey and changing the invertebrate species composition in the

Severn Estuary SAC	
	<p>sediment. Though the water quality has been improved in recent years there are still local areas of concern and any increase in nutrient loading should be avoided. At present the intertidal mudflats and sandflats are moderately vulnerable to this category of operation.</p> <ul style="list-style-type: none"> • Inappropriate grazing - Much of the saltmarsh is managed by grazing and changes in management can alter the availability of prey and suitability of roosting sites. The saltmarsh is currently highly vulnerable to the selective extraction of species.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • N/A
HRA/AA Studies undertaken that address this site	<p>HRA Screening of the County Council of the City and County of Cardiff Local Development Plan Preferred Strategy Sept 2007. www.cardiff.gov.uk/ObjView.asp?Object_ID=9788</p> <ul style="list-style-type: none"> • The Screening states that the significance of the potential impacts of the Eastern Bay Link (Pg. 50, Paragraph 6.23) in the Preferred Strategy (either alone or in-combination with other plans and projects) will be considered when a more detailed scheme is available. An appropriate assessment may be required for the scheme. <p>HRA Screening of the Torfaen Local Development Plan (2006-2021) January 2008. http://www.torfaen.gov.uk/EnvironmentAndPlanning/Planning/ForwardPlanning/Publications/HabitatsRegulationAssessment.pdf</p> <ul style="list-style-type: none"> • It is likely that an increase of 7000 dwellings in Torfaen and associated development will in some way impact upon the site. It is likely however that the potential impact will be as a result of in-combination effects with other implemented plans and programmes in close proximity to the Severn Estuary. <p>AA Screening of the Vale of Glamorgan Local Development Plan Preferred Strategy Dec 07. http://www.valeofglamorgan.gov.uk/files/Living/Planning/Policy/LDP/Appropriate_Assessment_Screening.pdf</p>

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	<p>ning_Report.pdf</p> <ul style="list-style-type: none"> Given the extent of the Severn Estuary and the diverse range of activities and operations that could result in adverse impact to the European Site, it is considered inevitable that the Draft Preferred Strategy will in some way, impact upon the designated site. While much of the development arising from the draft preferred strategy is likely to be located well away from the Severn Estuary, the south-eastern zone has been identified as a growth area and abuts the boundary of the designated site. Therefore, it is recommended that a more detailed assessment of the LDP be undertaken following consultation on the Draft Preferred Strategy to ascertain and mitigate against any likely significant effects to the SPA, SAC, RAMSAR. <p>HRA and AA of the Wales Spatial Plan Update June 2008. http://wales.gov.uk/about/strategy/spatial/hra/download/?lang=en</p> <ul style="list-style-type: none"> The HRA Screening concludes that the WSPU and other plans have the potential to give rise to adverse effects at this site. The AA states that it is not possible to predict in specific terms whether the WSPU would or would not give rise to significant adverse effects either alone or in combination with other plans/ strategies and projects upon specific European sites. However, it does identify that this site is likely to come under increasing risk of adverse in combination effects from transport infrastructure, urban and economic development and recreation and tourism as a result of the WSPU and English RSSs. The AA also identifies that in combination with the English RSSs the WSPU has the potential to have negative effects on water levels, flood protection and water quality issues, which could affect this site.

Special Protection Areas

Site Name: Severn Estuary

- Location : 011329 N/030257 W
- JNCC Site Code: UK9015022
- Size: 24662.98
- Designation: SPA

Severn Estuary SPA	
Site Description	<p>The Severn Estuary is located between Wales and England in south-west Britain. It is a large estuary with extensive intertidal mud-flats and sand-flats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. The seabed is rock and gravel with sub-tidal sandbanks. The estuary's classic funnel shape, unique in the UK, is a factor causing the Severn to have the second- highest tidal range in the world (after the Bay of Fundy in Canada). This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide- swept sand and rock. The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK. The site is of importance during the spring and autumn migration periods for waders moving up the west coast of Britain, as well as in winter for large numbers of waterbirds, especially swans, ducks and waders.</p>
Qualifying Features	<p>Article 4.1 Qualification</p> <p>Over winter the area regularly supports:</p> <ul style="list-style-type: none"> • Bewick's Swan <i>Cygnus columbianus bewickii</i> 3.9% of the GB population <p>Article 4.2 Qualification</p>

	Severn Estuary SPA
	<p>On Passage:</p> <ul style="list-style-type: none"> • Ringed Plover <i>Charadrius hiaticula</i> 1.3% wintering population <p>Over winter:</p> <ul style="list-style-type: none"> • <u>Curlew</u> <i>Numenius arquata</i> 1% of the population • <u>Dunlin</u> <i>Calidris alpina alpina</i> 3.3% of the population • <u>Pintail</u> <i>Anas acuta</i> 1.1% of the population • <u>Redshank</u> <i>Tringa totanus</i> 1.3% of the population • <u>Shelduck</u> <i>Tadorna tadorna</i> 1.1% of the population <p>Article 4.2 Qualification: Internationally Important Assemblage of Birds including:</p> <ul style="list-style-type: none"> • <u>Gadwall</u> <i>Anas strepera</i> • <u>Shelduck</u> <i>Tadorna tadorna</i> • <u>Pintail</u> <i>Anas acuta</i> • <u>Dunlin</u> <i>Calidris alpina alpina</i> • <u>Curlew</u> <i>Numenius arquata</i> • <u>Redshank</u> <i>Tringa totanua</i> • <u>Bewick's Swan</u> <i>Cygnus columbianus bewickii</i> • <u>Wigeon</u> <i>Anas Penelope</i> • <u>Lapwing</u> <i>Vanellus vanellus</i> • <u>Teal</u> <i>Anas crecca</i> • <u>Mallard</u> <i>Anas platyrhynchos</i> • <u>Shoveler</u> <i>Anas clypeata</i> • <u>Pochard</u> <i>Aythya ferina</i> • <u>Tufted Duck</u> <i>Aythya fuligula</i> • <u>Grey Plover</u> <i>Pluvialis squatarola</i>

Severn Estuary SPA	
	<ul style="list-style-type: none"> • <u>White-fronted Goose</u> <i>Anser albifrons albifrons</i> • <u>Whimbrel</u> <i>Numenius phaeopus</i>.
Conservation Objectives	<p>The interest features will be considered to be in favourable condition when, subject to natural processes, each of the following conditions are met:</p> <p>Interest feature 1: Internationally important population of regularly occurring Annex 1 species: Bewick's swan</p> <ul style="list-style-type: none"> i. the 5 year peak mean population size for the Bewick's swan population is no less than 289 individuals (ie the 5 year peak mean between 1988/9 - 1992/3); ii. the extent of saltmarsh at the Dumbles is maintained; iii. the extent of intertidal mudflats and sandflats at Frampton Sands, Waveridge Sands and the Noose is maintained; iv. the extent of vegetation with an effective field size of >6 ha and with unrestricted bird sightlines > 500m at feeding, roosting and refuge sites are maintained; v. greater than 25% cover of suitable soft leaved herbs and grasses in winter season throughout the transitional saltmarsh at the Dumbles is maintained; vi. aggregations of Bewick's swan at feeding, roosting and refuge sites are not subject to significant disturbance. <p>Interest feature 2: Internationally important population of regularly occurring migratory species: wintering dunlin</p> <ul style="list-style-type: none"> i. the 5 year peak mean population size for the wintering dunlin population is no less than 41,683 individuals (ie the 5 year peak mean between 1988/9 - 1992/3); ii. the extent of saltmarsh is maintained;

	Severn Estuary SPA
	<ul style="list-style-type: none"> iii. the extent of intertidal mudflats and sandflats is maintained; iv. the extent of shingle and rocky shore is maintained; v. the extent of vegetation with a sward height of <10cm is maintained throughout the saltmarsh; vi. the distribution and abundance of suitable invertebrates in intertidal mudflats and sandflats is maintained; vii. the distribution and abundance of suitable invertebrates in shingle and rocky shore is maintained; viii. the extent of strandlines is maintained; ix. unrestricted bird sightlines of >200m at feeding and roosting sites are maintained; x. aggregations of dunlin at feeding or roosting sites are not subject to significant disturbance. <p>Interest feature 3: Internationally important population of regularly occurring migratory species: wintering European white-fronted goose</p> <ul style="list-style-type: none"> i. the 5 year peak mean population size for the wintering European white fronted goose population is no less than 3,002 individuals (ie the 5 year peak mean between 1988/9-1992/3); ii. the extent of saltmarsh at the Dumbles is maintained; iii. the extent of intertidal mudflats and sandflats at Frampton Sands, Waveridge Sands and the Noose is maintained; iv. greater than 25% cover of suitable soft-leaved herbs and grasses is maintained during the winter on saltmarsh areas; v. unrestricted bird sightlines of >200m at feeding and roosting sites are maintained; vi. aggregations of European white-fronted goose at feeding or roosting sites are not subject to significant disturbance. <p>Interest feature 4: Internationally important population of regularly occurring migratory species: wintering redshank</p> <ul style="list-style-type: none"> i. the 5 year peak mean population size for the wintering redshank population is no less than

Severn Estuary SPA	
	<p>2,013 individuals (ie the 5 year peak mean between 1988/9 - 1992/3);</p> <ul style="list-style-type: none"> ii. the extent of saltmarsh is maintained; iii. the extent of intertidal mudflats and sandflats is maintained; iv. the extent of shingle and rocky shore is maintained; v. the extent of vegetation with a sward height of <10cm throughout the saltmarsh is maintained; vi. the distribution and abundance of suitable invertebrates in intertidal mudflats and sandflats is maintained; vii. the distribution and abundance of suitable invertebrates in shingle and rocky shore is maintained; viii. strandlines are not subject to significant disturbance; ix. unrestricted bird sightlines of >200m at feeding and roosting sites are maintained; x. aggregations of redshank at feeding or roosting sites are not subject to significant disturbance. <p>Interest feature 5: Internationally important population of regularly occurring migratory species: wintering shelduck</p> <ul style="list-style-type: none"> i. the 5 year peak mean population size for the wintering shelduck population is no less than 2,892 individuals (ie the 5 year peak mean between 1988/9 - 1992/3); ii. the extent of saltmarsh is maintained; iii. the extent of intertidal mudflats and sandflats is maintained; iv. the extent of shingle and rocky shore is maintained; v. the distribution and abundance of suitable invertebrates in intertidal mudflats and sandflats is maintained; vi. unrestricted bird sightlines of >200m at feeding and roosting sites are maintained; aggregations of shelduck at feeding or roosting sites are not subject to significant disturbance. <p>Interest feature 6: Internationally important assemblage of waterfowl</p> <ul style="list-style-type: none"> i. the 5 year peak mean population size for the waterfowl assemblage is no less than 68,026

Severn Estuary SPA	
	<p>individuals (ie the 5 year peak mean between 1988/9 - 1992/3);</p> <ul style="list-style-type: none"> ii. the extent of saltmarsh is maintained; iii. the extent of intertidal mudflats and sandflats is maintained; iv. the extent of shingle and rocky shore is maintained; v. extent of vegetation of <10cm throughout the saltmarsh is maintained; vi. the distribution and abundance of suitable invertebrates in intertidal mudflats and sandflats is maintained; vii. the distribution and abundance of suitable invertebrates in shingle and rocky shore is maintained; viii. greater than 25% cover of suitable soft leaved herbs and grasses during the winter on saltmarsh areas is maintained; ix. strandlines are not subject to significant disturbance; x. unrestricted bird sightlines of >500m at feeding and roosting sites are maintained; xi. waterfowl aggregations at feeding or roosting sites are not subject to significant disturbance.
Component SSSIs	<ul style="list-style-type: none"> • Severn Estuary SSSI • Flat Holm SSSI • Bridgwater Bay SSSI • Penarth Coast SSSI • Steep Holm SSSI • Sully Island SSSI • Upper Severn Estuary SSSI <p>Maps of the site can be viewed on the CCW website.</p>
Key Environmental Conditions (factors that maintain site integrity)	<p>Key supporting habitats for the Annex I species:</p> <ul style="list-style-type: none"> • Intertidal mudflats and sandflats:

	Severn Estuary SPA
	<ul style="list-style-type: none"> • Habitat extent - The focal area for the Bewick's swans is the upper Severn Estuary in the vicinity of the New Grounds, Slimbridge area. The mudflats and sandflats exposed as the tide falls where the estuary widens in the upper reaches of the site at Waveridge Sands, Frampton Sands and The Noose are used as safe refuge areas when the birds are disturbed. • Unimpeded sightlines at feeding and roosting sites - Bewick's swan require unrestricted views >500m to allow early detection of predators when feeding and roosting. <p>• Saltmarsh:</p> <ul style="list-style-type: none"> • Habitat extent - The birds feed on the saltmarsh and the transition from saltmarsh to coastal grazing marsh in front of the sea defences in the upper estuary at The Dumbles, where areas of the high marsh are mainly affected only by brackish water during tidal inundation. • Vegetation characteristics - Bewick's swan graze on a range of 'soft' meadow grasses such as <i>Agrostis stolonifera</i> and <i>Alopecurus geniculatus</i> found in wet meadows which are outwith the European marine site boundary. • Unimpeded sightlines at feeding and roosting sites - as above <p>Key supporting habitats for populations of regularly occurring migratory species and assemblage of waterfowl:</p> <ul style="list-style-type: none"> • Intertidal mudflats and sandflats: <ul style="list-style-type: none"> • Habitat extent - Intertidal mudflats and sandflats and their communities are important habitats as they provide both roosting and feeding areas. The European white-fronted geese roost at night on estuarine sandbanks and usually fly less than 10km to the daytime feeding grounds. Therefore conservation of traditional roosting sites is necessary to enable the population to exploit potential feeding habitats. • Food availability - Most of the waders and waterfowl within the assemblage including the internationally important regularly occurring migratory birds feed on invertebrates within and on

	Severn Estuary SPA
	<p>the sediments.</p> <ul style="list-style-type: none"> • Unimpeded sightlines at feeding and roosting sites - Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting. <ul style="list-style-type: none"> • Saltmarsh: <ul style="list-style-type: none"> • Habitat extent - Saltmarsh and their communities are important habitats as they provide both roosting and feeding areas. Upper and lower saltmarsh provide important feeding and roosting areas for the internationally important migratory birds throughout the estuary. • Food availability - The saltmarshes provide a rich feeding habitat for redshank and shelduck, which feed on invertebrate species in the sediments, such as the mudsnail Hydrobia. The European white-fronted geese graze on a range of saltmarsh grasses and herbs such as common saltmarsh grass Puccinellia maritime and sea barley Hordeum marinum. The birds feed on the saltmarsh and the transition to coastal grazing marsh in front of the sea defences in the upper estuary and particularly at the The Dumbles. • Vegetation characteristics - Vegetation of <10 cm is required throughout areas used by roosting waders. This is managed by grazing. • Unimpeded sightlines at feeding and roosting sites - as above. • The saltmarshes also have an important function providing a safe haven from the tides that flood the mudflats twice a day. The low-growing dense vegetation provides a suitable roosting habitat for redshank and dunlin, which prefer to roost on areas of short vegetation ensuring good visibility. • Shingle and rocky shore: <ul style="list-style-type: none"> • Habitat extent - the shingle and rocks in the estuary provide feeding areas for dunlin and redshank and some limited foraging at high tide. It is also provides important roost sites at high tide particularly for the dunlin and redshank. Many of the rocks are off shore and are therefore generally free from human disturbance. These include Guscar Rocks in the upper reaches,

Severn Estuary SPA						
	<p>Blackstone Rocks at Clevedon and Stert Island in Bridgwater Bay.</p> <ul style="list-style-type: none"> • Food availability - see above. • Unimpeded sightlines at feeding and roosting sites - as above. <p>• Wet coastal grazing marsh, improved grassland and open standing waters - these supporting habitats lie outside the European marine site boundary but within the SPA. They provide key areas for feeding and roosting for all the migratory species particularly at high tide.</p> <p>Key environmental conditions for the supporting habitats:</p> <p>Refer to key environmental conditions for Severn Estuary SAC</p> <p>Other key conditions:</p> <p>Refer to key environmental conditions for Severn Estuary SAC</p> <ul style="list-style-type: none"> • Maintain levels of prey <p>Maps showing supporting habitats of the Severn Estuary SPA can be found on the CCW Website.</p>					
SPA Condition Assessment	Severn Estuary SSSI condition summary ²² (compiled 09 April 2008).					
	% Area meeting PSA* target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed

²² Natural England SSSI condition summary. Available [online]: <http://www.english-nature.org.uk/special/ssi/reportAction.cfm?report=sdrt18&category=S&reference=1002284>

Severn Estuary SPA						
	95.71%	95.71%	0.00%	2.44%	1.85%	0.00%
	<p>*PSA target - The Government's Public Service Agreement (PSA) target to have 95% of the SSSI area in favourable or recovering condition by 2010.</p>					
<p>Vulnerabilities (includes existing pressures and trends)</p>	<p>Internationally important populations of regularly occurring Annex 1 species:</p> <ul style="list-style-type: none"> • Physical loss of supporting habitats through removal - Refer to Severn Estuary SAC. In addition, activities or developments resulting in physical loss of the intertidal supporting habitats are likely to reduce the availability of feeding and roosting habitat and thus be detrimental to the favourable condition of the SPA interest features including the Annex 1 species, Bewick's swan. • Noise or visual disturbance - Overwintering birds are disturbed by sudden movements and sudden noises. This can displace the birds from their feeding grounds. Disturbance can prevent the birds from feeding and in response they either a) decrease their energy intake at their present (disturbed) feeding site through displacement activity, or b) move to an alternative less favoured feeding site. Such a response affects energy budgets and thus survival. There is intermittent disturbance from both the landward and seaward side of the site. Bewick's swans are mainly affected by disturbance from the landward side and any increase in disturbance should be avoided. At present NE and CCW assess that the Annex 1 species are moderately vulnerable to noise and visual disturbance on the intertidal mudflats and sandflats and highly vulnerable to this category of operation on the saltmarsh. • Contamination by synthetic and/or non-synthetic toxic compounds - Refer to Severn Estuary SAC. Bewick's swans is moderately vulnerable to toxic contamination. In addition, waterfowl are subject to the accumulation of toxins through the food chain or through direct contact with toxic 					

	Severn Estuary SPA
	<p>substances when roosting or feeding. Their ability to feed can also be affected by the abundance or change in palatability of their prey caused by toxic contamination.</p> <p>Internationally important waterfowl assemblage including populations of regularly occurring migratory species:</p> <ul style="list-style-type: none"> • Physical loss through removal - as above • Damage by abrasion or selective extraction - Refer to Severn Estuary SAC. • Noise or visual disturbance - Refer to Severn Estuary SAC. There is intermittent disturbance to the internationally important migratory species and the waterfowl assemblage from both the landward and seaward side of the site which has increased in recent years, due to the estuary becoming more populated and the development of all weather recreational pursuits. All supporting habitats are currently highly vulnerable to noise and visual disturbance. • Contamination by synthetic and/or non-synthetic toxic compounds - as above. <p>Changes in nutrient and/or organic loading - Refer to Severn Estuary SAC.</p> <ul style="list-style-type: none"> • Biological disturbance through the selective extraction of species - Wildfowling is carried out all around the estuary. NE and CCW have not established that it has a detrimental effect on the overall bird populations but state that wildfowling needs to be exercised in a managed and sustainable manner preferably by a British Association of Shooting and Conservation (BASC) affiliated association, applying the BASC wildfowling code of conduct. Bait digging is also carried out around the estuary. If too large an area is regularly dug over, it can change the availability of prey in the sediment as the area needs a period of recovery and recolonisation. The removal of

Severn Estuary SPA	
	strandline vegetation by beach cleaning removes an important habitat for invertebrates, as well as many of the invertebrates themselves, reducing the quantity and variety of prey available to the birds. Much of the saltmarsh is managed by grazing and changes in management can alter the availability of prey and suitability of roosting sites. The saltmarsh is currently highly vulnerable to the selective extraction of species.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • N/A
HRA/AA Studies undertaken that address this site	<ul style="list-style-type: none"> • Refer to Severn Estuary SAC

Ramsar Sites

Site Name: Severn Estuary

- Location: 51 13 29 N/03 02 57 W
- JNCC Site Code: UK11081
- Size: 24662.98 (ha)
- Designation: Ramsar

Severn Estuary Ramsar	
Site Description	<p>The Severn Estuary is a large estuary with extensive intertidal mudflats and sandflats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. The seabed is rock and gravel with subtidal sandbanks. The estuary's classic funnel shape, unique in the UK, is a factor causing the Severn to have the second-highest tidal range in the world. This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tideswept sand and rock. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK.</p> <p>The large tidal range leads to strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide-swept sand and rock. Broad intertidal flats with areas of unstable sand and muddy flats support high densities of invertebrates. Intertidal rock platforms support a wide variety of invertebrate species. There are large areas of subtidal sand, rock and gravel with a variety of aquatic estuarine communities including <i>Sabellaria alveolata</i> reef. Areas of saltmarsh fringe the estuary, mostly grazed with a range of vegetation communities. There are gradual and stepped transitions between bare mudflat to upper marsh and grassland. Main vegetation types are: upper saltmarsh with <i>Festuca rubra</i> and <i>Juncus gerardii</i>; middle marsh dominated by <i>Puccinellia maritima</i> with <i>Glaux maritima</i> and <i>Triglochin maritima</i>; dense monocultures of <i>Spartina anglica</i> at the edge of the mudflats-brackish pools and depressions with</p>

Severn Estuary Ramsar	
	<i>Phragmites australis</i> and <i>Bolboschoenus maritimus</i> .
Qualifying Features	<p>Ramsar criterion 1</p> <ul style="list-style-type: none"> • Immense tidal range (second-largest in world) creating diversity of physical environment and biological communities. <p>Ramsar criterion 3</p> <ul style="list-style-type: none"> • Due to unusual estuarine communities, reduced diversity and high productivity. <p>Ramsar criterion 4</p> <ul style="list-style-type: none"> • This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon <i>Salmo salar</i>, sea trout <i>S. trutta</i>, sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i>, allis shad <i>Alosa alosa</i>, twaite shad <i>A. fallax</i>, and eel <i>Anguilla anguilla</i>. It is also of particular importance for migratory birds during spring and autumn. <p>Ramsar criterion 5</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> • 70919 waterfowl <p>Ramsar criterion 6</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> • Tundra Swan • Greater white-fronted goose • Common shelduck • Gadwall • Dunlin • Common redshank

Severn Estuary Ramsar	
	<p>Ramsar criterion 8</p> <ul style="list-style-type: none"> The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon <i>Salmo salar</i>, sea trout <i>S. trutta</i>, sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i>, allis shad <i>Alosa alosa</i>, twaite shad <i>A. fallax</i>, and eel <i>Anguilla Anguilla</i> use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad <i>Alosa alosa</i> and twaite shad <i>A. fallax</i> which feed on mysid shrimps in the salt wedge.
Conservation Objectives	<ul style="list-style-type: none"> Refer to Severn Estuary SAC and SPA
Component SSSIs	<ul style="list-style-type: none"> Sully Island SSSI Steep Holm SSSI Bridgwater Bay SSSI Flat Holm SSSI Severn Estuary SSSI Severn Estuary SSSI Flat Holm SSSI Upper Severn Estuary SSSI Bridgwater Bay SSSI Penarth Coast SSSI Steep Holm SSSI Sully Island SSSI Upper Severn Estuary SSSI
Key Environmental	As per Severn Estuary SPA

Severn Estuary Ramsar	
Conditions (factors that maintain site integrity)	
Ramsar Condition Assessment	<ul style="list-style-type: none"> • N/A
Vulnerabilities (includes existing pressures and trends)	<ul style="list-style-type: none"> • Physical loss of supporting habitats through removal - Refer to Severn Estuary SPA. • Noise or visual disturbance - Refer to Severn Estuary SPA. • Contamination by synthetic and/or non-synthetic toxic compounds - Refer to Severn Estuary SPA. In addition, the intertidal mudflats and sandflats and the saltmarsh are currently highly vulnerable to the introduction of synthetic and non-synthetic compounds. • Damage by abrasion or selective extraction - Refer to Severn Estuary SAC. • Changes in nutrient and/or organic loading - Refer to Severn Estuary SAC. • Biological disturbance through the selective extraction of species - Refer to Severn Estuary SPA.
Landowner/ Management Responsibility	<ul style="list-style-type: none"> • N/A
HRA/AA Studies undertaken that address this site	<ul style="list-style-type: none"> • Refer to the Severn Estuary SAC

Appendix 2: Plans and Programmes Review

National

Plan	Potential impacts that could cause 'in-combination' effects
<p>People, Places, Futures: The Wales Spatial Plan (update) 2008</p>	<ul style="list-style-type: none"> • Housing and employment growth may lead to increased transport movements - the potential for in-combination effect is greater where housing sites are in close proximity to Natura 2000 sites. • New communities require increased infrastructure – potential for land take, pollution increase, disturbance/ severance of habitats and species. • Growth in the requirement for waste management/ transport disposal from new communities and businesses has the potential to increase pollution, and introduce land take issues. • Recreation pressures may result from housing developments near/ adjacent to Natura 2000 sites. • Atmospheric pollution generated as a result of housing, employment and transport growth.
<p>Welsh Coastal Tourism Strategy Draft Final Strategy Document (2007)</p>	<ul style="list-style-type: none"> • Direct loss of habitat through development - Severn Estuary SPA, Ramsar and SAC is present all along the Cardiff coastline. • Increased levels of tourism and employment may lead to increased transport movements. • Atmospheric pollution generated as a result of employment and transport growth. • Increased recreational pressure through water sports. <p>An increased level of waterborne transport and development along the coast has the potential to increase diffuse levels of water pollution.</p>
<p>'Catching the Wave' - A water sports tourism strategy for Wales (2004)</p>	<ul style="list-style-type: none"> • Increased recreational pressure on the Severn Estuary, Ramsar and SAC. • An increased level of watersports has the potential to increase diffuse levels of water pollution. • There is also the potential of increased levels of disturbance on nesting birds.

Regional

Plan	Potential impacts that could cause 'in-combination' effects
<p>Gloucestershire County Council Minerals Core Strategy, Preferred Options (2008)</p>	<ul style="list-style-type: none"> • The MCS identifies the potential outward supply opportunity of crushed rock into Wales and the West Midlands. This could have the potential to have in-combination effects through increased transport and associated impacts/ pollution incidents • The MCS also identifies the provision potential of the Severn Vale Corridor resource area to provide potential new site allocations for sand and gravel working.
<p>Joint Waste Core Strategy for the West of England Consultation, Bristol City Council (1997); South Gloucestershire Minerals and Waste Local Plan (2002); Monmouthshire Unitary Development Plan</p>	<ul style="list-style-type: none"> • Potential impacts include land take; increased transport movements; dust/noise and odour associated with industrial processes; contamination/accumulation of toxic substances; waste water; topography alteration; and aggregates removal.
<p>Wessex Water - Water Resource Management Plan (WRMP) (2008)</p>	<ul style="list-style-type: none"> • Wessex Water has determined that in the south and west resource zones there is enough available water to meet demands over the coming years. In the north and east zones, however, some deficits are likely to occur resulting from expected reductions in permitted groundwater abstraction volumes arising from the low flows project and population growth
<p>The Parret Catchment Abstraction Management Strategy (2006)</p>	<ul style="list-style-type: none"> • Under the Habitats Regulations, the Environment Agency Wales has a duty to assess the effects of existing abstraction licences and any new applications to make sure they do not impact on internationally important nature conservation sites. Water efficiency is also tested by the EA before a new licence is granted. If the assessment of a new application shows that it could have an impact on a SAC/SPA the EA will have to follow strict rules in setting a time limit for that licence. • The EA has a statutory duty, to ensure that the integrity of the riverine SAC ecosystem is maintained or restored through sustainable water resources management. As part of this duty, they have to ensure that permissions (abstraction licences, discharge consents, radioactive

Plan	Potential impacts that could cause 'in-combination' effects
	<p>substance authorisations, waste management licences and integrated pollution control (IPC authorisations) do not have an adverse effect on the integrity of the designated SAC species.</p> <ul style="list-style-type: none"> • The catchment has been split into 10 Water Resource Management Units (WRMU). WRMUs 1, 4, 5 and 7 are assessed as having 'water available'. WRMU's 2 and 10 are assessed as having 'no water available'. WRMU 3 is 'over licensed' and 6, 8 and 9 are 'over abstracted'. • The impact of any water shortage in the assessment areas could be felt in the Severn Estuary SAC/ SPA/ Ramsar
The Wye Catchment Abstraction Management Strategy (2008)	<ul style="list-style-type: none"> • The catchment has been split into 4 Water Resource Management Units (WRMU). The document states that all 4 WRMUs are assessed to have 'no water available'. • The River Wye ultimately flows into the Severn Estuary. Therefore any impact to the Severn Estuary caused by changes to the water resource management of the catchment needs is considered as part of the CAMS process.
Environment Agency Review of Consents	<ul style="list-style-type: none"> • No documentation regarding the Severn Estuary and/or those rivers discharging into the Severn Estuary has been made available from the Environment Agency at the time of this assessment. The Review of Consents process is a review of all permits and consents (such as discharge consents and abstraction licenses) granted prior to the enforcement of the Habitats Regulations to ensure that no adverse effects on the nature conservation interests on designated sites are likely to occur. The RoC process aims to be fully completed by 2010.

Local

Plan	Potential impacts that could cause 'in-combination' effects
Core Strategy within the Bristol Development Framework. (Examination Stage May 2010)	<p>The Core Strategy focuses on supporting the economic role of Avonmouth, given its importance as Bristol's largest industrial location. To do this it promotes the continued redevelopment and renewal of the area's established industrial areas and a number of new waste recycling and energy from waste/biofuel facilities. Generic effects related to redevelopment scenarios include:</p> <ul style="list-style-type: none"> • Increased traffic movements • Contributions to atmospheric pollution loading
Monmouthshire County	Generic effects related to development/ growth scenarios include:

Plan	Potential impacts that could cause 'in-combination' effects
<p>Council Local Development Plan Options Report (2008)</p>	<ul style="list-style-type: none"> • Potential for land take/ habitat fragmentation • Increased demand for water resources/ abstraction/ hydrological impacts • Increased traffic movements, contributions to atmospheric pollution loading • Growth in requirements for waste management facilities, increased demand for minerals • Increased recreational pressure from existing/ new populations
<p>Forest of Dean District Council Core Strategy Second Preferred Options (2008)</p>	<ul style="list-style-type: none"> • The River Wye SAC, Wye Valley Woodlands SAC, Wye Valley and Forest of Dean Bat Sites SAC and the Severn Estuary SPA, Ramsar and SAC are all within the district boundary. • Lydney lies in close proximity to the Severn Estuary SPA, Ramsar and SAC. There is the potential for increased levels of disturbance as a result of new development and increased recreational activity.
<p>Stroud District Council Local Development Framework (2005-2011); South Gloucestershire Council Local Development Framework; Bristol City Council Local Development Plans (1997)</p>	<p>Generic effects related to development/ growth scenarios include:</p> <ul style="list-style-type: none"> • Housing and employment growth resulting in direct land take and increased transport movements and associated air pollutants. • Increased levels of water abstraction for expanding communities could lead to potential impacts upon surface and groundwater. • Recreational pressures from housing/ development which are situated close to European sites may increase levels of disturbance.
<p>The Severn River Basin Management Plan (2009)</p>	<ul style="list-style-type: none"> • Impacts include increased water abstraction, increased development, exploitation of fish stocks, increase in sewage effluent and associated pollutants. <p>This plan describes how the region will meet the challenge of the Water Framework Directive to improve the quality of every aspect of the water environment in the Severn. The plan proposes new actions to manage the water environment in the Severn river basin district.</p> <p>The key targets of the plan are:</p> <ul style="list-style-type: none"> • By 2015, 17% of surface waters (rivers, lakes, estuaries) in this river basin district are going to improve for at least one biological, chemical or physical element. This includes an improvement

Plan	Potential impacts that could cause 'in-combination' effects
	<p>of over 1860km of river, in relation to fish, phosphate, specific pollutants and other elements</p> <ul style="list-style-type: none"> • 34% of surface waters will be at good or better ecological status/potential and 65% of groundwater bodies will be at good status by 2015 • At least 38% of assessed surface waters will be at good or better biological status by 2015 <p>The following challenges are addressed in the plan:</p> <ul style="list-style-type: none"> • diffuse pollution from agriculture and other rural activities • point source pollution from water industry sewage works • physical modification of water bodies • diffuse pollution from urban sources
<p>Severn Catchment Flood Management Plan (draft 2008)</p>	<ul style="list-style-type: none"> • Increases in infrastructure provision (housing/employment) could potentially impact on surface water run-offs, leading to an increase in non-permeable surfaces and a more rapid rise in peak flows, increasing flood risk. • Changes in land management practices (for example agricultural intensification, afforestation) can lead to changes in surface water flows and field run-off. • Climate change and the increase in milder, wetter winters and intensive rainfall events could increase flows in rivers on a more frequent basis and increase demands on the urban drainage networks, whilst sea level rise may result in higher tides experienced. This rise, coupled with stormier winters may result in severe impacts at the coastline downstream from this CFMP, with the possibility of extending up into the Lower River Severn.
<p>Severn Tidal Tributaries Flood Management Plan (draft 2007)</p>	<ul style="list-style-type: none"> • The full document was not available at the time of this assessment.

Other plans and programmes

Plan	Potential impacts that could cause 'in-combination' effects
Cardiff International Airport Master Plan (2006)	<ul style="list-style-type: none"> • A greater number of planes and improved highways access has the potential to increase the levels of recreational pressure at Cardiff Beech Woods SAC and the Severn Estuary SPA/ Ramsar/ SAC. • Severn Estuary SPA/ Ramsar/ SAC - overwintering birds can be disturbed by sudden movements and noises that can result in reduced food intake and/or increased energy expenditure.
Severn Tidal Power Feasibility Study (2009)	<p>The Severn Tidal Power HRA preliminary screening²³ identified a number of likely significant impacts in relation to tidal range power generation upon the Severn Estuary SAC, SPA, Ramsar and upon the River Wye SAC and River Usk SAC:</p> <ul style="list-style-type: none"> • Permanent habitat loss from the placement of power generation infrastructure; • Temporary habitat loss/disturbance during construction activities; • Noise, vibration and light pollution during construction; • Sediment generation during construction; • Pollution incident during construction; • Habitat loss/change as a result of alterations in tidal range upstream of a barrage or lagoon; • Habitat loss/change as a result of alterations in tidal range downstream of a barrage or lagoon; • Habitat loss or change as a result of alterations in land drainage capacity; • Habitat loss/change as a result of alterations to tidal flows (for example, flow speeds and flow patterns); • Habitat loss/change as a result of alterations to sediment transport (including erosion and deposition); • Habitat loss/change as a result of alterations to chemical parameters such as salinity, dissolved oxygen and the dispersion of regulated discharges;

²³ DECC (2008) Severn Tidal Power HRA Preliminary Screening

Plan	Potential impacts that could cause 'in-combination' effects
	<ul style="list-style-type: none"> • Direct mortality of aquatic species (sluices and turbines); • Barrier to movement for aquatic species (barrage and turbines); • Noise, vibration and light pollution during operation (gates, sluices, turbines and permanent lighting installations); • Electromagnetic field from power transmission cables; • Reduction in prey availability, for example, reduced invertebrate populations, reduced fish populations, and displacement effects; • Reductions in tidal range particularly upstream of tidal power developments with alterations to the extent of intertidal habitats and use of these areas by waterfowl; • Changes in sediment transport and sediment supply resulting in the long-term morphological change to intertidal and subtidal areas and associated habitats; and • Risks to genetically unique populations of migratory fish using the Severn Estuary and its tributary rivers due to the presence and operation of tidal power devices.
<p>Bristol Deep Sea Container Terminal (BDSCT)</p>	<p>The EIA²⁴ identifies the main impacts of the BDSCT on the Severn Estuary SPA/ SAC/ Ramasar. The direct impacts that relate to the designated status of the Severn Estuary are:</p> <ul style="list-style-type: none"> • The reclamation of intertidal habitat and the loss of a small area of designated SPA and SAC habitat (approximately 2ha); • Capital dredging within the main channel of the estuary and the turning area for the proposed container terminal and the effects of this on subtidal animal communities; and • The disposal of arisings from the capital dredging within a deep water area of the estuary and the effects of this on subtidal animal communities. <p>The indirect impacts of the proposed works that have the potential to affect the designated status of the site comprise:</p> <ul style="list-style-type: none"> • Modification of the local hydrodynamics and sediment transport around the container terminal, leading to an increase in accretion over SPA and SAC upstream intertidal mudflats totalling

²⁴ Bristol Port Company (2008) Bristol Deep Sea Container Terminal Environmental Statement - Non Technical Summary.

Plan	Potential impacts that could cause 'in-combination' effects
	<p>approximately 80ha;</p> <ul style="list-style-type: none"> • Subtidal and potentially intertidal deposition of fine sediment within the estuary as a result of dredging and disposal of sediment; and • Disturbance to birds in and around the port as a result of activities during the construction process
<p>Severn Estuary Shoreline Management Plan (SMP) and developing SMP2; and Flood Risk Strategy (2000)</p>	<p>The proposed development at Oldbury is part of 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 is to 'hold the line', such that local defences should be maintained to defend the coastal land within the sub unit. The longer term management options are to 'retreat the line' or to 'hold the line', with 'advancing the line' deemed inappropriate with regards to coastal processes or natural environment interests. Impacts may therefore arise from the construction of additional sea defences required by the development of the new nuclear power station at Oldbury. Coastal erosion issues transferred along the coastline as a result could have potential impacts on sensitive shoreline habitats and species.</p>
<p>Severn Estuary Coastal Habitat Management Plan (2006)</p>	<ul style="list-style-type: none"> • Impacts may arise from the loss of floodplain areas which are otherwise identified within the Severn Estuary CHaMP as being included within areas considered suitable for habitat creation.
<p>Decommissioning of Oldbury Nuclear Power Station</p>	<ul style="list-style-type: none"> • The Environmental Impact Assessment by British Nuclear Group in 2007 for the decommissioning of the existing Magnox nuclear power station at Oldbury has not been made available from DECC at the time of this assessment

Appendix 3: Likely Significant Effect (LSE) Screening Table

SIGNIFICANT EFFECTS SCREENING (INCORPORATING IN-COMBINATION ASSESSMENT):

European Sites within a 20km²⁵ radius of the nominated site

	Designation	Distance to nominated site
Severn Estuary	SAC	Adjacent
Severn Estuary	SPA	Adjacent
Severn Estuary	Ramsar	Adjacent
River Wye	SAC	6.5 km
Wye Valley & Forest of Dean Bat Sites	SAC	7.8 km
Wye Valley Woodlands	SAC	6.5 km
Avon Gorge Woodlands	SAC	19.9 km
River Usk	SAC	30 km

The likely significant effects of the development of the nominated site on the above listed European sites located within a 20km radius of the nominated site have been assessed. Some of these European sites have been screened out for the reasons given below. For the remaining European sites, the assessment of the likely significant effects of the construction, operation and decommissioning phases of a new nuclear power station development are presented in tabular form.

²⁵ 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 included in the Screening Assessment. The Screening Assessment was carried out in line with consultation comments provided by Statutory Consultees.

European Sites within a 20km²⁶ radius of the nominated site for which likely significant impacts are not considered not to arise:

- **Wye Valley and Forest of Dean Bat Sites SAC:** The Wye Valley and Forest of Dean Bats SAC straddles the Wales-England border and covers an area of 142.7ha. It is underpinned by 4 SSSI in Wales and 9 in England, all of which lie entirely within the SAC. The nominated site at Oldbury is over 6km away from the SAC and the sites are separated by the Severn Estuary. The site is designated for its bat species, and given its distance from the nominated site, it is considered unlikely for significant effects which arise as a result of changes to water quality to impact upon those habitats used by the bats (for foraging and fly-ways). Given the type of development proposed at Oldbury and the distance from the SAC it is also not likely that there will be likely significant effects on the bats through increased levels of disturbance. There is potential for increased levels of airborne pollutants during the construction, operation and decommissioning phases of the proposed development at Oldbury, which could include planned (argon-41, krypton-85 and tritium) and accidental radioactive emissions. Air quality and changes to local and wider air quality conditions is not an identified vulnerability for this SAC and given the distance of the site there is not likely to be significant effects. Given the distance of the SAC from Oldbury and the favourable condition status of the designated features, it is not likely that the development proposed at Oldbury will have likely significant effects on the Wye Valley and Forest of Dean Bat Sites SAC.
- **Wye Valley Woodlands SAC:** The Wye Valley Woodlands SAC is a large woodland SAC that straddles the Wales–England border. The site covers an area of 914ha and is underpinned by 9 SSSIs in Wales and 7 in England, all of which lie entirely within the SAC. The Wye Valley contains abundant and near-continuous semi-natural woodland along the gorge. The nominated site is over 7km away from the SAC and the sites are separated by the Severn Estuary. No impacts arising from changes to water quality are likely to occur within this SAC given that the water levels and quality are not identified vulnerabilities for this SAC. There is potential for increased levels of airborne pollutants during the construction, operation and decommissioning phases of the nominated site at Oldbury, which could include planned (argon-41, krypton-85 and tritium) and accidental radioactive emissions. The SAC is potentially at risk from the effects of released quarry dust into the atmosphere from works adjacent to the Blackliff-Wyndcliff SSSI, however the Core Management Plan²⁷ identifies that the significance of

²⁶ See footnote 1 above

²⁷ Countryside Council for Wales (CCW), 2008, Core Management Plan including conservation objectives for Wye Valley Woodlands Special Area of Conservation (SAC), April 2008

these releases on designated features is unknown. The Core Management Plan also identifies that site level management issues (traditional woodland management and grazing) are the most important factors in returning the features to a favourable condition status. Given this and the distance of nominated site from the SAC, it is not likely that the development proposed will have likely significant effects on the Wye Valley Woodlands SAC.

- **Avon Gorge Woodlands SAC:** Avon Gorge is representative of *Tilio-Acerion* forests in south-west England on the limestone cliffs and screes of a large river gorge. The nominated site at Oldbury is over 19km away from the SAC and the sites are separated by Bristol. Given the distance of the nominated site and the urban setting of the SAC, along with the majority of the site considered as having a favourable condition status²⁸, it is not likely that the development proposed will have likely significant effects on the Avon Gorge Woodlands SAC.

²⁸ Natural England (Accessed 06/02/09) Sites of Special Scientific Interest – Avon Gorge SSSI. Available online: <http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdr118andcategory=Sandreference=1003073>

Severn Estuary, SAC²⁹

Unitary Authority: Vale of Glamorgan, Cardiff, Newport, City of Bristol, Monmouthshire, Gloucestershire, North Somerset; Somerset, South Gloucestershire

Source: Construction (duration approx 5 years)

Severn Estuary, SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/ excavations and infrastructure provision (sedimentation, pollution incidents through water courses and cycles).
Potential effects on the SAC: Receptor	<p>Changes in organic and nutrient loading can change affect species associated with mud flats, sand flats, sand banks and salt meadows designated within the SAC.</p> <p>Sedimentation arising during construction can alter designated habitats.</p> <p>Contamination by synthetic and non-synthetic compounds is potentially an issue for the estuary mudflats, sandflats and the saltmarshes. Toxins can bind to sediments, affecting supporting species, and thereby impact upon the food chain.</p> <p>Migratory fish species (Annex II - sea lamprey, river lamprey and twaite shad) are sensitive to reductions in water quality.</p>
Risk of Likely Significant Effect	The maintenance of high water quality and the existing sedimentary regime is noted as a key environmental condition requirement at this site. The current ecological status of the estuary at Oldbury is moderate (EA, RBMP

²⁹ Currently no conservation objective available for this SAC.

Severn Estuary, SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
(LSE)?	<p>data, 2008).</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks Water quality, habitat disturbance through recreation and development</p> <p>Of relevance to understanding environmental condition:</p> <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/RBMPs • Coastal Habitat Management Plans Frameworks <p>Bristol Deep Sea Container Terminal Water quality, habitat loss, fragmentation</p>
Risk from ‘In Combination’ Effects?	Yes: Severn Barrage; West Midlands RSS Phase II; Bristol Deep Sea Container Terminal
AA Required?	Yes

Severn Estuary, SAC: Construction (duration approx 5 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/traffic growth, and the emissions arising from construction activity. Likely to be restricted to a local level for example dust/particulates.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading, relevant to conditions supporting low diversity invertebrate communities that provide food sources for wintering birds.
Risk of Likely Significant Effect (LSE)?	Air quality not an identified vulnerability for the SAC, although the potential effects of increased nutrient loading from airborne pollutants should be considered in the context of known scale/known environmental conditions. There is the potential for significant effect, particularly at a local level.
Potential Impacts - other Plans and Programmes	Local Development Frameworks (Gloucester, Bristol) Increases in airborne pollutants arising from housing/ economic development, infrastructure, increase in transport
Risk from 'In Combination' Effects?	Unlikely
AA Required?	Further background environmental condition information required to eliminate aerial emissions as significant

Severn Estuary, SAC: Construction (duration approx 5 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Construction of infrastructure, extension of site into 'buffer' habitats, possible development at the coastal fringes.
Potential effects on the SAC: Receptor	<p>Construction activities can result in a direct loss of terrestrial, marine and sub-tidal habitats given the location of the proposed development site on the coast.</p> <p>The construction of physical barriers such as a marine off-shore landing facility and/or cooling water infrastructure can impact upon breeding and movement of migratory fish species.</p>
Risk of Likely Significant Effect (LSE)?	<p>Intertidal habitats in the Severn Estuary, which are a primary reason for selection of this SAC are particularly vulnerable to physical loss including direct loss of habitat, reduction in its extent, creation of physical barriers, and changes to hydrology and sediment transport regimes arising from construction on the coastal fringe. Any direct loss of habitat is considered to be significant.</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation</p> <p>Bristol Deep Sea Container Terminal Water quality, habitat loss, fragmentation</p>
Risk from 'In Combination' Effects?	Yes: Severn Barrage; Bristol Port Deep Sea Container Terminal
AA Required?	Yes

Severn Estuary, SAC: Construction (duration approx 5 years)	
Coastal Squeeze	
Potential Impacts: Pathway	Construction of infrastructure and facilities relating to the operation of the nuclear power station may result in an encroachment upon land at the coastal fringes. All supporting habitats are sensitive to removal by land reclamation and construction activity.
Potential effects on the SAC: Receptor	Designated species and habitats are particularly vulnerable to the physical loss of supporting habitats and changes to sedimentation regimes, especially within the intertidal area. Should construction encroach into the coastal fringe this may result in a loss of supporting habitats and those environmental conditions necessary to maintain designated habitats and species in a favourable condition.
Risk of Likely Significant Effect (LSE)?	SAC designated species are particularly vulnerable to any physical loss of supporting habitats, especially in the intertidal area which may occur directly through construction at the coastal fringe, or indirectly through changes to sedimentation and erosion regimes. There is the potential for significant effect.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from ‘In Combination’ Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Construction (duration approx 5 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	The construction phase extends over 5-6 years with potential for significant increases in noise/light and visual changes during the construction period.
Potential effects on the SAC: Receptor	Disturbance to mudflats and sandflats at the intertidal zone from construction activity. Low frequency noise and regular, frequent vibration can impact upon the movement and reproductive success of migratory fish species within the Severn Estuary Ramsar site (sea lamprey, river lamprey twaite shad, allis shad, eel, Atlantic salmon, sea trout), given their proximity to the proposed development.
Risk of Likely Significant Effect (LSE)?	NE and CCW note that supporting habitats are highly vulnerable to noise and visual disturbance. Disturbance to fish species can result in displacement, reduced feeding capacity, and impact upon breeding/survival rates. Risk of likely significant effect.
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Possible in-combination effects – restricted to local level sites where applicable
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Operation (duration approx 60 years)

Severn Estuary, SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water quality and drainage from planned and accidental discharges (radioactive and non-radioactive), and from the abstraction and discharge of water for cooling (heated water up to 10° warmer than the receiving environment).
Potential effects on the SAC: Receptor	<p>Changes to water quality and of water temperature can impact species composition/encourage excessive algal growth. Heated water release can result in thermal barriers to species, affecting their behaviour and reproductive success, and may also result in incidental mortality of fish and other aquatic species.</p> <p>Pollutants are mobile and may impact other watercourses/cycles both up and downstream from the release point as a result of tidal movements.</p> <p>Cooling water discharge can result in areas of significantly or permanently warmed water and areas of differing salinity, which although small may result in changes to habitats and species composition.</p> <p>Biocides used to clean cooling infrastructure have potential to impacts receiving environment.</p> <p>Bioaccumulation from the routine release of radioactive substances can also result in endocrine disruption following synergistic impacts between toxic compounds, leading to altered rates of reproduction and dispersal within migratory fish species.</p> <p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/condenser units.</p>
Risk of Likely Significant Effect (LSE)?	Potential for operation effects of changes to water quality and temperature to result in adverse effects on water quality need further investigation to determine whether changes are likely to be significant.

Severn Estuary, SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
	<p>Groundwater quantity and chemical quality around Oldbury are assessed by the EA as being 'good'. Additional abstraction of water may result in a decrease in this status.</p> <p>Associated effects of abstraction may also result in mortality of fish (sea lamprey, river lamprey and twaite shad are Annex II species and a primary reason for selection at this SAC) and aquatic species. Risk of likely significant effect.</p> <p>Accidental radioactive discharges are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.</p>
Potential Impacts - other Plans and Programmes	Local Development Frameworks and Minerals and Waste Development Frameworks (Gloucester, Bristol) Housing/employment development. Increased abstraction/discharge requirements.
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Operation (duration approx 60 years)	
Air Quality	
Potential Impacts: Pathway	<p>Potential local impacts from increased development/ traffic growth (nitrogen oxides, sulphur dioxide).</p> <p>Potential impacts from planned (argon-41, krypton-85 and tritium) and accidental radioactive emissions.</p>
Potential effects on the SAC: Receptor	<p>An increase in airborne pollutants can lead to nutrient loading and changes to water quality from aerial deposition.</p> <p>Changes in air quality can impact upon sensitive designated communities within the SAC.</p>
Risk of Likely Significant Effect (LSE)?	<p>Air quality and changes to local and wider air quality conditions are not identified vulnerabilities for the Severn Estuary SAC, although the potential effects of increased nutrient loading from airborne pollutants should be considered in the context of known scale/ known environmental conditions</p> <p>Accidental radioactive emissions are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/ economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	Further background environmental condition information required to eliminate aerial emissions as significant at this site.

Severn Estuary, SAC: Operation (duration approx 60 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	<p>Changes to footprint of site through operation, for example to accommodate waste storage, develop infrastructure may lead to the loss of supporting or buffer habitats.</p> <p>The construction and maintenance of permanent infrastructure such as roads, compound sites and waste storage facilities may result in fragmentation of habitats and reduce/alter available corridors for the movement of species across habitats and resources.</p>
Potential effects on the SAC: Receptor	<p>Additional construction activities arising from changes to the footprint of the site can increase loss of terrestrial, marine and sub-tidal habitats given the location of the proposed development site on the coast.</p> <p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/condenser units. Species of migratory fish move through the estuary between the sea and the rivers (the mouth of the River Wye lies southwest of the proposed site).</p> <p>The presence of physical barriers such as a marine off-shore landing facility and water cooling infrastructure can impact upon breeding and movement of migratory fish species.</p>
Risk of Likely Significant Effect (LSE)?	<p>Intertidal habitats in the Severn Estuary, which are a primary reason for selection of this SAC are particularly vulnerable to physical loss including direct loss of habitat, reduction in its extent, and changes to hydrology and sediment transport regimes arising from construction on the coastal fringe.</p> <p>Associated effects of abstraction may also result in mortality of fish (sea lamprey, river lamprey and twaite shad are Annex II species and a primary reason for selection at this SAC) and aquatic species. Risk of likely significant effect.</p> <p>Changes to species and habitats composition have potential significant effects on designated fish species and dependant bird species.</p>

Severn Estuary, SAC: Operation (duration approx 60 years)	
Habitat (and Species) Loss and Fragmentation	
	Any direct loss of habitat and species is considered to be significant.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Operation (duration approx 60 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	Operational activity may result in significant local increases in noise and vibration events, light pollution and visual disturbance in and around the immediate vicinity of the site.
Potential effects on the SAC: Receptor	Operation of offshore infrastructure for example marine landing facility and cooling water intake infrastructure can result in disturbance to migratory fish species, affecting their migration and reproductive behaviour.
Risk of Likely Significant Effect (LSE)?	Disturbance to fish can result in displacement, reduced feeding capacity, and impact upon breeding/survival rates. Risk of likely significant effect.
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Possible in-combination effects – restricted to local level sites where applicable
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Decommissioning (duration approx 30 years)

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	<p>Changes in organic and nutrient loading can impact on the structure of designated intertidal habitats and alter communities associated with them.</p> <p>Contamination by synthetic and non-synthetic compounds is potentially an issue for the estuary mudflats, sandflats and the saltmarshes. Toxins can bind to sediments, affecting supporting species and impact upon the foodchain.</p> <p>Migratory fish species (Annex II - sea lamprey, river lamprey and twaite shad) are sensitive to reductions in water quality.</p>
Risk of Likely Significant Effect (LSE)?	<p>The maintenance of high water quality and the existing sedimentary regime is noted as a key environmental condition requirement at this site. The current ecological status of the estuary at Oldbury is moderate (EA, RBMP data, 2008).</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation</p> <p>Local Development Frameworks Water quality (abstraction, pollution)</p> <p>Of relevance to understanding environmental condition:</p> <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
	<ul style="list-style-type: none"> • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/traffic growth associated with decommissioning and the emissions arising from [de]construction activity. Likely to be restricted to a local level for example dust/particulates.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading, relevant to conditions supporting low diversity invertebrate communities that provide food sources for wintering birds.
Risk of Likely Significant Effect (LSE)?	Air quality not an identified vulnerability for the SAC, although the potential effects of increased nutrient loading from airborne pollutants should be considered in the context of know scale/ known environmental conditions.
Potential Impacts - other Plans and Programmes	Local Development Frameworks (Gloucester, Bristol) Increases in airborne pollutants arising from housing/ economic development, infrastructure, growth of transport emissions
Risk from 'In Combination' Effects?	Unlikely
AA Required?	Further background environmental condition information required to eliminate aerial emissions as significant

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through decommissioning activities for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities required during decommissioning can result in a direct loss of terrestrial, marine and sub-tidal habitats given the location of the proposed development site on the coast.
Risk of Likely Significant Effect (LSE)?	Intertidal habitats in the Severn Estuary, which are a primary reason for selection of this SAC are particularly vulnerable to physical loss including direct loss of habitat, reduction in its extent, and changes to hydrology and sediment transport regimes arising from deconstruction on the coastal fringe. Any direct loss of habitat is considered to be significant.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	Decommissioning activity and associated de-construction likely to result in significant local increases in noise events, light pollution and visual disturbance in and around the immediate vicinity of the site.
Potential effects on the SAC: Receptor	Disturbance to mudflats and sandflats at the intertidal zone from deconstruction activity. Deconstruction of offshore infrastructure for example marine landing facility and cooling water intake infrastructure can result in disturbance to migratory fish species.
Risk of Likely Significant Effect (LSE)?	NE and CCW note that supporting habitats are highly vulnerable to noise and visual disturbance. Disturbance to fish can result in displacement, reduced feeding capacity, and impact upon breeding/survival rates. Risk of likely significant effect.
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Possible in-combination effects – restricted to local level sites where applicable
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary SPA/Ramsar

Unitary Authority: Vale of Glamorgan; Cardiff; Newport; City of Bristol; Monmouthshire; Gloucestershire; North Somerset; Somerset; South Gloucestershire

Area: 24,662.98/ 24,662.98ha

Source: Construction (duration approx 5 years)

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/ excavations, infrastructure provision (sedimentation, pollution incidents through water courses and cycles).
Potential effects on the SAC: Receptor	<p>Waterfowl are subject to accumulation of toxins through the food chain, and vulnerable to changes in palatability of prey caused by [toxic] contamination. NE and CCW have identified this is an issue that requires further assessment.</p> <p>Ramsar criterion 4 and 8 note the importance of the estuary for migratory fish species and as a feeding and nursery ground. Fish species are vulnerable to changes in water quality.</p> <p>Bioaccumulation can also result in endocrine disruption following synergistic impacts between toxic compounds, leading to altered rates of reproduction and dispersal within migratory fish species. This may impact upon the bird species which are dependent upon fish as prey.</p> <p>Sedimentation arising during construction can alter designated habitats within the Ramsar site.</p>
Risk of Likely Significant Effect (LSE)?	The maintenance of high water quality and the existing sedimentary regime is noted as a key environmental condition requirement at this site. The current ecological status of the estuary at Oldbury is moderate (EA, RBMP data, 2008).

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Water Resources/Quality	
	There is the potential for significant effect, particularly at a local level.
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality</p> <p>Local Development Frameworks Water quality (abstraction, pollution)</p> <p>Of relevance to understanding environmental condition:</p> <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/traffic growth, and the emissions arising from construction activity. Likely to be restricted to a local level for example dust/particulates.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading, relevant to conditions supporting low diversity invertebrate communities that provide food sources for wintering birds.
Risk of Likely Significant Effect (LSE)?	Air quality not an identified vulnerability for the SPA/Ramsar, although the potential effects of increased nutrient loading from airborne pollutants should be considered in the context of known scale/known environmental conditions.
Potential Impacts - other Plans and Programmes	Local Development Frameworks (Gloucester, Bristol) Increases in airborne pollutants arising from housing/ economic development, infrastructure, growth of transport
Risk from 'In Combination' Effects?	Unlikely
AA Required?	Further background environmental condition information required to eliminate aerial emissions as significant

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Habitats (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Construction of cooling water infrastructure, extension of site into 'buffer' habitats, possible development at the coastal fringes.
Potential effects on the SAC: Receptor	<p>Direct loss of habitat is likely to reduce the availability of feeding and roosting habitat and thus be detrimental to the favourable condition of the SPA interest features, including Annex 1 Bewick's Swan.</p> <p>Particular issues include the loss of sightlines and habitat connectivity between feeding and roosting sites for bird species as noted in conservation objectives for all SPA interest features.</p> <p>Construction of physical barriers such as through the construction of a marine off-shore landing facility can impact upon breeding and movement of migratory fish species designated within the Ramsar site.</p>
Risk of Likely Significant Effect (LSE)?	<p>SPA designated species are particularly vulnerable to the physical loss of supporting habitats, especially in the intertidal area which may occur through a change of land use or indirectly through changes to sedimentation.</p> <p>Significant effects upon designated habitats and species are likely.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study</p> <p>Water quality, habitat loss, fragmentation</p>
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Coastal Squeeze	
Potential Impacts: Pathway	Whereby construction areas, infrastructure and facilities require development of land at the coastal fringe.
Potential effects on the SAC: Receptor	Designated species and habitats are particularly vulnerable to the physical loss of supporting habitats and changes to sedimentation regimes, especially in the intertidal area. Should construction encroach into the coastal fringe this may result in a loss of supporting habitats and those environmental conditions necessary to maintain designated habitats and species in a favourable condition.
Risk of Likely Significant Effect (LSE)?	SPA designated species are particularly vulnerable to the physical loss of supporting habitats, especially in the intertidal area which may occur through a change of land use or indirectly through changes to sedimentation.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from ‘In Combination’ Effects?	Uncertain
AA Required?	Yes

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	The construction phase extends over 5-6 years with potential for significant increases in noise, light and visual changes during the construction period.
Potential effects on the SAC: Receptor	<p>Disturbance to mudflats and sandflats at the intertidal zone from construction activity has the potential to have a direct adverse impact on internationally important breeding and migratory wading and wildfowl bird populations.</p> <p>Overwintering birds are disturbed by sudden movements and noise which can displace them from their feeding grounds. Bewick's Swan in particular is affected by disturbance from the landward side.</p> <p>Low frequency noise and regular, frequent vibration can impact upon the movement and reproductive success of migratory fish species within the Severn Estuary Ramsar site (sea lamprey, river lamprey twaite shad, allis shad, eel, Atlantic salmon, sea trout), given their proximity to the proposed development.</p>
Risk of Likely Significant Effect (LSE)?	<p>Disturbance to bird and fish species can result in displacement, reduced feeding capacity, and impact upon breeding/ survival rates.</p> <p>The upper reaches of the Severn are known to be of particular importance for overwintering birds.</p> <p>NE and CCW note that supporting habitats are highly vulnerable to noise and visual disturbance.</p> <p>Risk of likely significant effect.</p>
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Possible in-combination effects – restricted to local level sites where applicable
Risk from 'In Combination' Effects?	Uncertain

Severn Estuary SPA/Ramsar: Construction (duration approx 5 years)	
Noise/Light/Visual Disturbance	
AA Required?	Yes

Source: Operation (duration approx 60 years)

Severn Estuary SPA/Ramsar: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	<p>Potential impacts on quality from discharges (radioactive and non-radioactive).</p> <p>Intake of water for cooling and discharge of (heated) cooling water to tidal reservoir and main estuary.</p>
Potential effects on the SAC: Receptor	<p>Changes to composition can impact species composition/encourage excessive algal growth – results in wider impacts on dependant bird species. Waterfowl are particularly subject to the accumulation of toxins through the food chain. The estuary is vulnerable to oil spills and discharges of toxins which bind to sediments. CCW and NE have indicated that impacts require further assessment.</p> <p>Ramsar criterion 4 and 8 note the importance of the estuary for migratory fish species and as a feeding and nursery ground. Fish species are vulnerable to changes in water quality and temperature. Cooling water discharge can therefore result in areas of significantly or permanently warmed water, and areas of differing salinity, which although small may result in changes to habitats and species composition.</p> <p>Pollutants are mobile and may impact other watercourses/cycles both up and downstream from the release point as a result of tidal movements.</p> <p>Biocides used to clean cooling infrastructure have potential to impacts receiving environment.</p> <p>Bioaccumulation from the routine release of radioactive substances can also result in endocrine disruption following synergistic impacts between toxic compounds, leading to altered rates of reproduction and dispersal within migratory fish species.</p>
Risk of Likely Significant Effect	<p>Potential for operation effects of changes to water quality and temperature to be result in adverse effects on water quality further investigation required to determine whether changes likely to be significant.</p>

Severn Estuary SPA/Ramsar: Operation (duration approx 60 years)	
Water Resources/Quality	
(LSE)?	<p>Groundwater quantity and chemical quality around Oldbury are assessed by the EA as being 'good'. Additional abstraction of water may result in a decrease in this status. Associated effects of abstraction may also result in mortality of fish and aquatic species. Risk of likely significant effect.</p> <p>Accidental radioactive discharges are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.</p>
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Housing/employment development. Increased abstraction/ discharge requirements
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary SPA/Ramsar: Operation (duration approx 60 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading and changes to water quality from aerial deposition. Changes in air quality can impact upon sensitive designated communities within the SAC.
Risk of Likely Significant Effect (LSE)?	Air quality and changes to local and wider air quality conditions are not identified vulnerabilities of the Severn Estuary SPA/ Ramsar, although the potential effects of increased nutrient loading from airborne pollutants should be considered in the context of known scale/ known environmental conditions. Accidental radioactive emissions are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.
Potential Impacts - other Plans and Programmes	Local Development Frameworks (Gloucester, Bristol) Increases in airborne pollutants arising from housing/ economic development, infrastructure, growth of transport
Risk from 'In Combination' Effects?	Unlikely
AA Required?	Further background environmental condition information required to eliminate aerial emissions as significant at this site.

Severn Estuary SPA/Ramsar: Operation (duration approx 60 years)	
Habitat (and species) Loss and Fragmentation	
Potential Impacts: Pathway	<p>Potential for fragmentation of habitat through loss of buffer habitats (land between designated areas) for proposed site.</p> <p>The construction and maintenance of permanent infrastructure such as roads, compound sites and waste storage facilities may result in fragmentation of habitats and reduce/alter available corridors for the movement of species across habitats and resources.</p>
Potential effects on the SAC: Receptor	<p>Direct loss of habitat is likely to reduce the availability of feeding and roosting habitat and thus be detrimental to the favourable condition of the SPA interest features, including Annex 1 Bewick's Swan.</p> <p>Particular issues include the loss of sightlines and habitat connectivity between feeding and roosting sites for bird species as noted in conservation objectives for all SPA interest features.</p> <p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/ condenser units. Migratory fish species designated within the Ramsar site move through the estuary between the sea and the rivers (the mouth of the River Wye lies southwest of the proposed site).</p> <p>Creation of physical barriers such as through the construction of a marine off-shore landing facility can impact upon breeding and movement of migratory fish species.</p>
Risk of Likely Significant Effect (LSE)?	<p>Loss of habitats can impact on bird and fish species dependent upon these habitats for foraging and breeding.</p> <p>SPA designated features are particularly vulnerable to the physical loss of supporting habitats, especially in the intertidal area which may occur through a change of land use or indirectly through changes to sedimentation.</p> <p>Associated effects of abstraction may also result in mortality of fish and aquatic species. Risk of likely significant effect.</p>

Severn Estuary SPA/Ramsar: Operation (duration approx 60 years)	
Habitat (and species) Loss and Fragmentation	
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary SPA/Ramsar: Operation (duration approx 60 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	Operational activity may result in significant local increases in noise and vibration events, light pollution and visual disturbance in and around the immediate vicinity of the site.
Potential effects on the SAC: Receptor	Operation of offshore infrastructure for example marine landing facility and cooling water intake infrastructure can result in disturbance to migratory fish species designated within the Ramsar site, affecting their migration and reproductive behaviour.
Risk of Likely Significant Effect (LSE)?	Disturbance to fish can result in displacement, reduced feeding capacity, and impact upon breeding/survival rates. Risk of likely significant effect.
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Possible in-combination effects – restricted to local level sites where applicable
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Decommissioning (duration approx 30 years)

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential for effects on quality/drainage from interim storage general and radioactive (accidental leakage/pollution incidents). Potential impacts of toxins/pollution noted above.
Potential effects on the SAC: Receptor	Ramsar criterion 4 and 8 note the importance of the estuary for migratory fish species and as a feeding and nursery ground. Fish species are vulnerable to changes in water quality.
Risk of Likely Significant Effect (LSE)?	<p>The maintenance of high water quality and the existing sedimentary regime is noted as a key environmental condition requirement at this site. The current ecological status of the estuary at Oldbury is moderate (EA, RBMP data, 2008). The chemical quality has not been assessed.</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality</p> <p>Local Development Frameworks Water quality (abstraction, pollution)</p> <p>Of relevance to understanding environmental condition:</p> <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/RBMPs • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Air Quality	
Potential Impacts: Pathway	Potential for local level effects in line with increased traffic/ transportation/development.
Potential effects on the SAC: Receptor	Indirect impacts through changes to water quality from aerial deposition.
Risk of Likely Significant Effect (LSE)?	Air quality and changes to local and wider air quality conditions is not an identified vulnerability for the Severn Estuary SPA/Ramsar, although the potential effects of increased nutrient loading from airborne pollutants should be considered in the context of known scale/known environmental conditions.
Potential Impacts - other Plans and Programmes	Local Development Frameworks (Gloucester, Bristol) Increases in airborne pollutants arising from housing/economic development, infrastructure, growth of transport
Risk from 'In Combination' Effects?	Unlikely
AA Required?	Further background environmental condition information required to eliminate aerial emissions as significant.

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through decommissioning activities for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities required during decommissioning can result in a direct loss of terrestrial, marine and sub-tidal habitats given the location of the proposed development site on the coast.
Risk of Likely Significant Effect (LSE)?	SPA designated species are particularly vulnerable to the physical loss of supporting habitats, especially in the intertidal area which may occur through a change of land use or indirectly through changes to sedimentation.
Potential Impacts - other Plans and Programmes	Severn Barrage Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Severn Estuary, SAC: Decommissioning (duration approx 30 years)	
Noise/Light/Visual Disturbance	
Potential Impacts: Pathway	Decommissioning activity and associated de-construction likely to result in significant local increases in noise events, light pollution and visual disturbance in and around the immediate vicinity of the site.
Potential effects on the SAC: Receptor	<p>Disturbance to mudflats and sandflats at the intertidal zone from deconstruction activity has the potential to have a direct adverse impact on internationally important breeding and migratory wading and wildfowl bird populations.</p> <p>Overwintering birds are disturbed by sudden movements and noise which can displace them from their feeding grounds. Bewick's Swan in particular is affected by disturbance from the landward side.</p> <p>Deconstruction of offshore infrastructure for example marine landing facility and cooling water intake infrastructure can result in disturbance to migratory fish species.</p>
Risk of Likely Significant Effect (LSE)?	<p>Disturbance to birds and fish can result in displacement, reduced feeding capacity, and impact upon breeding/survival rates.</p> <p>The upper reaches of the Severn are known to be of particular importance for overwintering birds.</p> <p>NE and CCW note that supporting habitats are highly vulnerable to noise and visual disturbance.</p> <p>Risk of likely significant effect.</p>
Potential Impacts - other Plans and Programmes	Local Development Frameworks/ Minerals and Waste Development Frameworks (Gloucester, Bristol) Possible in-combination effects – restricted to local level sites where applicable
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

River Wye SAC

Unitary Authority: Fynwy/Monmouthshire, Gloucestershire, Herefordshire, Powys

Area: 2234.89ha

Source: Construction (duration approx 5 years)

River Wye SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/ excavations, infrastructure provision, sedimentation, pollution incidents.
Potential effects on the SAC: Receptor	Changes to water quality and of water temperature can impact species composition/encourage excessive algal growth - results in wider impacts on migratory fish and otters.
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Wye.</p> <p>The current ecological status of the River Wye is assessed as 'moderate' (EA, RBMP data, 2008).</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks Water quality, habitat disturbance (recreation, infrastructure development)</p>

River Wye SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
	Of relevance to understanding environmental condition: <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

River Wye SAC: Construction (duration approx 5 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading and therefore effect the populations of migratory fish and otters, and upon vegetation communities for which the SAC is designated.
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Wye, and of the vegetation communities for which the SAC is designated.</p> <p>However given the distance of the mouth of the River Wye and the SAC from the proposed development, and given that the impacts of emissions arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are likely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Wye SAC: Construction (duration approx 5 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Construction of infrastructure, extension of site into 'buffer' habitats, possible development at the coastal fringes.
Potential effects on the SAC: Receptor	Adverse impacts upon migratory fish species further along the coast at the proposed development site may be transferred to populations at the River Wye. Any significant effects upon fish populations at the River Wye may also negatively impact upon other populations.
Risk of Likely Significant Effect (LSE)?	There is the potential for significant negative effects upon migratory fish species shared between site designations. Significant effects may also impact upon other populations.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

Source: Operation (duration approx 60 years)

River Wye SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water quality and drainage from planned and accidental discharges (radioactive and non-radioactive), and from the abstraction and discharge of water for cooling (heated water up to 10° warmer than the receiving environment).
Potential effects on the SAC: Receptor	<p>Changes to water quality and of water temperature can impact species composition/encourage excessive algal growth - results in wider impacts on migratory fish and otters.</p> <p>Pollutants are mobile and may impact other watercourses/cycles both up and downstream from the release point as a result of tidal movements.</p> <p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/condenser units. Migratory fish species move through the estuary between the sea and the rivers (the mouth of the River Wye lies southwest of the proposed site).</p> <p>Cooling water discharge can result in areas of significantly or permanently warmed water, which although small may result in changes to habitats and species composition.</p> <p>Biocides used to clean cooling infrastructure have potential to impacts receiving environment.</p> <p>Bioaccumulation from the routine release of radioactive substances can also result in endocrine disruption following synergistic impacts between toxic compounds, leading to altered rates of reproduction and dispersal within migratory fish species.</p>
Risk of Likely Significant Effect	A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Wye.

River Wye SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
(LSE)?	<p>The ecological status of the River Wye is assessed as ‘moderate’. The chemical condition of this river has yet to be assessed (EA, RBMP data, 2008).</p> <p>Potential for operation effects of changes to water quality and temperature to result in adverse effects on water quality need further investigation to determine whether changes are likely to be significant.</p> <p>Abstraction of water and associated effects may result in mortality of fish and aquatic species. Risk of likely significant effect.</p> <p>Accidental radioactive discharges are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks Water quality (abstraction, pollution); habitat disturbance (recreation, infrastructure development)</p> <p>Of relevance to understanding environmental condition:</p> <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans Frameworks
Risk from ‘In Combination’ Effects?	Yes
AA Required?	Yes

River Wye SAC: Operation (duration approx 60 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth.
Potential effects on the SAC: Receptor	<p>An increase in airborne pollutants can lead to nutrient loading and therefore effect the populations of migratory fish and otters.</p> <p>Changes in air quality can impact upon sensitive designated communities within the SAC.</p>
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Wye.</p> <p>However given the distance of the mouth of the River Wye and the SAC from the proposed development, and given that the impacts of emissions arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are unlikely.</p> <p>Accidental radioactive emissions are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Wye SAC: Operation (duration approx 60 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	<p>Changes to footprint of site through operation, for example to accommodate waste storage, develop infrastructure may lead to the loss of supporting or buffer habitats.</p> <p>The construction and maintenance of permanent infrastructure such as roads, compound sites and waste storage facilities may result in fragmentation of habitats and reduce/alter available corridors for the movement of species across habitats and resources.</p>
Potential effects on the SAC: Receptor	<p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/ condenser units at European sites adjacent to the proposed development may affect population dispersal of those species to the River Wye SAC, as species of migratory fish move through the estuary between the sea and the River Wye (the mouth of the River Wye lies southwest of the proposed site).</p> <p>Creation of physical barriers such as through the construction of a marine off-shore landing facility can impact upon breeding and movement of migratory fish species at European sites adjacent to the proposed development. This may affect the population dispersal of those species to the River Wye SAC.</p>
Risk of Likely Significant Effect (LSE)?	<p>Abstraction and the presence of barriers may affect migratory fish populations near the proposed development site, affecting their migration to the River Wye.</p> <p>Any loss or reduction of fish populations may impact upon otters.</p> <p>Risk of likely significant effect.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation</p>
Risk from ‘In Combination’ Effects?	Uncertain
AA Required?	Yes

Source: Decommissioning (duration approx 30 years)

River Wye SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	<p>Changes to water quality and of water temperature can impact species composition/ encourage excessive algal growth - results in wider impacts on migratory fish and otters.</p> <p>Contamination by synthetic and non-synthetic compounds can result in toxins binding to sediments, affecting fish species with impact up the foodchain.</p> <p>Migratory fish species are sensitive to reductions in water quality.</p>
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Wye.</p> <p>The ecological status of the River Wye is assessed as 'moderate'. The chemical condition of this river has yet to be assessed (EA, RBMP data, 2008).</p> <p>There is the potential for significant effect, particularly at a local level.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks Water quality (abstraction, pollution), habitat disturbance (recreation, infrastructure development)</p> <p>Of relevance to understanding environmental condition:</p>

River Wye SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
	<ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

River Wye SAC: Decommissioning (duration approx 30 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth associated with decommissioning and the emissions arising from [de]construction activity. Likely to be restricted to a local level for example dust/particulates.
Potential effects on the SAC: Receptor	Indirect impacts through changes to water quality from aerial deposition.
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Wye.</p> <p>However given the distance of the mouth of the River Wye and the SAC from the proposed development, and given that the impacts of emissions arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/ economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Wye SAC: Decommissioning (duration approx 30 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through decommissioning activities for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities required during decommissioning may impact upon migratory fish species at European sites adjacent to the proposed development. This may affect the population dispersal of those species to the River Wye SAC, as species of migratory fish move through the estuary between the sea and the River Wye (the mouth of the River Wye lies southwest of the proposed site).
Risk of Likely Significant Effect (LSE)?	Any loss or reduction of fish populations may impact upon otters.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Uncertain
AA Required?	Yes

River Usk SAC

Unitary Authority: Casnewydd/ Newport; Fynwy/ Monmouthshire; Powys

Area: 1007.71HA

Source: Construction (duration approx 5 years)

River Usk SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from earthworks/ excavations, infrastructure provision (sedimentation, pollution incidents).
Potential effects on the SAC: Receptor	Changes to water quality and water temperature can impact species composition/ encourage excessive algal growth. This can result in wider impacts on migratory fish and otters.
Risk of Likely Significant Effect (LSE)?	<p>The current overall status of the River Usk is assessed as 'moderate' (EA, RBMP data, 2008).</p> <p>Given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that any transfer of impacts on water resources and quality arising from the development are likely to be diffuse, significant effects upon this SAC arising from the development are unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks Water quality, habitat disturbance (recreation, infrastructure development)</p> <p>Of relevance to understanding environmental condition:</p>

River Usk SAC: Construction (duration approx 5 years)	
Water Resources/Quality	
	<ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Usk SAC: Construction (duration approx 5 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth.
Potential effects on the SAC: Receptor	An increase in airborne pollutants can lead to nutrient loading and therefore effect the populations of migratory fish and otters, and upon vegetation communities for which the SAC is designated.
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Usk, and of the vegetation communities for which the SAC is designated.</p> <p>However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that the impacts of emissions arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Usk SAC: Construction (duration approx 5 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Construction of infrastructure, extension of site into 'buffer' habitats, possible development at the coastal fringes.
Potential effects on the SAC: Receptor	Adverse impacts upon migratory fish species further along the coast at the proposed development site may be transferred to populations at the River Usk. Any significant effects upon fish populations at the River Usk may also negatively impact upon otter populations.
Risk of Likely Significant Effect (LSE)?	Given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that any transfer of impacts on habitats and species arising from the development are likely to be diffuse, significant effects upon this SAC arising from the development are unlikely.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

Source: Operation (duration approx 60 years)

River Usk SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential impacts on water quality and drainage from planned and accidental discharges (radioactive and non-radioactive), and from the abstraction and discharge of water for cooling (heated water up to 10° warmer than the receiving environment).
Potential effects on the SAC: Receptor	<p>Changes to water quality and of water temperature can impact species composition/ encourage excessive algal growth - results in wider impacts on migratory fish and otters.</p> <p>Pollutants are mobile and may impact other watercourses/ cycles both up and downstream from the release point as a result of tidal movements.</p> <p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/ condenser units. Migratory fish species move through the estuary between the sea and the rivers (the mouth of the River Usk lies southwest of the proposed site).</p> <p>Cooling water discharge can result in areas of significantly or permanently warmed water, which although small may result in changes to habitats and species composition.</p> <p>Biocides used to clean cooling infrastructure have potential to impacts receiving environment.</p> <p>Bioaccumulation from the routine release of radioactive substances can also result in endocrine disruption following synergistic impacts between toxic compounds, leading to altered rates of reproduction and dispersal within migratory fish species.</p>
Risk of Likely Significant Effect	The current overall status of the River Usk is assessed as 'moderate'. The chemical condition of this river has yet to be assessed (EA, RBMP data, 2008).

River Usk SAC: Operation (duration approx 60 years)	
Water Resources/Quality	
(LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Usk.</p> <p>However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that any transfer of impacts on water resources and quality arising from the development are likely to be diffuse, significant effects upon this SAC arising from the development are unlikely.</p> <p>Accidental radioactive discharges are unlikely given the level of regulatory control.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks Water quality (abstraction, pollution), habitat disturbance (recreation, infrastructure development)</p> <p>Of relevance to understanding environmental condition:</p> <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans
Risk from ‘In Combination’ Effects?	Unlikely
AA Required?	No

River Usk SAC: Operation (duration approx 60 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth.
Potential effects on the SAC: Receptor	<p>An increase in airborne pollutants can lead to nutrient loading and therefore effect the populations of migratory fish and otters.</p> <p>Changes in air quality can impact upon sensitive designated communities within the SAC.</p>
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Usk.</p> <p>However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that the impacts of emissions arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are unlikely.</p> <p>Accidental radioactive emissions are unlikely given the level of regulatory control. Risk of significant effects of this is therefore unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/ economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Usk SAC: Operation (duration approx 60 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	<p>Changes to footprint of site through operation, for example to accommodate waste storage, develop infrastructure may lead to the loss of supporting or buffer habitats.</p> <p>The construction and maintenance of permanent infrastructure such as roads, compound sites and waste storage facilities may result in fragmentation of habitats and reduce/alter available corridors for the movement of species across habitats and resources.</p>
Potential effects on the SAC: Receptor	<p>Impingement and entrainment of fish (larvae and eggs) and other aquatic species at water intakes/ condenser units at European sites adjacent to the proposed development may affect population dispersal of those species to the River Usk SAC, as species of migratory fish move through the estuary between the sea and the River Usk (the mouth of the River Usk lies southwest of the proposed site).</p> <p>Creation of physical barriers such as through the construction of a marine off-shore landing facility can impact upon breeding and movement of migratory fish species.</p>
Risk of Likely Significant Effect (LSE)?	<p>Any loss or reduction of fish populations may impact upon otters.</p> <p>However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that any transfer of impacts on habitats and species arising from the development are likely to be diffuse, significant effects upon this SAC arising from the development are unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation</p>
Risk from ‘In Combination’ Effects?	Unlikely
AA Required?	No

Source: Decommissioning (duration approx 30 years)

River Usk SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
Potential Impacts: Pathway	Potential effects on water quality and drainage from [de]construction activities, earthworks, infrastructure, waste storage.
Potential effects on the SAC: Receptor	<p>Changes to water quality and of water temperature can impact species composition/ encourage excessive algal growth - results in wider impacts on migratory fish and otters.</p> <p>Contamination by synthetic and non-synthetic compounds can result in toxins binding to sediments, affecting fish species with impacts up the foodchain.</p> <p>Migratory fish species are sensitive to reductions in water quality.</p>
Risk of Likely Significant Effect (LSE)?	<p>The current overall status of the River Usk is assessed as ‘moderate’. The chemical condition of this river has yet to be assessed (EA, RBMP data, 2008).</p> <p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Usk.</p> <p>However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that any transfer of impacts on water resources and quality arising from the development are likely to be diffuse, significant effects upon this SAC arising from the development are unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation, barriers to migration</p> <p>Local Development Frameworks</p>

River Usk SAC: Decommissioning (duration approx 30 years)	
Water Resources/Quality	
	Water quality (abstraction, pollution), habitat disturbance (recreation, infrastructure development) Of relevance to understanding environmental condition: <ul style="list-style-type: none"> • Catchment Abstraction Management Strategies/ RBMPs • Coastal Habitat Management Plans Frameworks
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Usk SAC: Decommissioning (duration approx 30 years)	
Air Quality	
Potential Impacts: Pathway	Potential local impacts from increased development/ traffic growth associated with decommissioning and the emissions arising from [de]construction activity. Likely to be restricted to a local level for example dust/particulates.
Potential effects on the SAC: Receptor	Indirect impacts through changes to water quality from aerial deposition.
Risk of Likely Significant Effect (LSE)?	<p>A reduction in water quality in the Severn Estuary has the potential to significantly affect the designated populations of migratory fish and otters within the River Usk.</p> <p>However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that the impacts of emissions arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are unlikely.</p>
Potential Impacts - other Plans and Programmes	<p>Local Development Frameworks (Gloucester, Bristol)</p> <p>Increases in airborne pollutants arising from housing/economic development, infrastructure, growth of transport</p>
Risk from 'In Combination' Effects?	Unlikely
AA Required?	No

River Usk SAC: Decommissioning (duration approx 30 years)	
Habitat (and Species) Loss and Fragmentation	
Potential Impacts: Pathway	Changes to footprint of site through decommissioning activities for example to accommodate waste storage, develop infrastructure.
Potential effects on the SAC: Receptor	Additional construction activities required during decommissioning may impact upon migratory fish species at European sites adjacent to the proposed development. This may affect the population dispersal of those species to the River Usk SAC, as species of migratory fish move through the estuary between the sea and the River Usk.
Risk of Likely Significant Effect (LSE)?	Any loss or reduction of fish populations may impact upon otters. However given the distance of the mouth of the River Usk and the SAC from the proposed development, and given that the impacts on habitats and species arising from the development are likely to be local rather than diffuse, significant effects upon this SAC arising from the development are unlikely.
Potential Impacts - other Plans and Programmes	Severn Barrage – Feasibility Study Water quality, habitat loss, fragmentation
Risk from ‘In Combination’ Effects?	Unlikely
AA Required?	No

Appendix 4: HRA/ Appropriate Assessment Proforma

Severn Estuary SAC

- Location: ST321748
- Size (ha): 73715.4
- Designation: SAC

Severn Estuary SAC	
Qualifying Features	<p>Annex I Habitats primary reason for selection:</p> <ul style="list-style-type: none"> • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) <p>Annex I Habitats qualifying feature:</p> <ul style="list-style-type: none"> • Sandbanks which are slightly covered by sea water all the time • Reefs <p>Annex II Species primary reason for selection:</p> <ul style="list-style-type: none"> • Sea lamprey <i>Petromyzon marinus</i> • River lamprey <i>Lampetra fluviatilis</i> • Twaite shad <i>Alosa fallax</i>
Conservation Objectives	<p>The conservation objective for the “estuaries” feature of the Severn Estuary SAC is to maintain the feature in favourable condition, as defined below:</p> <p><u>Interest feature 1: Estuaries</u></p>

	Severn Estuary SAC
	<ul style="list-style-type: none"> • the total extent of the estuary is maintained; • the characteristic physical form (tidal prism/cross sectional area) and flow (tidal regime) of the estuary is maintained; • the characteristic range and relative proportions of sediment sizes and sediment budget within the site is maintained; • the extent, variety and spatial distribution of estuarine habitat communities (i.e. subtidal sandbanks, intertidal mudflats and sandflats, atlantic salt meadows, and reefs of <i>Sabellaria alveolata</i>) within the site is maintained; • the extent, variety, spatial distribution and community composition of the following notable communities is maintained: <i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock; Hydroids, ephemeral seaweeds and <i>Littorina littorea</i> in shallow eulittoral mixed substrata pools; <i>Balanus crenatus</i> and <i>Tubularia indivisa</i> on extremely tide-swept circalittoral rock; <i>Fucus serratus</i> and piddocks on lower eulittoral soft rock; <i>Mytilus edulis</i> and piddocks on eulittoral firm clay; <i>Balanus crenatus</i>, <i>Halichondrea panicea</i> and <i>Alcyonidium diaphanum</i> on extremely tide-swept sheltered circalittoral rock; <i>Sertularia cupressina</i> and <i>Hydrallmania falcate</i> on tide-swept sublittoral cobbles or pebbles in coarse sand; Peat and clay exposures; <i>Corralina officinalis</i> and coralline crusts in shallow eulittoral rockpools; Eel grass (<i>Zostera</i>) beds; and any other notable hard substrata; • the abundance of the following notable estuarine species assemblages is maintained or increased: Migratory fish species (River and Sea Lamprey, Twaite shad, Allis shad, Sea trout, salmon, eel); Estuarine species (species typically occurring and breeding in estuaries); Marine species, predominantly those occurring infrequently in the Severn; Freshwater species occurring and breeding within the Severn SAC; Assemblage of waterfowl species (Bewicks' swan, dunlin, redshank, shelduck, European whitefronted goose); Nationally important bird populations (wigeon, teal, pintail, pochard, tufted duck, ringed plover, grey plover, curlew, whimbrel and spotted redshank); Assemblage of vascular plant species (salt marsh species; Eel grass (<i>Zostera</i>) species) • the physico-chemical characteristics of the water column (nutrients, oxygen, turbidity, temperature and salinity) support the ecological objectives described above;

	Severn Estuary SAC
	<ul style="list-style-type: none"> • Toxic contaminants in water column (including contributory water flows into the estuary such as surface flows over mudflats and saltmarsh) and sediment are below levels which would pose a risk to the ecological objectives described above. <p><u>Interest feature 2: Subtidal Sandbanks</u></p> <ul style="list-style-type: none"> • the total extent of the subtidal sandbanks within the site is maintained; • the extent and distribution of the individual subtidal sandbank communities (Sublittoral Sands and Muddy Sands; Sublittoral cohesive mud and sandy mud communities) within the site is maintained; • the community composition of the sub tidal sandbank feature within the site is maintained; • the variety and distribution of sediment types across the subtidal sandbank feature is maintained; • the gross morphology (depth, distribution and profile) of the subtidal sandbank feature within the site is maintained. <p><u>Interest feature 3 : Mudflats and sandflats not covered by seawater at low tide (mudflats and sandflats)</u></p> <ul style="list-style-type: none"> • The total extent of the mudflats and sandflats feature is maintained; • the variety and extent of individual mudflats and sandflats communities (Intertidal gravel and clean sand communities; Intertidal muddy sand communities; Intertidal mud communities) within the site is maintained; • the distribution of individual mudflats and sandflats communities (within the site is maintained; • the community composition of the mudflats and sandflats feature within the site is maintained; • the topography of the intertidal flats and the morphology (dynamic processes of sediment movement and channel migration across the flats) are maintained. <p><u>Interest feature 4: Atlantic salt meadow</u></p>

	Severn Estuary SAC
	<ul style="list-style-type: none"> • the total extent of Atlantic salt meadow and associated transitional vegetation communities within the site is maintained; • the extent and distribution of the individual Atlantic salt meadow and associated transitional vegetation communities within the site is maintained; • the zonation of Atlantic salt meadow vegetation communities and their associated transitions to other estuary habitats is maintained; • the relative abundance of the typical species of the Atlantic salt meadow and associated transitional vegetation communities is maintained; • the abundance of the notable species of the Atlantic salt meadow and associated transitional vegetation communities is maintained; • the structural variation of the salt marsh sward (resulting from grazing) is maintained within limits sufficient to satisfy the requirements of conditions above and the requirements of the Ramsar and SPA features; • the characteristic stepped morphology of the salt marshes and associated creeks, pills, drainage ditches and pans, and the estuarine processes that enable their development, is maintained. • Any areas of <i>Spartina anglica</i> salt marsh are capable of developing naturally into other saltmarsh communities. <p><u>Interest feature 5: Reefs</u></p> <ul style="list-style-type: none"> • the total extent and distribution of <i>Sabellaria</i> reef is maintained; • the community composition of the <i>Sabellaria</i> reef is maintained; • the full range of different age structures of <i>Sabellaria</i> reef are present; • the physical (abundance of suitable coarse sediments to support reef growth (tube building) and the availability of suitable substrates where <i>Sabellaria</i> has been known to occur in the past) and ecological processes (supply of <i>Sabellaria</i> larvae (within the water column) and abundance of food (suspended detritus material) within the water column to support feeding) necessary to support <i>Sabellaria</i> reef are maintained.

	Severn Estuary SAC
	<p><u>Interest feature 6 : River lamprey <i>Lampetra fluviatilis</i></u></p> <ul style="list-style-type: none"> • the migratory passage of both adult and juvenile river lamprey through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality; • the size of the river lamprey population in the Severn Estuary and the rivers which drain into it, is at least maintained and is at a level that is sustainable in the long term; • the abundance of prey species forming the river lamprey’s food resource within the estuary, is maintained; • Toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above. <p>Note: The river lamprey population of the Severn depends on habitat in the adjacent River Usk SAC, River Wye SAC and River Severn. The habitats in these rivers, including spawning and nursery areas, are essential for the fulfilment of the species’ lifecycle and therefore the Severn Estuary river lamprey feature can only be in favourable condition if the conservation objectives pertaining to the River Usk SAC and River Wye SAC river lamprey feature are also met in full and there is a continued recorded presence of this species in the River Severn.</p> <p><u>Interest feature 7: The conservation objective for sea lamprey <i>Petromyzon marinus</i></u></p> <ul style="list-style-type: none"> • the migratory passage of both adult and juvenile sea lamprey through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality; • the size of the sea lamprey population in the Severn Estuary and the rivers which drain into it, is at least maintained as is at a level that is sustainable in the long term; • the abundance of prey species forming the sea lamprey’s food resource within the estuary, is

Severn Estuary SAC	
	<p>maintained;</p> <ul style="list-style-type: none"> • Toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above. <p><u>Interest feature 8: The conservation objective for twaite shad <i>Alosa fallax</i></u></p> <ul style="list-style-type: none"> • the migratory passage of both adult and juvenile twaite shad through the Severn Estuary between the Bristol Channel and their spawning rivers is not obstructed or impeded by physical barriers, changes in flows or poor water quality; • the size of the twaite shad population within the Severn Estuary and the rivers draining into it is at least maintained and is at a level that is sustainable in the long term; • the abundance of prey species forming the twaite shad's food resource within the estuary, in particular at the salt wedge, is maintained; • Toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above.
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Hydrodynamic and sedimentary regime - The conservation of the site features is dependent on the tidal regime. The tidal range in the Severn Estuary is the second-highest in the world and the scouring of the seabed and strong tidal streams result in natural erosion of the habitats and the presence of high sediment loads. • Maintain suitable distance between the site and development - to allow for managed retreat of intertidal habitats and avoid coastal squeeze. • Manage public access and activities.
Vulnerabilities (includes existing)	<ul style="list-style-type: none"> • Physical loss of supporting habitats through removal • Contamination by synthetic and/or non-synthetic toxic compounds

Severn Estuary SAC	
<p>pressures and trends) <i>Details at Appendix 1</i></p>	<ul style="list-style-type: none"> • Damage by abrasion or selective extraction • Changes in nutrient and/or organic loading • Inappropriate grazing
<p>Predicted Impacts <i>What are the issues arising from the plan and how might the site be affected?</i></p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Increased/ altered drainage from earthworks and excavation • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) • Alteration of flow from abstraction • Changes to water temperature from controlled discharge • Sedimentation and changes in organic and nutrient loading arising from construction during the construction and decommissioning phases <p>Habitat (and Species) Loss and Fragmentation</p> <ul style="list-style-type: none"> • Direct loss of terrestrial, marine and intertidal habitats for which the SAC is designated for through general construction and deconstruction activities and where encroachment upon the coastal fringe is necessary • Fragmentation from encroachment onto surrounding habitats during construction of the nuclear power station and related infrastructure required during the construction and decommissioning phases • Indirect loss and degradation of habitats and species arising from increased sedimentation and turbidity, and altered levels of dissolved oxygen and water temperatures • Impingement of fish and larvae on water intake filters during abstraction <p>Coastal Squeeze</p> <ul style="list-style-type: none"> • Reduction of coastal margin through encroachment of the development footprint into the coastal fringe

Severn Estuary SAC	
	<ul style="list-style-type: none"> • Development along the coastal fringe can impact upon erosion and sediment transport regimes that are required to maintain designated habitats and species present within the SAC <p>Disturbance</p> <ul style="list-style-type: none"> • Construction activities resulting in vibration disturbance to marine communities adjacent to the proposed development site. Adverse effects of this disturbance on the migration and behaviour of migratory fish species designated within the Severn Estuary SAC are likely given that fish nursery areas are concentrated here, with invertebrate food resources being most abundant within intertidal mudflat and upper estuarine habitats³⁰. <p>Air Quality</p> <ul style="list-style-type: none"> • Local level impacts (reduced air quality arising from increased emissions from road/ transport/ generation sources) arising from construction decommissioning activities. • Accidental radioactive discharges
<p>Potential In-combination effects (screening)</p> <p><i>What other plans and programmes could lead to in-combinations effects?</i></p>	<p>The following plans have the potential to contribute ‘in-combination’ impacts in relation to the key issues identified:</p> <p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Habitat (and Species) Loss and Fragmentation/Coastal Squeeze</p> <ul style="list-style-type: none"> • Severn Estuary Coastal Habitat Management Plan (CHaMP) • Severn Estuary Shoreline Management Plan (SMP)

³⁰ <http://www.english-nature.org.uk/science/natural/profiles%5CnaProfile116.pdf>

Severn Estuary SAC	
	<ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Disturbance</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Air Quality</p> <ul style="list-style-type: none"> • Local Development Frameworks (Somerset, Gloucester, Bristol, and South East Wales)
<p>Appropriate Assessment</p> <p>Likelihood of adverse effect on integrity:</p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Current Environment Agency data³¹ show the ecological status of the estuarine environments near to Oldbury to range between ‘good’ at the mouth of the River Wye and ‘moderate’ towards the mouth of the River Severn, these assessment points located southwest and northeast of the proposed development site respectively. The EA considers the ecological potential of the Severn Estuary as a whole is of ‘moderate’ status. Groundwater quantity and chemical quality around Oldbury are assessed by the EA as being ‘good’. • Radioactive discharges are subject to targets monitored by the EA and of the non-radioactive discharges, nitrate contributions are considered to be the most significant (research cited by the EA in the nuclear sector report). In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges. • “Key Environmental Conditions (factors maintaining site integrity)” (Appendix 1, Site

³¹ Environment Agency River Basin Management Plans: Severn River Basin District, 2008: <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/severn/Intro.aspx>

	Severn Estuary SAC
	<p>Characterisations) for the Severn Estuary SAC indicate that any increase in nutrient loading through discharge of synthetic and non-synthetic toxic compounds should be avoided given their likely impact upon habitats designated within the Severn Estuary SAC, as well as upon designated migratory fish species (sea lamprey, river lamprey, twaite shad) including impacts transferred from invertebrates exposed to the toxicity to fish communities up the foodchain.</p> <ul style="list-style-type: none"> • As such, whilst current water quality indicators confirm “moderate” to “good” ecological and chemical status around Oldbury, it is not possible to conclude, without further information on discharge levels and quality of discharge arising from the development, that planned radioactive and non-radioactive discharges will not adversely impact upon the SAC. • Given that water abstraction requirements, mechanisms use during abstraction and their location at Oldbury are unknown, it is not possible to conclude that water supply to the development will avoid levels of abstraction which result in adverse effects on the SAC arising from direct impacts upon designated fish species during uptake. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Direct loss of estuarine, mud flat, sand flat and salt meadow habitats from the Severn Estuary SAC arising from the development (including ancillary and induced developments) as a result of direct land take, coastal squeeze through the construction of sea defences, and 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 proposed site, and are important feeding grounds for migratory fish (at some or all stages of their life cycles). • 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,

	Severn Estuary SAC
	<p>such as for shad species, where upstream migration to spawning sites is triggered earlier in the season by increased water temperatures³². 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 station³³, suggesting the potential for the discharge of warmer waters at Oldbury to detrimentally alter species composition within the Severn Estuary SAC.</p> <ul style="list-style-type: none"> • The potential construction of a marine off-shore landing 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 Terminal³⁴ 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-shore landing facility and cooling tower infrastructure at Oldbury can also affect the migratory movements, reproductive success and recruitment of migratory fish species which move through the estuary within the Severn Estuary SAC with abstraction impacting directly on species survival. • The Severn Estuary Coastal Habitat Management Plan (CHaMP)³⁵ produced by the Environment Agency³⁶ 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

³² <http://www.english-nature.org.uk/lifeinukrivers/publications/shad.pdf>

³³ 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.

³⁴ <http://www.mfa.gov.uk/environment/works/documents/screening%20scoping/construction-07/Bristol-Container-Terminal.pdf>

³⁵ CHaMPs are specifically focused on the integrity of N2K and Ramsar sites.

³⁶ The Severn Estuary Coastal Habitat Management Plan: Technical Summary (EA, 2006)

	Severn Estuary SAC
	<p>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.</p> <ul style="list-style-type: none"> • 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 being included within the CHaMP as part of the total extent of habitat within Habitat Behavioural Units 4 and 5 suitable for habitat creation 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)³⁷, 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, with adverse effects on site integrity likely. <p>Disturbance</p> <ul style="list-style-type: none"> • 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 development site. Adverse effects of this disturbance on the migration and behaviour of migratory fish species designated within the Severn Estuary SAC are likely given that fish nursery areas are concentrated here, with invertebrate food resources being most abundant within intertidal mudflat and upper estuarine habitats³⁸. Few species are dependant on the deep-water channel for feeding where disturbance impacts are likely to be diffuse.

³⁷ <http://www.severnestuary.net/frms/docs/severn%20scoping%20report%20jan%2009%20v2.pdf>

³⁸ <http://www.english-nature.org.uk/science/natural/profiles%5CnaProfile116.pdf>

Severn Estuary SAC	
	<p>Air Quality</p> <ul style="list-style-type: none"> Information provided by the South West Observatory 2008³⁹ indicates that 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. 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 Agency's most recent available assessment of radioactive aerial emissions indicates that all fall within authorised limits.⁴⁰ 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 vulnerabilities for the SAC. Moreover the potential for cumulative effects arising from other plans and programmes are likely to be minimal if any, given that measures set out in the Local Development Framework are pertinent only to built up areas located away from Oldbury (Gloucester and Bristol). It is therefore considered that air quality impacts upon the SAC are unlikely to be a significant.
<p>Possible Avoidance and Mitigation Measures – includes recommendations for policy/proposals</p>	<p>Water Resource and Quality</p> <ul style="list-style-type: none"> 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 (EA) (abstraction licensing and discharge consents, to be reviewed under the Review of Consents process to be completed by 2010). 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)⁴¹ 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.

³⁹ <http://www.swo.org.uk/information-publications/state-of-the-south-west/>

⁴⁰ Measuring Environmental Performance: Sector Report for the Nuclear Industry (Environment Agency, Nov 2005).

⁴¹ 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.

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	<ul style="list-style-type: none"> • The use of cooling towers instead of direct intake methods used in cooling water intake should be considered if environmental impacts arising from the use of cooling towers (whereby additional land take is necessary and visual impacts are likely) can be more effectively avoided or mitigated than for those impacts arising from the use of direct intake methods (where there are much greater abstraction requirements, a need for large culverts which extend a long way out into the water source, and result in higher thermal discharges). Should this not be the case, cooling water culverts should be designed to avoid effects on the existing thermal regime 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. • The IPC, as guided by the NPS, can also direct requirements for the efficiency of water use and the protection of water quality. This may include requiring that management measures relating to supply and discharge (including potential effects on European sites), are in place prior site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments. • The majority of remaining 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. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Direct loss and fragmentation of habitat (and species) arising from land take from the development of the new nuclear power station together with induced and ancillary infrastructure can be effectively 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 site and around induced/ ancillary developments to be maintained and enhanced

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	<p>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 site to minimise further direct and indirect impacts upon habitats and species (such as disturbance, pollution, run-off and drainage etc.), and for such plans to link to existing integrated land and coastal management plans. The interest features and conservation objectives of the designated sites should guide the identification of potential mitigation and compensation measures.</p> <ul style="list-style-type: none"> • Avoidance and/or mitigation against any additional losses and fragmentation of habitats and species resulting from the movement of coastal habitat due to changes to the geomorphological processes at the coastal frontage of the site and beyond (as a result of maintenance of/ improvements to existing coastal defences and the construction of additional defences and a marine off-shore landing 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. • 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

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	<p>requirements 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.</p> <p>Disturbance</p> <ul style="list-style-type: none"> • The implementation of avoidance and mitigation measures aimed to reduce noise, vibration, light and visual disturbance arising from the development of the site and associated induced and ancillary infrastructure during construction, operation and decommissioning is required to ensure no adverse impacts upon the integrity of European sites will occur. Mitigation measures required include: the requirement for technologies and operating practices which take account identified sensitivities in fish (particularly in relation to vibration impacts) and bird populations (particularly in regard to the regularity of disturbance) in the estuarine environment to be implemented where practicable; the requirement to restrict encroachment of construction areas into sensitive habitats (particularly coastal) through site design; the requirement to implement appropriate screening of disturbance impacts arising during construction (and deconstruction) works; the requirement for the phasing and timing of development works which take into account breeding and feeding cycles and habitats, and the flight lines and migration routes of sensitive species including birds, fish and otter; and the requirement for construction environmental management plans to be implemented at the site level which require the management of disturbance impacts through appropriate avoidance or mitigation to ensure no adverse impacts upon site integrity will arise. There is also a role for the IPC to ensure that developments at Oldbury incorporate technologies and operating practices which take into account identified sensitivities of species in the estuarine environment around the proposed development at Oldbury.

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	<ul style="list-style-type: none"> 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. No operations or elements of the plan should be allowed to proceed unless suitable avoidance, cancellation and reduction measures can be identified and effectively implemented so as to avoid any adverse effects on site integrity. <p>Air Quality</p> <ul style="list-style-type: none"> Whilst air quality impacts are not assessed as being a significant vulnerability at the Severn Estuary SAC, SPA and Ramsar sites around 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 off-set 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. 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

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	<p>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)⁴² with non-radioactive emissions expected to be an improvement upon existing standards; and the requirement that any emissions which lead to adverse effects on the integrity of European sites will not be permitted by the relevant regulatory authority.</p>
Conclude no adverse effect on integrity?	<ul style="list-style-type: none"> • It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Oldbury will not have significant adverse effects on the Severn Estuary SAC as a result of impacts to water quality and water resources, habitats and species, or as a result of coastal squeeze or disturbance. • It is, however, considered that air quality impacts are unlikely to be significant given current environmental conditions, known site vulnerabilities and available mitigation measures to address site level impacts.

⁴² 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.

Severn Estuary SPA

- Location: 511329N/030257W
- Size (ha): 2466.2
- Designation: SPA

	Severn Estuary SPA
Qualifying Features	<p>Article 4.1 Qualification</p> <p>Over winter the area regularly supports:</p> <ul style="list-style-type: none"> • Bewick's Swan <i>Cygnus columbianus bewickii</i> 3.9% of the GB population <p>Article 4.2 Qualification</p> <p>Over winter the area regularly supports:</p> <ul style="list-style-type: none"> • Gadwall <i>Anas strepera</i> 0.9% of the population • White-fronted Goose <i>Anser albifrons albifrons</i> 0.4% of the population • Dunlin <i>Calidris alpina alpina</i> 3.3% of the population • Shelduck <i>Tadorna tadorna</i> 1.1% of the population • Redshank <i>Tringa totanus</i> 1.3% of the population • Curlew <i>Numenius arquata</i> 1% of the population • Pintail <i>Anas acuta</i> 1.1% of the population • Ringed Plover <i>Charadrius hiaticula</i> 1.3% of the population <p>Article 4.2 Qualification: Internationally Important Assemblage of Birds</p> <p>Over winter the area regularly supports:</p> <ul style="list-style-type: none"> • waterfowl

Severn Estuary SPA	
Conservation Objectives	<ul style="list-style-type: none"> • To maintain all interest features in favourable condition as defined by conservation management plans; • To ensure the extent of intertidal mudflats, sandflats, saltmarshes, shingle and rocky shore and strandline habitats and the invertebrate populations they support are maintained; • To maintain the extent of vegetation which provide important sight lines, feeding, breeding and roosting sites
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Intertidal mudflats and sandflats are maintained within regard to their habitat extent, openness (unimpeded sightlines) and provision of feeding and roosting sites; • Saltmarsh, Shingle and rocky shore communities are maintained with regards to their habitat extent, openness, and vegetation composition; • Wet coastal grazing marsh, improved grassland and open standing waters remain within the SPA as key reeding and roosting sites; • Hydrodynamic and sedimentary regime are maintained; • Public access is managed at suitable levels; • Levels of prey should be maintained.
Vulnerabilities (includes existing pressures and trends) <i>Details at Appendix 1</i>	<ul style="list-style-type: none"> • Physical loss through removal • Noise or visual disturbance • Contamination by synthetic and/or non-synthetic toxic compounds • Damage by abrasion or selective extraction • Changes in nutrient and/or organic loading • Biological disturbance through the selective extraction of species
Predicted Impacts	Water Resources and Quality

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<p><i>What are the issues arising from the plan and how might the site be affected?</i></p>	<ul style="list-style-type: none"> • Increased/ altered drainage from earthworks and excavation • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) • Alteration of flow from abstraction • Changes to water temperature from controlled discharge • Sedimentation and changes in organic and nutrient loading arising from construction during the construction and decommissioning phases <p>Habitat (and Species) Loss and Fragmentation</p> <ul style="list-style-type: none"> • Direct loss of terrestrial, marine and intertidal habitats supporting designated species within the SPA through general construction and deconstruction activities and where encroachment upon the coastal fringe is necessary • Fragmentation from encroachment onto surrounding habitats during construction of the nuclear power station and related infrastructure required during the construction and decommissioning phases • Indirect loss and degradation of habitats and species arising from increased sedimentation and turbidity, and altered levels of dissolved oxygen and water temperatures • Impingement of fish and larvae on water intake filters during abstraction <p>Coastal Squeeze</p> <ul style="list-style-type: none"> • Reduction of coastal margin through encroachment of the development footprint into the coastal fringe • Development along the coastal fringe can impact upon erosion and sediment transport regimes that are required to maintain designated habitats and species present within the SPA <p>Air Quality</p> <ul style="list-style-type: none"> • Local level impacts (reduced air quality arising from increased emissions from road/ transport/

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	<p>generation sources) arising from construction decommissioning activities</p> <ul style="list-style-type: none"> • Accidental radioactive discharges <p>Disturbance (noise, light and visual)</p> <ul style="list-style-type: none"> • Local level impacts arising from construction and decommissioning activities can impact upon overwintering and breeding birds for which the site is designated.
<p>Potential In-combination effects (screening)</p> <p><i>What other plans and programmes could lead to in-combinations effects?</i></p>	<p>The following plans have the potential to contribute ‘in-combination’ impacts in relation to the key issues identified. In-combination impacts may be positive where the plans’ function is to actively manage those identified issues (for example Catchment Abstraction Management Strategies).</p> <p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Severn Estuary CHaMP • Severn Estuary Shoreline Management Plan (SMP) • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Disturbance</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury

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	<p>Air Quality</p> <ul style="list-style-type: none"> Local Development Frameworks (Somerset, Gloucester, Bristol, and South East Wales)
<p>Appropriate Assessment</p> <p>Likelihood of adverse effect on integrity:</p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> Current Environment Agency data⁴³ 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 located southwest and northeast of the proposed development site respectively. The EA considers the ecological potential of the Severn Estuary as a whole is of ‘moderate’ status. Groundwater quantity and chemical quality around Oldbury are assessed by the EA as being ‘good’. Radioactive discharges are subject to targets monitored by the EA and of the non-radioactive discharges, nitrate contributions are considered to be the most significant (research cited by the EA in the nuclear sector report). In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges. “Key Environmental Conditions (factors maintaining site integrity)” (Appendix 1, Site Characterisations) for the Severn Estuary SPA indicate that any increase in nutrient loading through discharge of synthetic and non-synthetic toxic compounds should be avoided, given their likely impact upon breeding, overwintering and migratory bird species designated within the SPA through contamination up the food chain. The increased discharge of nutrients and/or toxic compounds will also likely impact upon invertebrate populations supported by the intertidal habitats and the estuary itself, thereby impacting upon the foraging resource of bird species for which the SPA is designated. As such, whilst current water quality indicators illustrate “moderate” to “good” ecological and chemical status around Oldbury, it is not possible (without further information on discharge levels and quality of discharge arising from the development) to conclude that planned radioactive and non-

⁴³ Environment Agency River Basin Management Plans: Severn River Basin District, 2008: <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/severn/Intro.aspx>

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	<p>radioactive discharges will not adversely impact upon the SPA.</p> <ul style="list-style-type: none"> Given that water abstraction requirements, mechanisms used during abstraction and their locations at Oldbury are currently unknown, it is not possible to conclude that water supply to the development will avoid levels of abstraction which lead to adverse effects on the SPA as a result of direct impacts upon fish and bird species within the SPA. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> Direct loss of estuarine, mud flat, sand flat and salt meadow habitats upon which designated bird species within the Severn Estuary depend 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 proposed 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). 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 affecting the availability of resources upon which bird species designated within the Severn Estuary SPA depend. The potential construction of a marine off-shore landing 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 Terminal⁴⁴ whereby extensive dredging

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

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	<p>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-shore landing facility and cooling tower infrastructure at Oldbury can also affect the migratory movements, reproductive success and recruitment of migratory fish species which move through the estuary, impacting upon the food and habitat resources of bird species designated within the Severn Estuary SPA.</p> <ul style="list-style-type: none"> • The Severn Estuary Coastal Habitat Management Plan (CHaMP)⁴⁵ produced by the Environment Agency⁴⁶ 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. • 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 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.

⁴⁵ CHaMPs are specifically focused on the integrity of N2K and Ramsar sites.

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

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	<ul style="list-style-type: none"> • 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 being included within the CHaMP as part of the total extent of habitat within Habitat Behavioural Units 4 and 5 suitable for habitat creation 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)⁴⁷, 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 SPA, with adverse effects on site integrity likely. <p>Disturbance (noise, light and visual)</p> <ul style="list-style-type: none"> • 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 Partnership⁴⁸ 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. • Site information for the SSSI units underpinning the SPA indicates that currently over 95% of the habitats supporting the designated species within the SPA are in favourable condition, thereby supporting species and ensuring species survival.

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

⁴⁸ The Habitats and Species of the Severn Estuary: A basic introduction for developers and decision makers. Severn Estuary Partnership

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	<p>Air Quality</p> <ul style="list-style-type: none"> • Information provided by the South West Observatory 2008 indicates that 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. • Information provided by the UK Air Pollution Information System (APIS)⁴⁹ indicate that a range of habitats within the Severn Estuary SPA, including saltmarsh, littoral and open water which are known to support wintering populations of Shelduck, Gadwall, Dunlin, and Common Redshank are highly sensitive to nitrogen loads. • 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 Agency's most recent available assessment of radioactive aerial emissions indicates that all fall within authorised limits. • 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 vulnerabilities for the SPA. Moreover the potential for cumulative effects arising from other plans and programmes are likely to be minimal if any, given that measures set out in the Local Development Framework are pertinent only to built up areas located away from Oldbury (Gloucester and Bristol). It is therefore considered that air quality impacts upon the SPA are unlikely to be a significant.
Possible Avoidance and Mitigation Measures – includes recommendations for	<p>Water Resource and Quality</p> <ul style="list-style-type: none"> • 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 (EA) (abstraction licensing and

⁴⁹ <http://www.apis.ac.uk/>

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<i>policy/proposals</i>	<p>discharge consents, to be reviewed under the Review of Consents process to be completed by 2010). 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)⁵⁰ 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.</p> <ul style="list-style-type: none"> • The use of cooling towers instead of direct intake methods used in cooling water intake should be considered if environmental impacts arising from the use of cooling towers (whereby additional land take is necessary and visual impacts are likely) can be more effectively avoided or mitigated than for those impacts arising from the use of direct intake methods (where there are much greater abstraction requirements, a need for large culverts which extend a long way out into the water source, and result in higher thermal discharges). Should this not be the case, cooling water culverts should be designed to avoid effects on the existing thermal regime 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. • The IPC, as guided by the NPS, can also direct requirements for the efficiency of water use and the protection of water quality. This may include requiring that management measures relating to supply and discharge (including potential effects on European sites), are in place prior site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments. • The majority of remaining 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.

⁵⁰ 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.

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	<p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Direct loss and fragmentation of habitat (and species) arising from land take from the development of the new nuclear power station together with induced and ancillary infrastructure can be effectively 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 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 site to minimise further direct and indirect impacts upon habitats and species (such as disturbance, pollution, run-off and drainage etc.), and for such plans to link to existing integrated land and coastal management plans. The interest features and conservation objectives of the designated sites should guide the identification of potential mitigation and compensation measures. • Avoidance and/or mitigation against any additional losses and fragmentation of habitats and species resulting from the movement of coastal habitat due to changes to the geomorphological processes at the coastal frontage of the site and beyond (as a result of maintenance of/ improvements to existing coastal defences and the construction of additional defences and a marine off-shore landing 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

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	<p>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.</p> <ul style="list-style-type: none"> • 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 requirements 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. <p>Disturbance</p> <ul style="list-style-type: none"> • The implementation of avoidance and mitigation measures aimed to reduce noise, vibration, light and visual disturbance arising from the development of the site and associated induced and ancillary infrastructure during construction, operation and decommissioning is required to ensure no adverse impacts upon the integrity of European sites will occur. Mitigation measures required include: the requirement for technologies and operating practices which take account identified sensitivities in fish (particularly in relation to vibration impacts) and bird populations (particularly in regard to the regularity of disturbance) in the estuarine environment to be implemented where practicable; the requirement to restrict encroachment of construction areas into sensitive habitats (particularly coastal) through site design; the requirement to implement appropriate screening of disturbance impacts arising during construction (and deconstruction) works; the requirement for the phasing and

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	<p>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 the requirement for construction environmental management plans to be implemented at the site level which require the management of disturbance impacts through appropriate avoidance or mitigation to ensure no adverse impacts upon site integrity will arise. There is also a role for the IPC to ensure that developments at Oldbury incorporate technologies and operating practices which take into account identified sensitivities of species in the estuarine environment around the proposed development at Oldbury.</p> <ul style="list-style-type: none"> • 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. No operations or elements of the plan should be allowed to proceed unless suitable avoidance, cancellation and reduction measures can be identified and effectively implemented so as to avoid any adverse effects on site integrity. <p>Air Quality</p> <ul style="list-style-type: none"> • Whilst air quality impacts are not assessed as being a significant vulnerability at the Severn Estuary SAC, SPA and Ramsar sites around 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 off-sett 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

Severn Estuary SPA	
	<p>and the new build overlap such that no adverse impacts upon site integrity will occur.</p> <ul style="list-style-type: none"> 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)⁵¹ with non-radioactive emissions expected to be an improvement upon existing standards; and the requirement that any emissions which lead to adverse effects on the integrity of European sites will not be permitted by the relevant regulatory authority.
Conclude no adverse effect on integrity?	<ul style="list-style-type: none"> It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Oldbury will not have significant adverse effects on the Severn Estuary SPA as a result of impacts to water quality and water resources, habitats and species, or as a result of coastal squeeze or disturbance. It is, however, considered that air quality impacts are unlikely to be significant given current environmental conditions, known site vulnerabilities and available mitigation measures to address site level impacts.

⁵¹ 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.

Severn Estuary Ramsar

- **Location:** 511329N/030257W
- **Size (ha):** 2466.298
- **Designation:** Ramsar

	Severn Estuary Ramsar
Qualifying Features	<p>Ramsar criterion 1</p> <ul style="list-style-type: none"> • Immense tidal range (second-largest in world) creating diversity of physical environment and biological communities. <p>Ramsar criterion 3</p> <ul style="list-style-type: none"> • Due to unusual estuarine communities, reduced diversity and high productivity. <p>Ramsar criterion 4</p> <ul style="list-style-type: none"> • This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon <i>Salmo salar</i>, sea trout <i>S. trutta</i>, sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i>, allis shad <i>Alosa alosa</i>, twaite shad <i>A. fallax</i>, and eel <i>Anguilla anguilla</i>. It is also of particular importance for migratory birds during spring and autumn. <p>Ramsar criterion 5</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> • 70919 waterfowl <p>Ramsar criterion 6</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> • Bewick's swan • Greater white-fronted goose • Common shelduck

Severn Estuary Ramsar	
	<ul style="list-style-type: none"> • Gadwall • Dunlin • Common redshank <p>Ramsar criterion 8</p> <ul style="list-style-type: none"> • The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon <i>Salmo salar</i>, sea trout <i>S. trutta</i>, sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i>, allis shad <i>Alosa alosa</i>, twaite shad <i>A. fallax</i>, and eel <i>Anguilla Anguilla</i> use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad <i>Alosa alosa</i> and twaite shad <i>A. fallax</i> which feed on mysid shrimps in the salt wedge.
Conservation Objectives	<ul style="list-style-type: none"> • Refer to Severn Estuary SAC and SPA
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Intertidal mudflats and sandflats are maintained within regard to their habitat extent, openness (unimpeded sightlines) and provision of feeding and roosting sites; • Saltmarsh, Shingle and rocky shore communities are maintained with regards to their habitat extent, openness, and vegetation composition; • Wet coastal grazing marsh, improved grassland and open standing waters remain within the SPA as key breeding and roosting sites; • Hydrodynamic and sedimentary regime are maintained; • Public access is managed at suitable levels; • Levels of prey should be maintained.
Vulnerabilities	<ul style="list-style-type: none"> • Physical loss through removal

Severn Estuary Ramsar	
<p>(includes existing pressures and trends)</p> <p><i>Details at Appendix 1</i></p>	<ul style="list-style-type: none"> • Noise or visual disturbance • Contamination by synthetic and/or non-synthetic toxic compounds • Damage by abrasion or selective extraction • Changes in nutrient and/or organic loading • Biological disturbance through the selective extraction of species
<p>Predicted Impacts</p> <p><i>What are the issues arising from the plan and how might the site be affected?</i></p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Increased/ altered drainage from earthworks and excavation • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) • Alteration of flow from abstraction • Changes to water temperature from controlled discharge • Sedimentation and changes in organic and nutrient loading arising from construction during the construction and decommissioning phases <p>Habitat (and Species) Loss and Fragmentation</p> <ul style="list-style-type: none"> • Direct loss of terrestrial, marine and intertidal habitats for which the Ramsar is designated for through general construction and deconstruction activities and where encroachment upon the coastal fringe is necessary • Fragmentation from encroachment onto surrounding habitats during construction of the nuclear power station and related infrastructure required during the construction and decommissioning phases • Indirect loss and degradation of habitats and species arising from increased sedimentation and turbidity, and altered levels of dissolved oxygen and water temperatures • Impingement of fish and larvae on water intake filters during abstraction <p>Coastal Squeeze</p>

Severn Estuary Ramsar	
	<ul style="list-style-type: none"> • Reduction of coastal margin through encroachment of the development footprint into the coastal fringe • Development along the coastal fringe can impact upon erosion and sediment transport regimes that are required to maintain designated habitats and species present within the Ramsar site <p>Disturbance (noise, light and visual)</p> <ul style="list-style-type: none"> • Local level impacts arising from construction and decommissioning activities can impact upon overwintering and breeding birds for which the site is designated. • Construction activities resulting in vibration disturbance to marine communities adjacent to the proposed development site. Adverse effects of this disturbance on the migration and behaviour of migratory fish species designated within the Severn Estuary 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 habitats⁵². <p>Air Quality</p> <ul style="list-style-type: none"> • Local level impacts (reduced air quality arising from increased emissions from road/ transport/ generation sources) arising from construction decommissioning activities • Accidental radioactive discharges
<p>Potential In-combination effects (screening)</p> <p><i>What other plans and programmes could</i></p>	<p>The following plans have the potential to contribute ‘in-combination’ impacts in relation to the key issues identified. In-combination impacts may be positive where the plans’ function is to actively manage those identified issues (for example Catchment Abstraction Management Strategies).</p> <p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal

⁵² <http://www.english-nature.org.uk/science/natural/profiles%5CnaProfile116.pdf>

Severn Estuary Ramsar	
<p>lead to in-combinations effects?</p>	<ul style="list-style-type: none"> • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Severn Estuary CHaMP • Severn Estuary Shoreline Management Plan (SMP) • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Disturbance</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Air Quality</p> <ul style="list-style-type: none"> • Local Development Frameworks (Somerset, Gloucester, Bristol, and South East Wales)
<p>Appropriate Assessment</p> <p>Likelihood of adverse effect on integrity:</p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Current Environment Agency data 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 located southwest and northeast of the proposed development site respectively. The EA considers the ecological potential of the Severn Estuary as a whole is of ‘moderate’ status. • Groundwater quantity and chemical quality around Oldbury are assessed by the EA as being ‘good’. • Radioactive discharges are subject to targets monitored by the EA and of the non-radioactive discharges, nitrate contributions are considered to be the most significant (research cited by the EA in the nuclear sector report). In particular it is noted that there can be measurable localised impacts

	Severn Estuary Ramsar
	<p>on sea nutrient levels in the vicinity of discharges.</p> <ul style="list-style-type: none"> • “Key Environmental Conditions (factors maintaining site integrity)” (Appendix 1, Site Characterisations) for the Severn Estuary Ramsar site indicate that any increase in nutrient loading through discharge of synthetic and non-synthetic toxic compounds should be avoided, given their likely impact upon waterfowl, migratory fish populations (atlantic salmon, sea and river lamprey, allis and twaite shad, and eel) designated within the Ramsar site, and thus upon the overall food chain. As such, whilst current water quality indicators illustrate “moderate” to “good” ecological and chemical status around Oldbury, it is not possible (without further information on discharge levels and quality of discharge arising from the development) to conclude that planned radioactive and non-radioactive discharges will not adversely impact upon the Ramsar site. • Given that water abstraction requirements, mechanisms used during abstraction and locations for Oldbury are currently unknown, it is not possible to conclude that water supply to the development will avoid levels of abstraction and direct impacts upon fish species during uptake that lead to adverse effects on the Ramsar Site. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Direct loss of estuarine, mud flat, sand flat and salt meadow habitats from the Severn Estuary Ramsar site 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 proposed 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). • 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

	Severn Estuary Ramsar
	<p>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 Ramsar site, such as for shad species, where upstream migration to spawning sites is triggered earlier in the season by increased water temperatures⁵³. 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 station⁵⁴, suggesting the potential for the discharge of warmer waters at Oldbury to detrimentally alter species composition within the Severn Estuary Ramsar site.</p> <ul style="list-style-type: none"> • The potential construction of a marine off-shore landing 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 Terminal⁵⁵ 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-shore landing facility and cooling tower infrastructure at Oldbury can also affect the migratory movements, reproductive success and recruitment of migratory fish species which move through the estuary within the Severn Estuary Ramsar site, with abstraction impacting directly on species survival. • The Severn Estuary Coastal Habitat Management Plan (CHaMP) produced by the Environment Agency indicates that the upstream areas of the Severn Estuary are most likely to demonstrate change by 2025. In particular, sea level rise is resulting in coastal squeeze and a net loss of intertidal

⁵³ <http://www.english-nature.org.uk/lifeinukrivers/publications/shad.pdf>

⁵⁴ 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.

⁵⁵ <http://www.mfa.gov.uk/environment/works/documents/screening%20scoping/construction-07/Bristol-Container-Terminal.pdf>

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	<p>habitat. Analysis indicates that the saltmarsh and intertidal mudflat and sandflat habitats around Oldbury (Habitat Behaviour Unit 4 and 5) will 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.</p> <ul style="list-style-type: none"> • 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. • 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 being included within the CHaMP as part of the total extent of habitat within Habitat Behavioural Units 4 and 5 suitable for habitat creation 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)⁵⁶, 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 Ramsar site⁵⁷, with adverse effects on site integrity likely. <p>Disturbance (noise, light and visual)</p> <ul style="list-style-type: none"> • Information provided by the Severn Estuary Partnership⁵⁸ 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

⁵⁶ <http://www.severnestuary.net/frms/docs/severn%20scoping%20report%20jan%2009%20v2.pdf>

⁵⁷ http://www.severnestuary.net/secg/docs/executive_summary.pdf

⁵⁸ The Habitats and Species of the Severn Estuary: A basic introduction for developers and decision makers. Severn Estuary Partnership

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	<p>pling, 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.</p> <ul style="list-style-type: none"> • Site information for the SSSI units underpinning the Ramsar site indicates that currently over 95% of the habitats supporting the designated species within the Ramsar site are in favourable condition, thereby supporting species and ensuring species survival. • 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 development site. Adverse effects of this disturbance on the migration and behaviour of migratory fish species designated within the Severn Estuary 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 habitats⁵⁹. Few species are dependent on the deep-water channel for feeding where disturbance impacts are likely to be diffuse. <p>Air Quality</p> <ul style="list-style-type: none"> • Information provided by the South West Observatory 2008 indicates that 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. • Saltmarsh, littoral and openwater habitats which support wintering bird species including Shelduck, Gadwall, Dunlin, and Common Redshank are known to be sensitive to nitrogen loads⁶⁰. • 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 Agency's most recent available assessment of radioactive aerial emissions indicates that all fall within authorised limits.

⁵⁹ <http://www.english-nature.org.uk/science/natural/profiles%5CnaProfile116.pdf>

⁶⁰ <http://www.apis.ac.uk/>

Severn Estuary Ramsar	
	<ul style="list-style-type: none"> • 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 vulnerabilities for the Ramsar site. Moreover the potential for cumulative effects arising from other plans and programmes are likely to be minimal if any, given that measures set out in the Local Development Framework are pertinent only to built up areas located away from Oldbury (Gloucester and Bristol). It is therefore considered that air quality impacts upon the Ramsar site are unlikely to be a significant.
<p>Possible Avoidance and Mitigation Measures – includes recommendations for policy/proposals</p>	<p>Water Resource and Quality</p> <ul style="list-style-type: none"> • 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 (EA) (abstraction licensing and discharge consents, to be reviewed under the Review of Consents process to be completed by 2010). 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)⁶¹ 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. • The use of cooling towers instead of direct intake methods used in cooling water intake should be considered if environmental impacts arising from the use of cooling towers (whereby additional land take is necessary and visual impacts are likely) can be more effectively avoided or mitigated than for those impacts arising from the use of direct intake methods (where there are much greater abstraction requirements, a need for large culverts which extend a long way out into the water source, and result in higher thermal discharges). Should this not be the case, cooling water culverts should be designed to avoid effects on the existing thermal regime in the Severn Estuary at Oldbury. Furthermore the volume of cooling water returned to the estuary should be required to be within the

⁶¹ 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.

Severn Estuary Ramsar	
	<p>capacity of the immediate receiving environment such that sediment flow is not adversely affected.</p> <ul style="list-style-type: none"> • The IPC, as guided by the NPS, can also direct requirements for the efficiency of water use and the protection of water quality. This may include requiring that management measures relating to supply and discharge (including potential effects on European sites), are in place prior site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments. • The majority of remaining 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. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Direct loss and fragmentation of habitat (and species) arising from land take from the development of the new nuclear power station together with induced and ancillary infrastructure can be effectively 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 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 site to minimise further direct and indirect impacts upon habitats and species (such as disturbance, pollution, run-off and drainage etc.), and for such plans to link to existing integrated land and coastal management plans. The interest features and conservation objectives of

	Severn Estuary Ramsar
	<p>the designated sites should guide the identification of potential mitigation and compensation measures.</p> <ul style="list-style-type: none"> • Avoidance and/or mitigation against any additional losses and fragmentation of habitats and species resulting from the movement of coastal habitat due to changes to the geomorphological processes at the coastal frontage of the site and beyond (as a result of maintenance of/ improvements to existing coastal defences and the construction of additional defences and a marine off-shore landing 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. • 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 requirements 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.

	Severn Estuary Ramsar
	<p>Disturbance</p> <ul style="list-style-type: none"> • The implementation of avoidance and mitigation measures aimed to reduce noise, vibration, light and visual disturbance arising from the development of the site and associated induced and ancillary infrastructure during construction, operation and decommissioning is required to ensure no adverse impacts upon the integrity of European sites will occur. Mitigation measures required include: the requirement for technologies and operating practices which take account identified sensitivities in fish (particularly in relation to vibration impacts) and bird populations (particularly in regard to the regularity of disturbance) in the estuarine environment to be implemented where practicable; the requirement to restrict encroachment of construction areas into sensitive habitats (particularly coastal) through site design; the requirement to implement appropriate screening of disturbance impacts arising during construction (and deconstruction) works; the requirement for the phasing and timing of development works which take into account breeding and feeding cycles and habitats, and the flight lines and migration routes of sensitive species including birds, fish and otter; and the requirement for construction environmental management plans to be implemented at the site level which require the management of disturbance impacts through appropriate avoidance or mitigation to ensure no adverse impacts upon site integrity will arise. There is also a role for the IPC to ensure that developments at Oldbury incorporate technologies and operating practices which take into account identified sensitivities of species in the estuarine environment around the proposed development at Oldbury. • 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. No operations or elements of the plan should be allowed to proceed unless suitable avoidance, cancellation and reduction measures can be identified and effectively implemented so as to avoid any adverse effects on site integrity.

Severn Estuary Ramsar	
	<p>Air Quality</p> <ul style="list-style-type: none"> • Whilst air quality impacts are not assessed as being a significant vulnerability at the Severn Estuary SAC, SPA and Ramsar sites around 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 off-sett 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. • 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)⁶² with non-radioactive emissions expected to be an improvement upon existing standards; and the requirement that any emissions which lead to adverse effects on the integrity of European sites will not be permitted by the relevant regulatory authority.

⁶² 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.

Severn Estuary Ramsar	
Conclude no adverse effect on integrity?	<ul style="list-style-type: none">• It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Oldbury will not have significant adverse effects on the Severn Estuary Ramsar site as a result of impacts to water quality and water resources, habitats and species, or as a result of coastal squeeze or disturbance.• It is, however, considered that air quality impacts are unlikely to be significant given current environmental conditions, known site vulnerabilities and available mitigation measures to address site level impacts.

River Wye SAC

- Location: 005736E/514857N
- Size (ha): 2701.43ha
- Designation: SPA

River Wye SAC	
Qualifying Features	<p>Annex I habitats primary reason for selection:</p> <ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation <p>Annex I habitats qualifying feature:</p> <ul style="list-style-type: none"> • Transition mires and quaking bogs <p>Annex II species primary reason for selection:</p> <ul style="list-style-type: none"> • White-clawed (or Atlantic stream) crayfish <i>Austropotamobius pallipes</i> • Sea lamprey <i>Petromyzon marinus</i> • Brook lamprey <i>Lampetra planeri</i> • River lamprey <i>Lampetra fluviatilis</i> • Twaite shad <i>Alosa fallax</i> • Atlantic salmon <i>Salmo salar</i> • Bullhead <i>Cottus gobio</i> • Otter <i>Lutra lutra</i> <p>Annex II Species qualifying feature:</p> <ul style="list-style-type: none"> • Allis shad <i>Alosa alosa</i>
Conservation	<ul style="list-style-type: none"> • To maintain and/or restore capacity of the habitats in the SAC to support each feature at near-natural

River Wye SAC	
Objectives	<p>population levels by maintaining unmodified ecological and hydromorphological processes and characteristics;</p> <ul style="list-style-type: none"> • The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature; • To maintain and/or restore where necessary flow regime, water quality and physical habitat to, a near-natural state, to support the coherence of ecosystem structure and function across the SAC; • To maintain all known breeding, spawning and nursery sites of species features except where natural processes cause them to change; • To maintain flow, water quality, substrate quality and quantity at fish spawning sites and nursery areas and prevent their depletion; • To maintain the river platform and profile through minimizing or preventing any physical modification to the river; • To maintain the river habitat in a favourable condition; • To remove or modify man-made barriers to allow the passage of species and their occupation of their natural range; • To maintain natural factors which may otherwise limit the natural range or dispersal of populations; • To maintain the natural range of the feature in the SAC; • To maintain and increase the population of otters in the SAC over the long term; • To maintain or increase the natural range of the plant communities represented within the SAC; • To maintain or increase the natural range of the white-clawed crayfish represented within the SAC. <p>Performance indicators can be found within the River Wye SAC Management Plan.</p>
Key Environmental Conditions (factors that maintain site integrity)	<ul style="list-style-type: none"> • Hydrological processes particularly river flow (level and variability) and water chemistry, determine a range of habitat factors of importance to the SAC features. • Geomorphological processes of erosion by water and subsequent deposition of eroded sediments downstream create the physical structure of the river habitats. These processes help to sustain the river ecosystem by allowing a continued supply of clean gravels and other important substrates to be

River Wye SAC	
	<p>transported downstream. In addition, the freshly deposited and eroded surfaces enable ecological succession required by specialist, early-successional species.</p> <ul style="list-style-type: none"> • Diverse riparian habitats - The type and condition of riparian vegetation influences shade and water temperature, nutrient run-off from adjacent land, the availability of woody debris to the channel and inputs of leaf litter and invertebrates to support in-stream consumers. • Habitat connectivity is an important property of river ecosystem structure and function. Many of the fish that spawn in the river are migratory and depend on the maintenance of suitable conditions on their migration routes to allow the adults to reach available spawning habitat and juvenile fish to migrate downstream. • External factors operating outside the SAC are influential particularly for migratory fish and otters.
<p>Vulnerabilities (includes existing pressures and trends)</p> <p><i>Details at Appendix 1</i></p>	<ul style="list-style-type: none"> • Abstraction levels • Eutrophication • Diffuse pollution • Barriers to migration • Development pressure • Invasive and non-native species • Artificially enhanced densities of other fish • External factors
<p>Predicted Impacts</p> <p><i>What are the issues arising from the plan and how might the site be affected?</i></p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Increased/ altered drainage from earthworks and excavation • Potential for toxic contamination from accidental leakage • Radioactive discharges (accidental and routine) • Alteration of flow from abstraction • Changes to water temperature from controlled discharge • Sedimentation and changes in organic and nutrient loading arising from construction during the

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	<p>construction and decommissioning phases</p> <p>Habitat (and species) Loss and Fragmentation</p> <ul style="list-style-type: none"> • Indirect loss and degradation of habitats and species arising from increased sedimentation and turbidity, and altered levels of dissolved oxygen and water temperatures • Impingement of fish and larvae on water intake filters during abstraction <p>Disturbance</p> <ul style="list-style-type: none"> • Construction activities resulting in vibration disturbance to marine communities adjacent to the proposed development site. Adverse effects of this disturbance on the migration and behaviour of migratory fish species may be transferred to species designated within the River Wye, with further impacts upon otters.
<p>Potential In-combination effects (screening)</p> <p><i>What other plans and programmes could lead to in-combinations effects?</i></p>	<p>The following plans have the potential to contribute ‘in-combination’ impacts in relation to the key issues identified:</p> <p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury <p>Disturbance</p>

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	<ul style="list-style-type: none"> • Bristol Deep Sea Container Terminal • Severn Tidal Power Feasibility Study • Decommissioning of the existing power station at Oldbury
<p>Appropriate Assessment</p> <p>Likelihood of adverse effect on integrity:</p>	<p>Water Resources and Quality</p> <ul style="list-style-type: none"> • Current Environment Agency data⁶³ 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 located southwest and northeast of the proposed development site respectively. The EA considers the ecological potential of the Severn Estuary as a whole is of ‘moderate’ status. • The ecological status of the River Wye as a whole is currently assessed as ‘moderate’. By 2015 the EA predicts that the ecological status and chemical quality of the water will increase to ‘good’ status by 2027 and 2015 respectively. • Groundwater quantity and chemical quality around Oldbury are assessed by the EA as being ‘good’. • Radioactive discharges are subject to targets monitored by the EA and of the non-radioactive discharges, nitrate contributions are considered to be the most significant (research cited by the EA in the nuclear sector report). In particular it is noted that there can be measurable localised impacts on sea nutrient levels in the vicinity of discharges. • “Key Environmental Conditions (factors maintaining site integrity)” (Appendix 1, Site Characterisations) for the Wye Valley SAC indicate that any increase in nutrient loading through discharge of synthetic and non-synthetic toxic compounds and in increased sediment loading through runoff during construction (and deconstruction) should be avoided given their likely impact upon the migratory fish (sea, brook and river lamprey, twaite shad, Atlantic salmon and Bullhead) and otter populations designated within the SAC. • As such, whilst current water quality indicators at the River Wye illustrate “moderate” to “good”

⁶³ Environment Agency River Basin Management Plans: Severn River Basin District, 2008: <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/severn/Intro.aspx>

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	<p>ecological status, it is not possible to conclude, without further information on discharge levels and quality of discharge arising from the development, that planned radioactive and non-radioactive discharges will not adversely impact upon the SAC.</p> <ul style="list-style-type: none"> Given that water abstraction requirements, mechanisms used during abstraction and their locations at Oldbury are currently unknown, it is not possible to conclude that water supply to the development will avoid resulting in indirect adverse impacts upon those species designated within the SAC, particularly upon those whose natural cycles require movement between the estuary and the River Wye. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> Indirect loss and degradation of habitats and species will 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 River Wye SAC, such as for shad species, where upstream migration to spawning sites is triggered earlier in the season by increased water temperatures⁶⁴. 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 station⁶⁵, suggesting the potential for the discharge of warmer waters at Oldbury to detrimentally alter species composition within the Severn Estuary European sites and River Wye SAC. The potential construction of a marine off-shore landing 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

⁶⁴ <http://www.english-nature.org.uk/lifeinukrivers/publications/shad.pdf>

⁶⁵ Hederson, P.A., & Seaby, R.M.H. (2001). Fish and crustacean captures at Hinkey Point B Nuclear Power Station; report for the year April 2000 to March 2001). Pisces Conservation Ltd.

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	<p>and sediment budgets upon which designated habitats rely. These impacts may be further exacerbated by the proposed Bristol Deep Sea Container Terminal⁶⁶ 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-shore landing 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 River Wyes SAC, with abstraction impacting directly on species survival.</p> <ul style="list-style-type: none"> • 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 being included within the CHaMP as part of the total extent of habitat within Habitat Behavioural Units 4 and 5 suitable for habitat creation 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)⁶⁷, 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 River Wye SAC⁶⁸, with adverse effects on site integrity likely. <p>Disturbance</p> <ul style="list-style-type: none"> • 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 development site. Adverse effects of this disturbance on the migration and

⁶⁶ <http://www.mfa.gov.uk/environment/works/documents/screening%20scoping/construction-07/Bristol-Container-Terminal.pdf>

⁶⁷ <http://www.severnestuary.net/frms/docs/severn%20scoping%20report%20jan%2009%20v2.pdf>

⁶⁸ http://www.severnestuary.net/secg/docs/executive_summary.pdf

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	<p>behaviour of migratory fish species may occur given that fish nursery areas are concentrated here, with invertebrate food resources being most abundant within intertidal mudflat and upper estuarine habitats⁶⁹. Few species are dependant on the deep-water channel for feeding where disturbance impacts are likely to be diffuse. Migratory fish species designated within the River Wye SAC may 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 the River Wye SAC.</p>
<p>Possible Avoidance and Mitigation Measures – includes recommendations for policy/proposals</p>	<p>Water Resource and Quality</p> <ul style="list-style-type: none"> • 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 (EA) (abstraction licensing and discharge consents, to be reviewed under the Review of Consents process to be completed by 2010). 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)⁷⁰ 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. • The use of cooling towers instead of direct intake methods used in cooling water intake should be considered if environmental impacts arising from the use of cooling towers (whereby additional land take is necessary and visual impacts are likely) can be more effectively avoided or mitigated than for those impacts arising from the use of direct intake methods (where there are much greater abstraction requirements, a need for large culverts which extend a long way out into the water source, and result in higher thermal discharges). Should this not be the case, cooling water culverts

⁶⁹ <http://www.english-nature.org.uk/science/natural/profiles%5CnaProfile116.pdf>

⁷⁰ 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.

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	<p>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.</p> <ul style="list-style-type: none"> • The IPC, as guided by the NPS, can also direct requirements for the efficiency of water use and the protection of water quality. This may include requiring that management measures relating to supply and discharge (including potential effects on European sites), are in place prior site development, with decisions made taking into account Best Available Technology (BAT) which ensure protection of the sensitivities of the receiving environments. • The majority of remaining 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. <p>Habitat (and Species) Loss and Fragmentation/ Coastal Squeeze</p> <ul style="list-style-type: none"> • Direct loss and fragmentation of habitat (and species) arising from land take from the development of the new nuclear power station together with induced and ancillary infrastructure can be effectively 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 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 site to minimise further direct and indirect impacts upon habitats and species

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	<p>(such as disturbance, pollution, run-off and drainage etc.), and for such plans to link to existing integrated land and coastal management plans. The interest features and conservation objectives of the designated sites should guide the identification of potential mitigation and compensation measures.</p> <ul style="list-style-type: none"> • Avoidance and/or mitigation against any additional losses and fragmentation of habitats and species resulting from the movement of coastal habitat due to changes to the geomorphological processes at the coastal frontage of the site and beyond (as a result of maintenance of/ improvements to existing coastal defences and the construction of additional defences and a marine off-shore landing 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. • 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 requirements 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

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	<p>requirement for the incorporation of fish protection measures within the cooling water intake/system design.</p> <p>Disturbance</p> <ul style="list-style-type: none"> • The implementation of avoidance and mitigation measures aimed to reduce noise, vibration, light and visual disturbance arising from the development of the site and associated induced and ancillary infrastructure during construction, operation and decommissioning is required to ensure no adverse impacts upon the integrity of European sites will occur. Mitigation measures required include: the requirement for technologies and operating practices which take account identified sensitivities in fish (particularly in relation to vibration impacts) and bird populations (particularly in regard to the regularity of disturbance) in the estuarine environment to be implemented where practicable; the requirement to restrict encroachment of construction areas into sensitive habitats (particularly coastal) through site design; the requirement to implement appropriate screening of disturbance impacts arising during construction (and deconstruction) works; the requirement for the phasing and timing of development works which take into account breeding and feeding cycles and habitats, and the flight lines and migration routes of sensitive species including birds, fish and otter; and the requirement for construction environmental management plans to be implemented at the site level which require the management of disturbance impacts through appropriate avoidance or mitigation to ensure no adverse impacts upon site integrity will arise. There is also a role for the IPC to ensure that developments at Oldbury incorporate technologies and operating practices which take into account identified sensitivities of species in the estuarine environment around the proposed development at Oldbury. • 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. No operations or elements of the plan should be allowed to proceed unless suitable avoidance,

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	cancellation and reduction measures can be identified and effectively implemented so as to avoid any adverse effects on site integrity.
Conclude no adverse effect on integrity?	<ul style="list-style-type: none"> • It is not possible at this stage of the development of the Nuclear NPS to say that proposals at Oldbury will not have significant adverse effects on the Severn Estuary Ramsar site as a result of impacts to water quality and water resources, habitats and species, or as a result of disturbance.

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Office for Nuclear Development
Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.decc.gov.uk